UPTAKE OF HEPATITIS B VACCINATION AND ITS DETERMINANTS AMONG HIGH RISK HEALTH CARE WORKERS IN SELECTED HOSPITALS IN KENYA

Leah Jepkios Bett (HND)

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DECLARATION

This thesis is my original work and has not been presented for a degree or other awards in any other University.

Signature: …….. Date: ……..

Bett, Leah Jepkios (I57/6028/2003)

We confirm that the work reported in this thesis was carried out under our supervision as university supervisors.

Signature: …….. Date: ……..

Dr. John P. Oyore

Department of Community Health

Kenyatta University

Signature: …….. Date: …….

Dr. George O. Orinda

Department of Biochemistry and Biotechnology

Kenyatta University

DEDICATION

To my loving husband Robert who believed in me, encouraged and supported me. You gave me the strength to grow and attempt to reach the stars. To my sons Zack and Dan, for sharing me so often with my work and studies. To my parents Mary and late Matthew for instilling in me understanding that great things come through perseverance; and to my siblings for your prayers and support.

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ABBREVIATION AND ACRONYMS

CDCP	Centers for Disease Control and Prevention
CHB	Chronic Hepatitis B
DF	Degree of Freedom
DNA	Deoxyribonucleic Acid
DTP-HB	Diptheria, Tetanus & Pertusis and Hepatitis B
DVI	Division of Vaccines and Immunization
EPI	Expanded Programme on Immunization
EPI-TF	Expanded Programme on Immunization Task Force
FDA	Food and Drug Administration
HB	Hepatitis B
HBIG	Hepatitis B Immune Globulin
HBsAg	Hepatitis B Surface Antigen
HBV	Hepatitis B Virus
HCC	Hepatocellular Carcinoma
HCV	Hepatitis C Virus
HCW	Health Care Workers
HIV	Human Immunodeficiency Virus
KEMRI	Kenya Medical Research Institute
KEPI	Kenya Expanded Programme on Immunization
MOH	Ministry of Health
MOPHS	Ministry of Public Health and Sanitation
NGO	Non- Governmental Organization
SIGN	Safe Injection Global Network
SSA	Sub-Saharan Africa
TFI	Task Force on Immunization
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
WHO	World Health Organization

DEFINITION OF TERMS

Health Care Workers – refers to medical trained health personnel and this study has limited this to nurses, doctors, surgeons, clinical officers and laboratory technicians/technologists.

Hepatitis B – life-threatening infectious liver infection caused by the hepatitis B virus.

Hepatitis B Prevention Methods – a variety of preventive measures which include; immunization with hepatitis B vaccine (childhood and at-risk populations), routine screening of blood donors for HBsAg, universal precautions when handling human blood and body fluids (use of gloves, protective garments and masks, when handling potentially infectious or contaminated materials), good personal hygiene, strict surveillance, and appropriate environmental control measures to limit transmission.

Hepatitis B Vaccination – the process of inoculating persons with hepatitis B vaccine in three doses at 0, 1 and 6 months

Occupational Exposure – this study has limited this definition to constant contact of health care workers to patients, blood and other body fluids during their practice.

Perception – refers to the deeper understanding and awareness of Hepatitis B Vaccination.

Uptake – voluntary acceptance of hepatitis B vaccination

Vaccination – the process of inoculating persons with any antigenic material for the purpose of producing active artificial immunity.

ABSTRACT

Hepatitis B Virus (HBV) infection poses a grave public health problem worldwide. Over two billion people are infected and an estimated 387 million of these suffering from chronic HBV infection, with a rate of ten million new carriers each year. Another one million die annually. About 90% of these cases live in developing countries with half of Kenya's population being estimated to be infected by HBV by the age of 30-40. Health care workers are among the most vulnerable groups to acquire HBV; with an estimated risk of four times higher than that of the general population. It is also a well-established fact that an unvaccinated individual stands the risk of 6% to 30% to acquire the infection on exposure to HBV contaminated blood or body fluids. Vaccination of high-risk groups is a key strategy for prevention. Despite the safe, effective and highly acceptable HBV vaccine that has been around since 1982, its use among health care workers in the developing world is low. Immunization among health care workers has two purposes; to protect them from several infectious diseases they may be exposed to through professional activities and to minimize the odds of infecting the patients they are taking care of. The study aimed at establishing the uptake of Hepatitis B vaccination and its determinants among high-risk health care workers in selected hospitals in Kenya. This was a descriptive cross-sectional study. Multistage sampling, including cluster and random sampling were used. Key informants from the Ministries of Public Health and Sanitation and Kenya Medical Research Institute were also interviewed. A pre-designed key informant interview guide and semi-structured questionnaires were used to collect the necessary data from 384 willing respondents. Chi-Square and Fishers Exact Test were performed to establish relations between variables. A high proportion of the respondents (78.6%) had good knowledge of Hepatitis B. Slightly more than half (50.3%) of the institutions did not have advocacy mechanisms in place, 36.5% had inadequate and only 13.3% had adequate advocacy mechanisms. Majority of the respondents (90.6%) had a positive attitude towards hepatitis B infection and vaccination. However, the uptake of hepatitis B vaccination among the high-risk health care workers was average, as only 59.6% had been vaccinated. Of these, only 32.0% had completed the recommended three dose vaccination. There was no statistically significant association between knowledge and uptake of vaccination ($\chi^2 = 0.629$; df = 1; P = 0.233 at 0.05 confidence level). There was also no statistically significant association between advocacy mechanisms and uptake of vaccination ($\chi^2 = 0.425$, df = 2 P = 1.710 at 0.05 level of significance). But there was a statistically significant association between attitude of health care workers and uptake of hepatitis B vaccination (Fishers Exact Test = 0.007, df = 3 and P value of 11.612 at 0.05 confidence level). There was a statistically significant association between the knowledge of HCW on HB and attitude of HCW towards hepatitis B vaccination ($\chi^2 = 0.023$, P = 5.151, 1= df at 0.05 level of significance and). In conclusion, the study found that attitude affects uptake while knowledge affects attitude. Therefore, the study recommends that institutions should put in place measures of increasing the knowledge of hepatitis B which will in turn improve the attitude of the health care workers towards hepatitis B. This will in ultimately increase the uptake of hepatitis B vaccination among the health care workers.

CHAPTER ONE: INTRODUCTION

1.1. Background Information

Hepatitis is a general term meaning “inflammation of the liver” and the most common cause is the infection with 1 of the 5 viruses called Hepatitis A, B, C, D and E virus. Of the 5 viral causes, Hepatitis B Virus (HBV) is the major cause of acute and chronic hepatitis worldwide (Yazigi, 2011). The HBV belongs to a family of DNA viruses called *Hepadnaviridae* and consists simply of a core particle (central portion) and a surrounding envelope (outer coat). The core is made up of the HBc antigen, whereas the envelope is made up of the HBs antigen. These viruses primarily infect liver cells. The severe pathological consequences of persistent HBV infections include the development of chronic hepatic insufficiency, cirrhosis and hepatocellular carcinoma (HCC). HBV infection occurs very often in early childhood where it is asymptomatic and often leads to the chronic carrier (Yazigi, 2011; WHO, 2009). Persons with chronic infection also serve as the main reservoir for continued HBV transmission (CDCP, 2006). Humans are actually the only reservoir of HBV (WHO, 2009).

HBV infection poses a grave public health problem worldwide, with over 2 billion people infected. An estimated 387 million are suffering from chronic HBV infection, with a rate of around 10 million new carriers each year (Samuel et al., 2009, and Baars et al., 2009). About 90% of these cases live in developing countries and 50 million of which are in Africa. It is the tenth leading cause of death worldwide accounting for an estimated one million deaths per year worldwide (Schmidt et al., 2013). HBV may be

the cause of up to 80% of all cases of hepatocellular carcinoma worldwide, second only to tobacco among known human carcinogens (Lavanchy, 2004).

In Kenya, HBV prevalence rate ranges between 4-6% and it is estimated that half of the Kenyan population will be infected with HBV by the age of 30 to 40 and 10% would have become carriers (MoPHS, 2008). Studies among Kenyans with HCC have shown that 32.7% to 83.3% of cases of HCC are attributable to HBV infection. Though the people of Kenya are healthy, one in every three people in every community in the country is infected with HBV (MoPHS, 2008).

According to the World Health Organization, vaccination of high-risk groups is a key strategy for the prevention of both horizontal and vertical transmission of HBV (WHO, 2002). Though preliminary studies show the need to include HBV vaccination in Kenya's Expanded Program of Immunization (KEPI), high cost of the vaccine and a myriad of competing health care needs have so far slowed the uptake of this strategy countrywide (MoPHS, 2008). As a result, current strategies for the prevention of HBV infection include screening of blood units, proper sterilization or disposal of infecting equipment and strategic vaccination of high-risk groups such as health care workers (WHO, 2009).

1.2. Statement of the Problem

Health care workers are constantly exposed to the dangers of acquiring hepatitis B due to contact with blood and body secretions of patients (Franco et al., 2012). It is also a

well-established fact that an unvaccinated individual stands the risk of 6% to 30% to acquire the infection on exposure to HBV contaminated blood or body fluids (Sydnor and Perl, 2011). Fortunately, HBV infection is largely preventable by vaccination (Saieed, 2007). The vaccine prevents HBV infection in 90%-100% of people who produce sufficient antibody responses (Schmidt et al., 2013). Despite the safe, effective and highly acceptable HBV vaccine that has been around since 1982, its use among HCW in the developing world is low (Ziraba et al., 2010). In a study in Thika district, only 12.8% of HCW had received vaccination prior to the study signifying a low vaccine uptake among the HCW in Kenya (Suckling et al., 2006).

The study, therefore, was seeking to establish the uptake of HBV vaccine and its determinants among high risk HCW in selected hospitals in Kenya. It was further seeking to address the gaps in order to inform the development of strategies to enhance the uptake of HBV vaccination among HCW in the country. The study findings were trying to identify factors that facilitate or constrain HBV vaccination among HCW in Kenya and suggest possible interventions at both public and private facilities in the country.

1.3. Justification of the Study

Health care workers are key in prevention of Hepatitis B but can also be a major source of infection. Despite the availability of the vaccine, adherence to recommendations has not been as great as initially expected. It is also not a policy in most countries (Talas 2009; Herck et al., 2008). Few studies are available on uptake of Hepatitis B vaccine

and its determinants among high-risk health care workers in Kenya. In a study in Thika district, only 12.8% of HCW had received vaccination prior to the study signifying a low vaccine uptake among the HCW in Kenya (Suckling et al., 2006). Therefore, establishing uptake of hepatitis B vaccine and its among high risk HCW in selected hospitals in Kenya provide information that is hoped to be used to design programs to protect both the patients and the Health Care Workers.

1.4. Research Questions

i. What is the level of knowledge on the risks of acquiring HBV infection among high-risk Health care workers in selected hospitals in Kenya?

ii. What advocacy mechanisms for HBV prevention exist for high-risk Health care workers in selected hospitals in Kenya?

iii. What are the attitudes of hepatitis B vaccination among high-risk Health care workers in selected hospitals in Kenya?

iv. What is the uptake of hepatitis B vaccination among high-risk Health care workers in selected hospitals in Kenya?

1.5. Hypotheses

i. There is no significant relationship between HBV knowledge and uptake of Hepatitis B vaccine.

ii. There is no significant relationship between advocacy mechanisms and uptake of hepatitis B vaccine.

iii. There is no significant relationship between attitudes of hepatitis B vaccination and uptake of hepatitis B vaccine

1.6. Research Objectives

1.6.1 General Objective

To establish the uptake of hepatitis B vaccination and its determinants among high-risk HCW in selected hospitals in Kenya.

1.6.2 Specific Objectives:

i. To determine the knowledge on the risks of acquiring HBV infection among high-risk health care workers in selected hospitals in Kenya.

ii. To determine the existence of advocacy mechanisms and the influence on need for vaccination against HBV among high-risk health care workers in selected hospitals in Kenya.

iii. To establish the attitudes of hepatitis B vaccination among high-risk health care workers in selected hospitals in Kenya.

iv. To determine the uptake of hepatitis B vaccination among high-risk health care workers in selected hospitals in Kenya.

1.7. Significance of the Study and Anticipated Output

The risk paused by HBV to the health care workers and by extension, to the patients that they handle is of public health importance. The recorded low uptake of hepatitis B vaccine by health care workers in other parts of the world is of significance too (Ziraba et al., 2010). This study was aimed at generating data from the Kenyan local context which can help health policy makers and development planners to design and develop appropriate strategies and programs that can help address the low uptake of hepatitis B vaccine by health care workers. In so doing, the risk of HBV transmission among HCW and indirectly, that of the patients they serve will be reduced.

1.8. Delimitations and Limitations of the Study

The study was limited to establishing the attitude, knowledge, advocacy mechanisms as well as uptake of Hepatitis B among the medical doctors, surgeons, nurses, clinical officers and the laboratory technologists within the health practitioners' fraternity. The choice of these cadres of staff was necessitated by their recurrent direct contact with blood and body fluids and their constant close relationship with patients. These cadres are regarded as most at risk for hepatitis B infection (WHO, 2002). The results from this study cannot therefore be generalized to other health care workers.

1.9. Assumptions of the Study

This study assumes that the results from this study will be relevant in addressing Hepatitis B vaccination compliance issues among HCW in Kenya.

1.10. Conceptual Framework

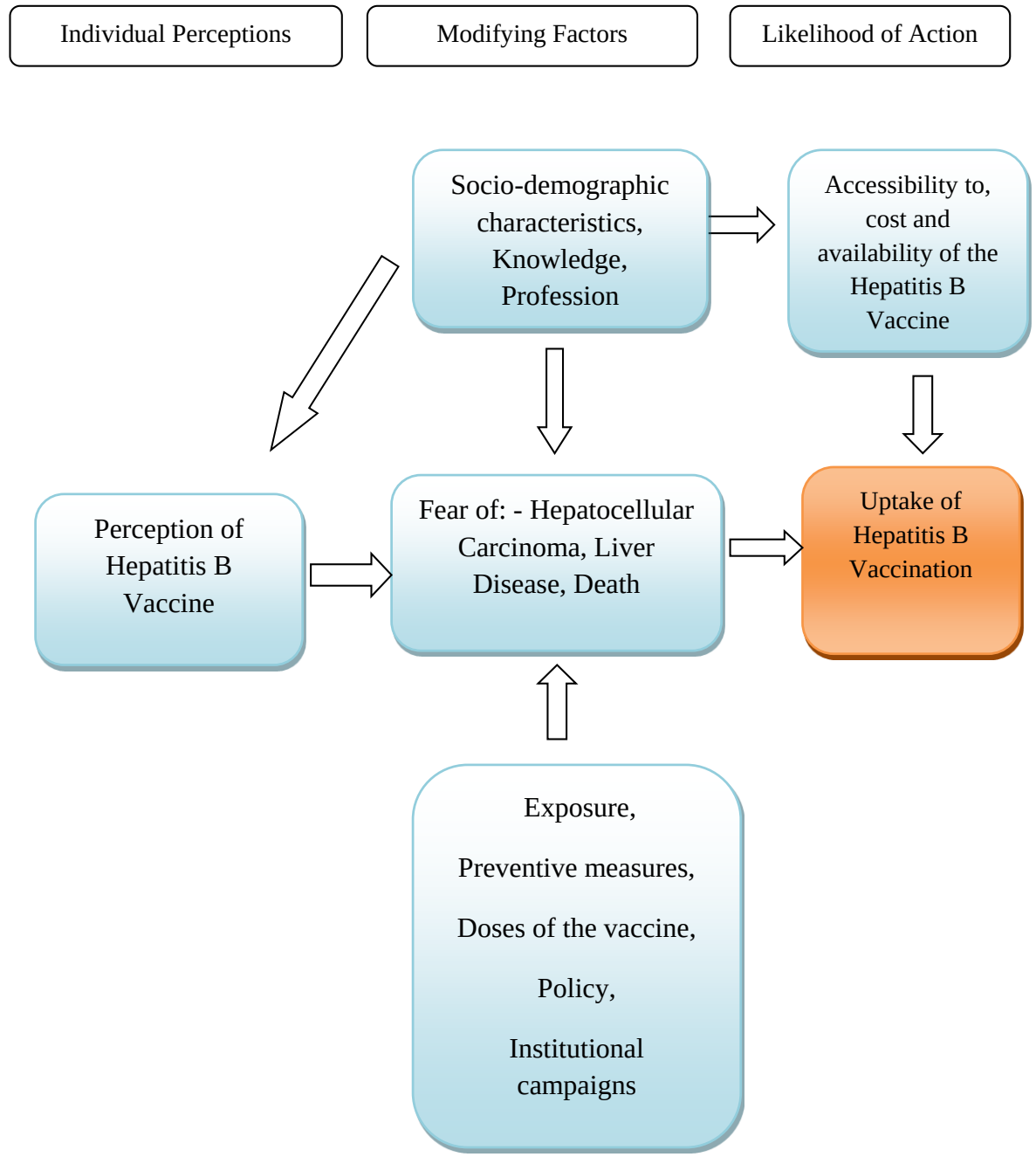
This study adopted the Health Belief Model (HBM). The model was developed in 1950s as a way to explain why medical screening programs offered by the U.S. Public Health Service were not very successful (Stretcher, 1997). The underlying concept of the original HBM is that health behavior is determined by personal beliefs of perceptions about a disease and the strategies available to decrease its occurrence (Stretcher, 1997). Four perceptions serve as the main constructs of the model: perceived seriousness, perceived susceptibility, perceived benefits, and perceived barriers. These, individually or in combination, can be used to explain health behavior. More constructs have been recently expanded to include cues to action, motivating factors, and self-efficacy.

The HBM is based on the understanding that a person will take a health-related action if the person feels negative health condition (i.e. HBV) can be avoided, has a positive expectation that by taking a recommended action he or she will avoid a negative health condition (i.e. HBV vaccination will be effective at prevention of HBV) and believes that he/she can successfully take a recommended health action (i.e. uptake of HBV vaccine).

1.10.1 Application of the theory in this study

This study establishes the perception and uptake of HBV vaccination among high risk Health Care Workers. The health belief model helps to understand the behavior of health care workers and possible reasons for non-compliance to Hepatitis B vaccination. Knowledge and perception determines uptake of HBV vaccination among health care workers. Perception and knowledge of susceptibility and the negative health effect of contracting HBV increases a healthcare workers' chances of uptake of HBV vaccination and vice versa. HBV can lead to hepatocellular carcinoma and death but only HCW who have the knowledge and perceive the severity of its risks and the benefit of taking the vaccine will choose to take HBV vaccine. There are also modifying factors such as media, availability, accessibility, personal relationships, incentives, self-efficacy among others that affect compliance to Hepatitis B vaccination among health care workers. This study assesses several of the components in order to identify and address some of the major reasons for non-compliance to Hepatitis B vaccine despite the risks the virus poses to the health care workers.

1.10.2 The Model Framework



(**Adopted From**: Stretcher V. & Rosenstock I.M. (1997).

Figure 1.1: Conceptual Framework

CHAPTER TWO: LITERATURE REVIEW

2.1 Overview of HBV

2.1.1 Global Situation of HBV Infection

Hepatitis B, an infectious disease of the liver caused by the hepatitis B virus (HBV), is a major public health problem worldwide (Baars et al., 2009). It is a highly resilient, blood-borne and sexually transmitted virus, which in chronically infected individuals can be found in high concentrations in blood, vaginal secretions and semen (Maher, 2008, Kuruuzum et al., 2008, Baars et al., 2009). It is known to remain viable for seven (7) days or longer on environmental surfaces at room temperature and acute hepatitis B has a long incubation period of up to 90 days on average during which the individual is infective (CDCP, 2006). HBV is the prototype member of the Hepadnaviridae family, genus *Orthohepadnavirus* of animal viruses (Carreno et al., 2008, Hubschen et al., 2009).

The infection is highly prevalent in Africa and Asia, and in the different countries, the infection rate ranges from 5% to 20% (Shin et al., 2006). Global epidemiology of HBV infection is based on prevalence of HBV surface antigen (HBsAg) in the population. Countries are classified into three categories of HBV endemicity: low (<2%), intermediate (2- 7%), and high (=8%) prevalence of HBsAg (Meheus and Dochez, 2008).

HBV infection is a major global public health problem, warranting a high priority for prevention and control (Baars et al., 2009). Over 2 billion of the world's population has been exposed to HBV and an estimated 387 million of these are now chronically infected with a rate of around 10 million new carriers each year. Approximately 17% of the carriers will die from the consequences of the HBV infection with an overall annual mortality rate of about one million. In Sub Saharan Africa (SSA), HBV infection is endemic. The average carrier rate of the virus in the SSA region is 10% (Baars et al., 2009).

2.1.2 National Situation

In Kenya, HBV is highly prevalent and it accounts for about 60% of the cases with liver cirrhosis, and for 80% of those with HCC. Around 70% of Kenyans have a positive HBV serology by adulthood. HBsAg carriage ranges between 8-20% depending on the province. Moreover, one in every three people in every community in the country is HBV positive (MoPHS, 2008).

2.2.HBV Awareness amongst HCW

Health care workers (HCW) are at risk of exposure to a variety of blood borne pathogens by needle prick and injuries by sharp objects or mucocutaneous contamination, in particular hepatitis B virus (HBV), hepatitis C virus (HCV), and HIV (Djeriri et al., 2008; Davanzo et al., 2008; Zhang et al., 2009; Talas, 2009). According to the World Health Organization's, approximately 3 million percutaneous exposures to blood-borne pathogens occur annually in the roughly 35 million HCW worldwide

(WHO2002) (Kuruuzum et al., 2008, Maher, 2008). The risk for HBV after percutaneous exposure to a non-immune person depends on the presence of hepatitis Be antigen (HBeAg). It can be as high as 30% in the case of an HBeAg-positive source and as low as < 6% with an HBeAg-negative source (Kuruuzum et al., 2008).

Chronic hepatitis B (CHB) can lead to life-threatening conditions like cirrhosis and hepatocellular carcinoma (HCC). Cirrhosis develops in approximately 20% of chronically infected patients, subsequently leading to hepatic insufficiency and portal hypertension. Hepatocellular carcinoma (HCC) is a highly aggressive cancer with rapid progression and only 10–20% of HCC patients are candidates for curative resection (Kim et al., 2009). Certain mutations in the molecular structure of the hepatitis B virus (HBV) appear to predispose people to liver cancer (Kukka, 2009). Moreover, the World Health Organization (WHO) estimates a death rate of 1 million people annually. In a minority of the cases, an HBV infection can lead to acute fulminant hepatitis (WHO, 2009).

2.3.Policies on HBV Vaccination

Injection safety and appropriate use of injections has been considered as a priority issue in the control of HBV. The estimated risk of infection following a needle prick from an infected source is 30% compared to only 3% for HCV and 0.3% for HIV (Sydnor and Perl, 2011). To prevent the adverse effects of unsafe injection practices the United Nations, NGOs, governments, donors and universities joined their forces in Safe Injection Global Network (SIGN) which is to enable identification of strategies for

development of large scale initiative to ensure safe injection as a priority. The Kenya National Vaccination (Draft) Policy has also recommended Monovalent Hepatitis B vaccine for prevention of hepatitis B infection in health workers and other special risk groups (MoPHS, 2008).

2.4.The Expanded Programme on Immunization (EPI)

The Expanded Programme on Immunization (EPI) has presented strategies for control of various diseases through a consultative process with regional experts from key agencies working in immunization. It responds in part to the 1998 EPI Review and the Task Force on Immunization (TFI) recommendations. It presents the rationale, objectives and strategies for improving delivery of EPI services and for achieving disease control objectives and introduce new vaccines and new technologies into EPI.

Hepatitis B infection has been well established in Africa ranging from moderate to high (2 - 8%) chronic carrier rate throughout the Region. According to EPI Task Force (EPI-TF), the efficacy of vaccines has been shown on the African continent and the benefits made abundantly clear. Hepatitis B vaccination has also been shown to be the cheapest and simplest intervention to reduce adult mortality due to the cirrhosis and hepato-cellular carcinoma, the leading cause of cancer death in Africa (EPI-TF, 2000).

As of 2000 the EPI-TF had worked on introducing HBV vaccination in six countries (Botswana, Gambia, Seychelles, Swaziland, South Africa and Zimbabwe) and that now include Hepatitis B vaccination into the routine program. While WHO has

recommended that all countries introduce universal hepatitis B vaccination into their immunization schedules, this is not feasible in many resource-limited setting (Maher, 2008). As of 2012, 183 member states vaccinate infants against hepatitis B as part of their vaccination schedules and 79% of the children received the hepatitis B (WHO, 2014).

Kenya Medical Research Institute (KEMRI) and Kenya Ministry of Health (MOH) have adopted two strategies for the eventual elimination of HBV infection. The first one involves screening of all blood transfusion units for HBV. The second one aims at integrating HB vaccine in the Kenyan EPI (KEPI) (MoPHS, 2008).

2.5 HBV awareness of risk and attitude among HCW

It has been observed that there is a strong association between age and HBV infection (Quaglio et al., 2008). In one study, it was found that occupational exposures were most common among the cleaning staff, and the most frequent cause of exposure was handling of garbage bags. Other common causes of exposures were needle recapping and invasive interventions performed by nurses, physicians, and interns (Kuruuzum et al., 2008). Interestingly, the incidence density of exposures in interns was almost as high as that in physicians. This finding underscores the need for improved education programs for interns regarding standard precautions (i.e., safety device use, record keeping) and the risk of occupational exposures.

In addition, nurses have an increased risk of HBV with respect to other jobs (Quaglio et al., 2008). This is because nurses perform more bedside procedures than other HCW (Talas, 2009). In a recent survey, it has been observed that HCW still have a poor perception of the risk of HBV infection with regard to occupational blood exposure, such as needlestick injuries (Djeriri, et al., 2008). Further they lack complete information on the standard procedures, on the necessity to report all biologic exposures, and on the importance of the follow-up for their own and public health (Davanzo et al., 2008).

2.6 Knowledge of HCW on hepatitis B risk and hepatitis B vaccination

Generally, it is easy to assume that health care workers should have adequate knowledge about diseases and other health conditions, by virtue of their training and proximity to health facilities (Kesieme et al., 2011). Assessing people's knowledge is a useful step to assess the extent to which an individual or community is in a position to adopt a disease-free behavior for this disease. Knowledge regarding HBV and safety precautions is needed to minimize the health care settings acquired infections among health personnel. Health care personnel should have complete knowledge of HBV infections, importance of vaccinations are practice of simple hygienic measures apart from that of specific protective measures (Othman et al., 2013).

Knowledge of the clinician plays a key role in prevention of spread of infection (Setia et al., 2013). People particularly health care workers who lack adequate knowledge about HBV might ignore the importance of vaccination (Othman et al., 2013). Unfortunately,

researchers have also not shown enough interest in evaluating the knowledge of Health-care Workers on hepatitis B virus infection or the vaccine. Most previous studies in health care workers in developing countries have revealed inadequate knowledge of hepatitis B virus infection and inadequate practice of preventive measures against the disease (Kesieme et al., 2011).

2.7 Uptake of HB Vaccine

Immunization among HCW has two purposes, both which allow for better prevention. First purpose is to protect HCW from several infectious diseases they may be exposed to through professional activities. Secondly to minimize the odds of infecting the patients they are taking care of. It should be clear that both objectives are extremely important and should be a priority to any health system (Talas, 2009).

The USA Food and Drug Administration (FDA) licensed the first 25 hepatitis B virus (HBV) vaccine in 1982 for infant immunization programs worldwide (Kao et al., 2009). Since then, safe and effective HBV vaccines have been available as the most effective means of preventing HBV disease and its consequences worldwide (Herck et al., 2008). Despite the existence of an effective vaccination program, up to 400 million people worldwide are chronically infected with HBV currently (Fe´rir et al., 2008; Talas, 2009).

Only relatively recently has mass childhood vaccination begun to be implemented and vaccination of high-risk groups, other than HCW, is still not a general policy worldwide

(Talas, 2009). Other factors attributed to continued persistence of HB in the developed world include limited use of the vaccine by those recommended for vaccination, current vaccination schedules require multiple (at least three) injections and a protracted immunization period of 6 or 12 months before completion, and regimens are inherently leading to a lack of compliance. For example, highly educated health care professionals never finish their vaccination course (Young et al., 2001). Furthermore, unlike HIV, HBV has not captured sufficient attention from policymakers, advocacy groups, or the general public: a major challenge for the future (Herck et al., 2008).

CHAPTER THREE: MATERIALS AND METHODS

3.1 Research Design

A descriptive cross-sectional study was conducted. The survey was aiming at seeking to establish uptake of Hepatitis B vaccination and its determinants among high-risk health care workers in Kenya. Accordingly, a survey was carried out amongst different cadres of healthcare workers including nurses, clinical officers, laboratory technicians/ technologists and medical doctors.

3.2 Study Variables

3.2.1 Independent Variable

The independent variable of the study was exposure of Health Care Workers to Hepatitis B.

3.2.2 Dependent Variables

The dependent variable tested was:

i. Uptake of Hepatitis B Vaccine among Health Care Workers

Table 3.1 gives a detailed review of the independent and dependent variables:

Table 3.1: Study Variables

	Main Variables	**Specific Variables Measured**
Independent Variables	Health Care Worker Exposure to Hepatitis B	- Profession
		- Sex
		- Age
		- Duration of professional practice
		- Health section of working
		- Knowledge of Hepatitis B
		- Occupational hazards and accidents
		- Hepatitis B prevention
		- Institutional advocacy measures
		- Perceived importance of Hepatitis B vaccine
		- Attitudes towards HB vaccine
		- Opinion on use /nonuse of HB vaccine
Dependent Variable	Uptake of Hepatitis B Vaccine among Health Care Workers	- Vaccination with Hepatitis B vaccine
		- Completion of Hepatitis B vaccine doses

3.3 **Study Site and Target Population**

The study was done in selected hospitals within the country. Various levels of health institutions were selected from three provinces that is Nairobi, Rift Valley and Western (Appendix 3). This was decided in order to give a more varied representation of the population, taking into great consideration the opportunities and differences within health care institutions. The study included all HCW whose occupational exposure put them at greater risks of contracting HBV. They included the nurses, clinical officers, laboratory technicians, and medical doctors.

3.4 Inclusion and Exclusion Criteria

3.4.1 Inclusion Criteria

HCW perceived to have the most potential risk of contracting HB through occupational exposure were included in the study. They were: clinical officers, nurses, laboratory technicians and medical doctors.

3.4.2 Exclusion Criteria

HCW not perceived to carry the most risk of exposure and those who were unwilling to give consent for the study were excluded. Other medics and paramedics who were not considered to be at greater risk of transmission include those working in; Physiotherapy, Radiology, Occupational health, Health records and Information, Pharmacy, Nutrition, Counseling among others.

3.5 Sampling

3.5.1 Sample Size Determination

A sample of 384 health care professionals was selected. The sample was decided on due to no estimate available for number of targeted health care professionals. According to Mugenda & Mugenda (2003) if there is no estimate available of the proportion in the target population assumed to have characteristic of interest, 50% should be used as recommended by Fisher., et al (1983).

The following formula was used to calculate the sample size:

$$n = \frac{(Z)^2 Pq}{(d)^2}$$

Where:

n=desired sample size

Z=the standard normal deviate at the required confident level

p= the proportion in the target population (50%) estimated to have the characteristic

q= 1-p

d= the level of statistical significance set

Hence the proportion of the target population with the desired characteristic was assumed as .50 the z-statistic was taken as 1.96, and a desired level of statistical significance set at .05 was calculated as shown below. Therefore the sample size was calculated as:

$$n = \frac{(1.96)^2 (.50)(.50)}{(.05)^2}$$

$$= 384$$

However, 400 questionnaires were distributed to take care of attrition. A total of **384** were analyzed after checking for completeness and coding.

3.5.2 Sampling Procedure

Multistage sampling was chosen as the best procedure since it was able to apply both cluster and random sampling. Three provinces in Kenya (Rift Valley, Nairobi and Western) were randomly selected for this study. A random selection of 30% of the eight

provinces was done. Further, health institutions in the provinces were selected after being clustered as per private versus public and level 4 and 5 hospitals. Random sampling through duty allocation lists was used to select the individual cases of health professionals who participated in the study. The method was chosen since there was no specified estimate of the targeted health care workers. Since random sampling provides accurate information about groups too large to study in their entity and is more efficient in capturing the variations or heterogeneity that exist within a population, it was assumed it would therefore give an equal chance to every health professional to being selected to participate in the study.

Key informants were also chosen purposively based on their qualification and capability to give the desired accurate information. Some of the key informants involved in this study were professionals drawn from the Ministry of Public Health and Sanitation (Kenya Expanded Programme on Immunization (KEPI)) and at Kenya Medical Research Institute (KEMRI). A total of 8 Key Informants were interviewed.

3.6 Pre-Testing

A pre-test exercise was done among 30 different cadres of HCW from Embu Provincial Hospital in Eastern Province. The results were used to review the tool; including omitting or revising some questions, in order to ensure that it captured the required information.

3.7 Data Collection Procedures

A number of instruments were used to collect the relevant data.

3.7.1 Semi Structured Interview

A semi-structured interview method was used to collect data from all the selected cadres of the healthcare workers using a questionnaire. This questionnaire was administered by trained research assistants (Appendix 1). A total of 384 health care workers were interviewed from selected hospitals. The questionnaire was addressing issues of knowledge, attitudes, advocacy mechanisms and uptake of hepatitis B vaccination.

3.7.2 Key Informant Interview

A pre-designed key informant interview guide was used to collect information from eight specialists in the relevant departments of the Ministry of Public Health and Sanitation and KEMRI. Broadly, the interview guide included focal themes like precautionary measures taken by the government to prevent occupational risk levels of contracting Hepatitis B virus, and any advocacy strategies being employed currently to combat the spread of Hepatitis B virus infection of patients by healthcare workers and vice versa.

3.7.3 Desk Review

Secondary data was collected from documentaries, journals and books on issues pertaining health care workers' perception and uptake of HB vaccine. These were important to validate the results obtained from data collected.

3.8 Data Management and Analysis

The data collection tools were checked to confirm that they had been adequately filled before being coded. Data was then analyzed both quantitatively and qualitatively. Both descriptive and inferential statistics were computed, coded and analyzed using Statistical Package for Social Sciences (SPSS) version 20.0 computer program.

Quantitative descriptive results were presented using frequencies, charts, tables, and narratives. Qualitative data was organized in themes and categories, and analyzed through summarization and description of the themes according to the objectives. Descriptive statistics was done using frequency counts. Inferential statistics was done using Fisher's Exact Test and chi-square test to test for association of variables. Statistical inferences were drawn to ascertain relationships between various variables tested. A P value < 0.05 was considered statistically significant.

3.9 Ethical considerations

Ethical clearance was sought from the Ministry of Education Science and Technology (Appendix 4) and Kenyatta University (Appendix 5) before embarking on field data collection. The respondents were adequately informed about the nature and purpose of the study. Strict rules of confidentiality were followed. Individual data has not been reported but only aggregate and summary reports have been communicated. Furthermore, informed consent was obtained from the respondents and no coercion, manipulation or undue influence was exercised.

CHAPTER FOUR: RESULTS

4.1 Social Demographic Characteristics of Health Care Workers

This section presents results on the characteristics of the respondents. The socio-demographic information collected included: type of institution and province the health care workers were drawn from, cadre, gender, age, marital status, years of practice and department HCW was mostly stationed. **Tables 4.1** summarizes the socio-demographic characteristics.

Out of the 384 respondents, 151 (39.3%) were working in health facilities in Western Province, 137 (35.7%) from Rift Valley Province while 96 (25.0%) from Nairobi Province. Majority of the respondents came from public health facilities represented by 254 (66.1%) of the respondents while 130 (33.9%) were from private health facilities as shown in **Table 4.1.**

As presented in **Table 4.1**, majority of the health care workers interviewed were nurses according to 225 (58.6%) of the responses, 75 (19.5%) were clinical officers, 46 (12.0%) were doctors and 38 (9.9%) were Laboratory technologists/technicians. More female 226 (58.9%) HCW participated in the study as compared to their male counterparts 158 (41.1%).

More than half of health care workers who participated in the study were aged 29 years and below according to 195 (50.8%) of the responses. This was followed by 117

(30.5%) who were aged between 30 to 39 years, 56 (14.6%) aged 40 to 49 years and only 16 (4.2%) of the respondents were 50 years and above as shown on **Table 4.1**.

Slightly more than half 198 (51.6%) of the health care workers who participated in the study were married, 175 (45.6%) were single, 6 (1.6%) were widowed while 5 (1.3%) of the respondents were divorced/separated (**Table 4.1**).

A good number of Health care workers137 (35.7%) who participated in the study had been practicing in the health care profession between one to five years prior to the study period. Another 104 (27.1%) had been practicing for more than 10 years, 92 (24.0%) for less than one year, and 51 (13.3%) had been practicing between for 6 and 10 years as illustrated in the **Table 4.1**.

The study also looked at the departments that the HCW were mostly stationed. Results showed that majority of the HCW 196 (51.0%) were stationed in the Inpatient department. This was followed by 132 (34.4%) working in the outpatient department, 65 (16.9%) worked in the delivery ward/maternity, 61 (15.9%) in the operating theatres while 40 (10.4%) worked in the laboratory (**Table 4.1**). The responses indicated that some of the HCW were rotating in more than one department.

Table 4.1: Socio-demographic Characteristics of Respondents (N = 384)

Variable	Response	Frequency	Percent
Type of Institution	Public	254	66.1
	Private	130	33.9
Province	Western Province	151	39.3
	Nairobi Province	96	25.0
	Rift Valley Province	137	35.7
Cadre	Nurse	225	58.6
	Clinical Officer	75	19.5
	Laboratory Technologist/Technician	38	9.9
	Medical Doctor	46	12.0
Gender	Male	158	41.1
	Female	226	58.9
Age	29 Years and Below	195	50.8
	30-39 Years	117	30.5
	40-49 Years	56	14.6
	50 Years and Above	16	4.2
Marital Status	Single	175	45.6
	Married	198	51.6
	Widowed/Widower	6	1.6
	Separated/Divorced	5	1.3
Years of Practice	Less than 1 Year	92	24.0
	1 to 5 Years	137	35.7
	6 to 10 Years	51	13.3
	More than 10 years	104	27.1
Outpatient	Yes	132	34.4
	No	252	65.6
Inpatient	Yes	196	51.0
	No	188	49.0
Operating Theatre	Yes	61	15.9
	No	323	84.1
Laboratory	Yes	40	10.4
	No	344	89.6
Maternity/Delivery Ward	Yes	65	16.9
	No	319	83.1

4.2 Knowledge of HCW on HB

The first objective of the study was to determine the knowledge of health care workers on Hepatitis B. Knowledge was assessed by a total of 23 questions focusing on knowledge on existence of HBV, causes of hepatitis B, the modes of HBV transmission, occupational risk to Hepatitis B, treatment and prevention of HBV. Each response was scored as 'yes' or 'no'. The scoring range of the knowledge questions was 12 (lowest) to 23 (highest). A cut off level of <18 was considered as poor knowledge whereas >= 18 was considered as good knowledge about HB. Knowledge scores for individual HCW were calculated and summed up to give the total knowledge scores.

Out of the 384 participants, 302 (78.6%) were within the good knowledge range whereas 82 (21.4%) showed poor knowledge about Hepatitis B. Poor knowledge was apparent in responses relating to; transmission of hepatitis B through mother to child (vertical transmission) and droplet infection, treatment of hepatitis B infection and prevention of hepatitis B through treatment of chronic hepatitis B infection. Slightly less than half; 142 (37%) of the study participants did not know that hepatitis B can be transmitted through mother to child. Another 215 (56%) did not know that Hepatitis B virus can be transmitted through droplet infection. Slightly more than half of the respondents, 193 (50.2%) did not know that hepatitis B does not have treatment in its acute state and another 233 (60.7%) did not know that treatment of chronic hepatitis is a means of prevention.

Some of the highly scored knowledge items include blood products as mode of transmission, cause of HB by viruses and vaccination as a means of HB prevention as shown by 379 (98.7%), 375 (97.7%) and 371 (96.6%) respectively. When the knowledge items were themed, the mean scores indicated that having heard (awareness) of hepatitis B was highest at 97.9%, followed by causes of hepatitis B at 97%. Treatment of hepatitis B and prevention were areas with low mean scores at 49.8% and 75.6% respectively. The summary of knowledge responses regarding hepatitis B is shown in **Table 4.2** below:

Table 4.2: Responses of the study participants to Hepatitis B knowledge items (N = 384).

	Hepatitis B Knowledge Items	Expected response	Yes	No
	Awareness of hepatitis B		**N (%)**	**N (%)**
1	Have you ever heard about HB	Yes	376 (97.9)	8 (2.1)
	Causes of hepatitis B			
2	Caused by Fungi	No	6 (1.6)	378 (98.4)
3	Caused by Parasites	No	6 (1.6)	378 (98.4)
4	Caused by Viruses	Yes	375 (97.7)	9 (2.3)
5	Caused by Bacteria	No	25 (6.5)	359 (93.5)
	Modes of HB Transmission			
6	Body cuts (tattoos, ear piercing)	Yes	257 (74.1)	90 (25.9)
7	Blood products	Yes	379 (98.7)	5 (1.3)
8	Contact with pets	No	20 (5.2)	364 (94.8)
9	Droplet infection	Yes	169 (44.0)	215 (56)
10	Mosquito bites	No	20 (5.2)	364 (94.8)
11	Needle pricks	Yes	353 (91.9)	31 (8.1)
12	Shaking hands	No	24 (6.3)	360 (93.8)
13	Sharing dishes	No	38 (9.9)	346 (90.1)
14	Unprotected sexual intercourse	Yes	331 (86.2)	53 (13.8)
15	Vertical transmission	Yes	242 (63.0)	142 (37.0)
	Treatment of HB Infection			
16	Is hepatitis B infection treatable?	No	193 (50.2)	191 (49.8)
	Prevention of HB			
17	Condoms	Yes	311 (81.0)	73 (19.0)
18	Vaccination	Yes	371 (96.6)	13 (3.4)
19	Use of protective gloves	Yes	365 (95.1)	19 (4.9)
20	Treatment of HB Infection	Yes	151 (39.3)	233 (60.7)
21	Isolation	No	219 (57.0)	165 (43.0)
22	Screening of blood before transfusion	Yes	370 (96.4)	14 (3.6)
23	A vaccine for hepatitis B does exist	Yes	300 (78.1)	84 21.9)

Knowledge was also analyzed in relation to the socio-demographic characteristics of the HCW. The results are shown on **Table 4.3**:

According to the results, good knowledge was recorded as a high response in all the socio-demographic characteristics of the HCW. However, the province was the only socio-demographic characteristic with a significant association with knowledge, categorized as good or poor (χ^2 = 0.013, df of 1, P value of 8.645) at 0.05 confidence level (**Table 4.3**).

Table 4.3: Description of knowledge as per socio-demographic characteristics of respondents (N=384)

Variable	Description	Knowledge		Total	P-Value
		Poor	Good		
Institution Type	Public	58	196	254	$\chi^2 = 0.322$; df = 1; P = 0.979
	Private	24	106	130	
Province	Western	41	110	151	$\chi^2 = 0.013$*; df = 2; P = 8.645
	Nairobi	11	85	96	
	Rift Valley	30	107	137	
Cadre	Nurse	54	171	225	$\chi^2 = 0.156$; df = 3; P = 5.228
	Clinical Officer	13	62	75	
	Laboratory Technologist/Technician	10	28	38	
	Medical Doctor	5	41	46	
Gender	Male	29	129	158	$\chi^2 = 0.230$; df = 1; P = 1.438
	Female	53	173	226	
Age	Below 30 Years	47	148	195	Fisher's Exact Test = 0.498; df = 3; P = 2.391
	30-40 Years	22	95	117	
	40-50 Years	9	47	56	
	Above 50 Years	4	12	16	
Marital Status	Single	38	137	175	Fisher's Exact Test = 0.730; df = 3; P = 1.176
	Married	41	157	198	
	Widowed/Widower	1	5	6	
	Separated/Divorced	2	3	5	
Years of Practice	Less than one year	16	76	92	$\chi^2 = 0.085$; df = 3; P = 6.633
	1 to 5 Years	39	98	137	
	6 to 10 Years	10	41	51	
	More than 10 years	17	87	104	
Department - Outpatient	Yes	27	105	132	$\chi^2 = 756$; df = 1; P = 0.097
	No	55	197	252	
Department - Inpatient	Yes	37	159	196	$\chi^2 = 0.227$; df = 1; P = 1.462
	No	45	143	188	
Department - Operating Theatres	Yes	12	49	61	$\chi^2 = 0.727$; df = 1; P = 0.122
	No	70	253	323	
Department - Laboratory	Yes	10	30	40	$\chi^2 = 0.552$; df = 1; P = 0.353
	No	72	272	344	
Department - Maternity	Yes	10	55	65	$\chi^2 = 0.198$; df = 1; P = 1.660
	No	72	247	319	

4.3 Existence of Advocacy Mechanisms and the Influence on HCW Need for Vaccination against HBV

The second objective of the study was to establish the existence of advocacy mechanisms and the influence on the health care workers' need for vaccination. Advocacy was assessed by a total of 5 questions. Each response was scored as 'yes' or 'no'. Advocacy scores for individual HCW were calculated and summed up to give the total advocacy scores. The scoring range of the advocacy questions was 0 (lowest) to 4 (highest). The rating of advocacy measures was done in three scores as follows: 0 score = No advocacy measure (None); 1-2 score = Inadequate advocacy measures in place and 3-5 score = Adequate advocacy measures in place. The overall scores on advocacy mechanisms showed that 193 (50.3%) of the HCW had no advocacy mechanisms in place in their institutions, 140 (36.5%) had inadequate mechanisms in place while a minority; 51 (13.3%) were aware of advocacy mechanisms in their institutions (**Figure 4.1**).

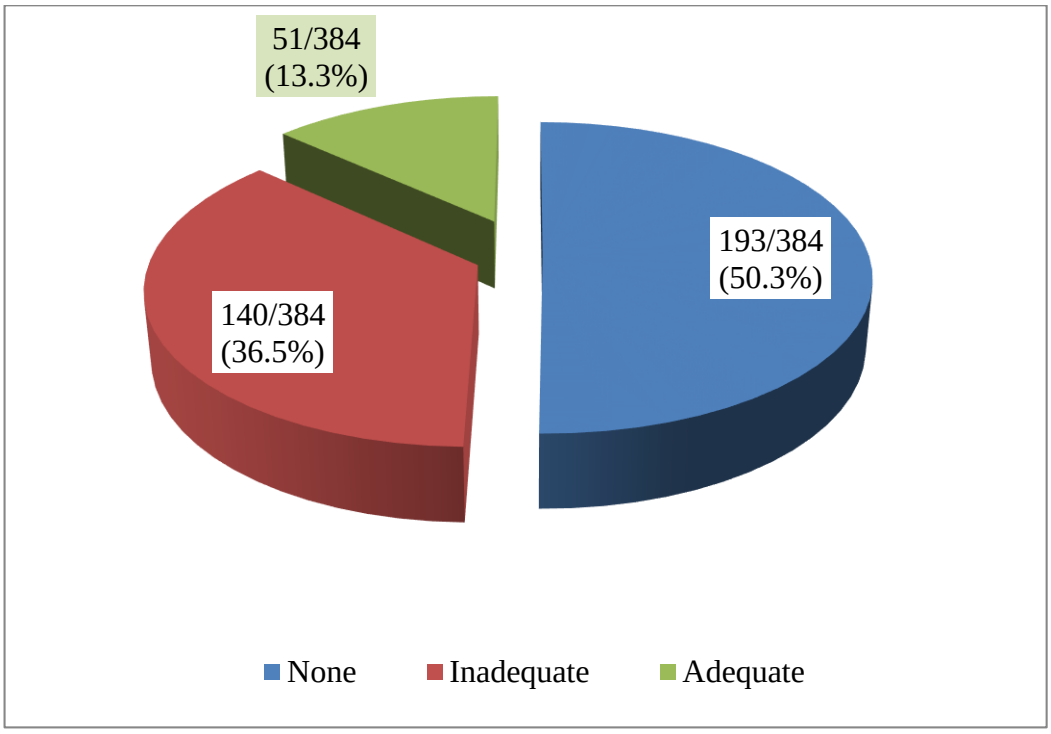


Figure 4.1: Overall scores on the responses of HCW regarding advocacy measures

The advocacy measures items were assessed through five questions as shown on **Table 4.4**. Majority 366 (95.3%) of the respondents indicated that there were policies in their institutions regarding pricks. Only 103 (26.8%) were positive that their institutions mentioned to them the need for hepatitis B vaccination, 94 (24.5%) said advocacy measures were present in their institutions while 93 (24.2%) reported that their institutions had organized workshops on hepatitis B prevention. A very small percentage 67 (17.4%) of the HCW who participated in this study had attended a workshop on hepatitis B prevention (**Table 4.4**).

Table 4.4: Responses of the study participants to Advocacy Measures Items (N = 384).

Advocacy Measures Items	**Yes**	**No**
	N (%)	**N (%)**
Policy on pricks	366 (95.3)	18 (4.7)
Need for vaccination mentioned	103 (26.8)	281 (73.2)
Advocacy Measures Present	94 (24.5)	290 (75.5)
Workshops Organized	93 (24.2)	291 (75.8)
Attended Workshop	67 (17.4)	317 (82.6)

The study also compared the advocacy mechanisms in relation to the socio-demographic characteristics of the HCW. The results are demonstrated in the **Table 4.5**. According to the results, there were no significant association between any of the demographic characteristics assessed and the advocacy mechanisms in place, characterized as none, inadequate or adequate.

Table 4.5: Description of advocacy mechanisms as per socio-demographic characteristics of respondents (N=384)

Variable	Description	Advocacy Mechanisms			Total	P-Value
		None	Inadequate	Adequate		
Institution Type	Public	123	96	35	254	$\chi^2 = 0.603$; df = 2; P = 10.011
	Private	70	44	16	130	
Province	Western	77	55	19	151	$\chi^2 = 0.849$; df = 4; P = 1.372
	Nairobi	52	32	12	96	
	Rift Valley	64	53	20	137	
Cadre	Nurse	113	91	21	225	$\chi^2 = 0.138$; df = 6; P = 9.694
	Clinical Officer	37	22	16	75	
	Laboratory Technologist/Technician	19	12	7	38	
	Medical Doctor	24	15	7	46	
Gender	Male	84	52	22	158	$\chi^2 = 0.482$; df = 2; P = 1.460
	Female	109	88	29	226	
Age	Below 30 Years	96	71	28	195	Fisher's Exact Test = 0.587; df = 6; P = 5.059
	30-40 Years	59	41	17	117	
	40-50 Years	31	19	6	56	
	Above 50 Years	7	9	0	16	
Marital Status	Single	84	66	25	175	Fisher's Exact Test = 0.896; df = 6; P = 2.184
	Married	104	69	25	198	
	Widowed/Widower	3	3	0	6	
	Separated/Divorced	2	2	1	5	
Years of Practice	Less than one year	53	27	12	92	$\chi^2 = 0.316$; df = 6; P = 7.056
	1 to 5 Years	64	53	20	137	
	6 to 10 Years	27	15	9	51	
	More than 10 years	49	45	10	104	
Department - Outpatient	Yes	70	48	14	132	$\chi^2 = 0499$; df = 2; P = 1.391
	No	123	92	37	252	
Department - Inpatient	Yes	96	74	26	196	$\chi^2 = 0.854$; df = 2; P = 0.315
	No	97	66	25	188	
Department - Operating Theatres	Yes	35	20	6	61	$\chi^2 = 0.439$; df = 2; P = 1.647
	No	158	120	45	323	
Department -Laboratory	Yes	21	12	7	40	$\chi 2 = 0.562$; df = 2;P =1.154
	No	172	128	44	344	
Department - Maternity	Yes	33	26	6	65	$\chi^2 = 0.538$; df = 2; P = 1.240
	No	160	114	45	319	

4.4 Attitudes of HCW towards Hepatitis B Vaccination

Attitude was measured using 7 questions. The items were scored as positive or negative. Any score of less than 4 was considered a negative attitude and any score of 5 and above was considered a positive attitude. The scores were range 0-7. From the 7 questions that were assessing attitude items, majority of the HCW 348 (90.6%) had positive attitudes towards hepatitis B virus as an occupational risk and hepatitis B vaccination, while only 36 (9.4%) had negative attitudes (**Table 4.6**).

Table 4.6: Attitude of HCW categorized as positive or negative

Attitude	Frequency	Percent
Positive	348	90.6
Negative	36	9.4
Total	**384**	**100.0**

Majority of the attitude item questions were correctly scored by the HCW (**Table 4.7**). The attitude item with the highest positive score was the belief that the HCW's occupation is a risk for Hepatitis B virus transmission as indicated by 377 (98.2%) who responded positively to this. Another good number of 361 (94%) suggested that Hepatitis B vaccination should be made a policy in the healthcare workforce, while 360 (93.8%) would refer other health care workers for hepatitis B vaccination. The only attitude item that was negative was the response that hepatitis B vaccine is meant for

children under five alone as reported by 57 (14.8%) of the HCW. The attitude items are shown in **Table 4.7.**

Table 4.7: Responses of the study participants to Hepatitis B attitude items (N=384)

	Hepatitis B Attitude Items	**Yes N (%)**	**No N (%)**
1	Do you think your occupation is a risk for Hepatitis B Virus transmission?	377 (98.2)	7 (1.8)
2	Hepatitis B vaccine is meant for children under five alone	57 (14.8)	327 (85.2)
3	Hepatitis B vaccine can be administered to adults	342 (89.1)	42 (10.9)
4	Protection by Hepatitis B vaccine is good	347 (90.4)	37 (9.6)
5	I would be willing to get a hepatitis B vaccination if recommended	355 (92.4)	29 (7.6)
6	I would refer other health care workers for hepatitis B vaccination	360 (93.8)	24 (6.3)
7	Hepatitis B vaccination should be made a policy in the healthcare workforce	361 (94.0)	23 (6.0)

Advocacy measures were also analyzed in relation to the socio-demographic characteristics of the HCW. The results are shown in **Table 4.8**. According to the results, there was a significant association between the age of the respondents and their attitude towards hepatitis B and vaccination as demonstrated by Fishers Exact Test of 0.007, df = 3 and P value of 11.612 at 0.05 confidence level. There was also a significant association between working in the inpatient department and the attitude; shown by $\chi^2 = 0.010$, df = 1 and P value of 6.671 at 0.05 confidence level.

Table 4.8: Description of attitude scores as per socio-demographic characteristics of respondents (N=384)

Variable	Description	Attitude		Total	P-Value
		Positive	Negative		
Institution Type	Public	230	24	254	$\chi^2 = 0.945$; df = 1; P = 0.005
	Private	118	12	130	
Province	Western Province	132	19	151	Fisher's Exact Test = 0.079; df = 2; P = 5.038
	Nairobi Province	92	4	96	
	Rift Valley Province	124	13	137	
Cadre	Nurse	206	19	225	Fisher's Exact Test = 0.253; df = 3; P = 3.942
	Clinical Officer	64	11	75	
	Laboratory Technologist/Technician	34	4	38	
	Medical Doctor	44	2	46	
Gender	Male	143	15	158	$\chi^2 = 0.947$; df = 1; P = 0.004
	Female	205	21	226	
Age	Below 30 Years	169	26	195	Fisher's Exact Test = 0.007*; df = 3;P = 11.612
	30-40 Years	114	3	117	
	40-50 Years	51	5	56	
	Above 50 Years	14	2	16	
Marital Status	Single	152	23	175	Fisher's Exact Test = 0.168; df = 3; P = 4.671
	Married	185	13	198	
	Widowed/Widower	6	0	6	
	Separated/Divorced	5	0	5	
Years of Practice	Less than one year	80	12	92	Fisher's Exact Test = 0.151; df = 3; P = 5.236
	1 to 5 Years	123	14	137	
	6 to 10 Years	50	1	51	
	More than 10 years	95	9	104	
Department - Outpatient	Yes	118	14	132	$\chi^2 = 0.549$; df = 1; P = 0.359
	No	230	22	252	
Department - Inpatient	Yes	185	11	196	$\chi^2 = 0.010$*; df = 1; P = 6.671
	No	163	25	188	
Department - Operating Theatres	Yes	55	6	61	$\chi^2 = 0.893$; df = 1; P = 0.018
	No	293	30	323	
Department-Laboratory	Yes	35	5	40	$\chi^2 = 0.474$; df = 1; P = 0.513
	No	313	31	344	
Department - Maternity	Yes	58	7	65	$\chi^2 = 0.672$; df = 1;P = 1.179
	No	290	29	319	

4.5 Uptake of Hepatitis B Vaccination by HCW

4.5.1 Uptake of hepatitis B vaccination

Uptake of Hepatitis B vaccine was not very high among the HCW as shown in **Table 4.9**. Out of 384 HCW interviewed, 229 (59.6%) had been vaccinated against Hepatitis B virus while 155 (40.4%) had not. This number was slightly above half of the respondents, an indication that uptake of Hepatitis B vaccine is still a major challenge among the HCW. Of those who were vaccinated, only 123 (53.7%) were fully vaccinated with the recommended three doses of the vaccine.

Table 4.9: Responses of the study participants to Hepatitis B vaccine uptake items (N=384)

	Hepatitis B Practice Items	**Yes N (%)**	**No N (%)**
1	Have you been vaccinated against Hepatitis B Virus?	229 (59.6)	155 (40.4)
	Number of doses of hepatitis B vaccine received		
2	Only one dose	40 (17.5)	189 (82.5)
3	Two doses	50 (21.8)	179 (78.2)
4	All the three doses	123 (53.7)	106 (46.3)
5	Not sure	16 (7.0)	213 (93.0)

4.5.2 Status of hepatitis B vaccination

The results were further analyzed to show the status of vaccination among HCW. The general status of vaccination of the entire 384 interviewed indicated that majority of the HCW were not vaccinated 155 (40.4%), 106 (27.6%) were partially vaccinated while

only 123 (32%) had completed the required 3 doses of vaccination as shown on **Figure 4.2**.

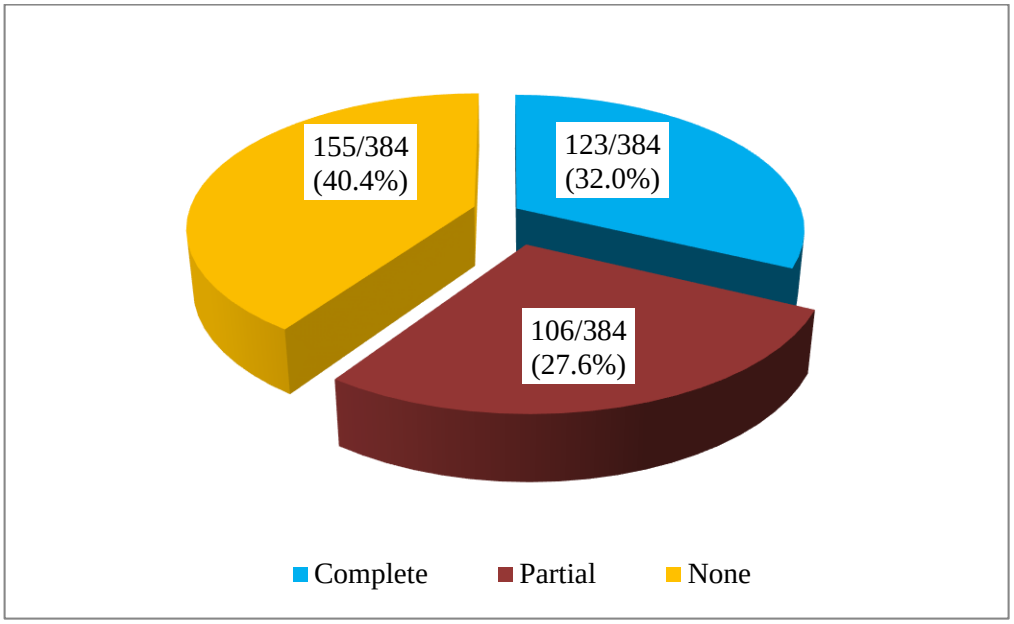


Figure 4.2: Status of hepatitis B Vaccination

4.5.3 Other hepatitis B practice items

Majority of the 229 HCW who had received a vaccine have not been checked to find out if vaccination created immunity. As shown in **Table 4.10**, only 36 (15.7%) of the HCW who had been vaccinated have had their blood checked to ascertain if HBV vaccination has given them immunity while a high proportion 193 (84.3%) have not had their blood checked for the same.

Further, motivation for vaccination was assessed. As shown in **Table 4.10,** only 43 HCW indicated why they had taken the vaccination. Slightly more than half 22 (51.2%) stated that they did so because they feared contracting Hepatitis B, 17 (39.5%) did it because it was readily available at their health facilities, while only 4 (9.3%) did it because it was their employers' policy.

Various reasons were given by the HCW for non-vaccination. Some of the reasons pointed out by the HCW for non-vaccination are presented in **Table 4.10.** 125 (80.6%) of the 155 HCW who had not received any vaccine responded to this item. Majority of the HCW 85 (68.0%) indicated that the vaccine was not readily available in the market and at the health care institutions they work in, making it hard for their vaccination. Another challenge leading to low uptake of the HBV vaccine was the high cost 33 (26.4%) of the vaccine. Other constraints were hatred for the injections 5 (4.0%), 1 (0.8%) said the prolonged timing between the doses was discouraging while another 1 (0.8%) said they did not take the vaccine because they had suffered from Hepatitis B infection before hence did not see the need of taking it.

Table 4.10: Responses of the study participants to Hepatitis B practice items (N=384)

	Hepatitis B Practice Items	**Yes N (%)**	**No N (%)**
	Post-vaccination practice		
1	Have you ever had your blood checked to ascertain that the HB vaccination administered has given you immunity?	36 (15.7)	193 (84.3)
	Motivation for Hepatitis B vaccination		
2	My fear of contracting Hepatitis B	22 (51.2)	21 (48.8)
3	The vaccine was readily available	17 (39.5)	26 (60.5)
4	It is my employer's policy	4 (9.3)	39 (90.7)
	Reasons for non-vaccination		
5	The vaccine is not readily available	85 (68.0)	40 (32.0)
6	The cost of vaccine is high	33 (26.4)	92 (73.6)
7	I hate injections	5 (4.0)	120 (96.0)
8	The time between the doses is prolonged	1 (0.8)	124 (99.2)
9	I have suffered from hepatitis B infection before	1 (0.8)	124 (99.2)

The study also assessed the uptake of hepatitis B vaccination in relation to the socio-demographic characteristics of the HCW (**Table 4.11**). According to the results, there was a significant association between uptake of hepatitis among the HCW and the type of institution they were working in (χ^2 = 0.012, df = 1 and P value = 6.360) at 0.05 confidence level. There was also a significant association with the province they were drawn from (χ^2 = 0.038, df = 2 and P value = 6.556) and the cadre of the HCW (χ^2 = 0.040 df = 3 and P value = 8.299) at 0.05 confidence level. Age of the respondents also showed a significant association with uptake of the hepatitis B vaccination as demonstrated by χ^2 = 0.033, df = 3 and P value of 8.768 at 0.05 confidence level. Other socio-demographic characteristics that has significant association with uptake of hepatitis B vaccination by the HCW were years of professional practice (χ^2 = 0.005 df = 3 and P value = 12.864), working in the outpatient department (χ^2 = 0.005 df = 1 and P value = 7.758) and the inpatient department (χ^2 = 0.012 df = 1 and P value = 6.354) all at 0.05 confidence level.

Table 4.11: Uptake as per socio-demographic characteristics of respondents (N=384)

Variable	Description	Positive	Negative	Total	P-Value
Institution Type	Public	140	114	254	$\chi^2 = 0.012$*; df = 1; P = 6.360
	Private	89	41	130	
Province	Western	96	55	151	$\chi^2 = 0.038$*; df = 2; P = 6.556
	Nairobi	63	33	96	
	Rift Valley	70	67	137	
Cadre	Nurse	128	97	225	$\chi^2 = 0.040$*; df = 3; P = 8.299
	Clinical Officer	41	34	75	
	Laboratory Technologist/Technician	24	14	38	
	Medical Doctor	36	10	46	
Gender	Male	103	55	158	$\chi^2 = 0.064$; df = 1; P = 3.441
	Female	126	100	226	
Age	Below 30 Years	128	67	195	$\chi^2 = 0.033$*; df = 3; P = 8.768
	30-40 Years	68	49	117	
	40-50 Years	26	30	56	
	Above 50 Years	7	9	16	
Marital Status	Single	111	64	175	Fisher's Exact Test = 0.099; df = 3; P = 5.806
	Married	114	84	198	
	Widowed/Widower	1	5	6	
	Separated/Divorced	3	2	5	
Years of Practice	Less than one year	66	26	92	$\chi^2 = 0.005$*; df = 3; P = 12.864
	1 to 5 Years	85	52	137	
	6 to 10 Years	29	22	51	
	More than 10 years	49	55	104	
Department - Outpatient	Yes	66	66	132	$\chi^2 = 0.005$*; df = 1; P = 7.758
	No	163	89	252	
Department - Inpatient	Yes	129	67	196	$\chi^2 = 0.012$*; df = 1; P = 6.354
	No	100	88	188	
Department - Operating Theatres	Yes	37	24	61	$\chi^2 = 0.859$; df = 1; P = 0.031
	No	192	131	323	
Department – Laboratory	Yes	22	18	40	$\chi^2 = 0.528$; df = 1; P = 0.399
	No	207	137	344	
Department - Maternity	Yes	34	31	65	$\chi^2 = 0.186$; df = 1; P = 1.1745
	No	195	124	319	

4.6 Test of associations

4.6.1. Test of Association between HBV Knowledge and Uptake of HBV Vaccine

The study tested the hypothesis that there is no significant relationship between HBV knowledge and uptake of Hepatitis B vaccine. The knowledge categorized as good or poor was used to calculate associations with vaccine uptake, as per the socio-demographic characteristics of HCW.

Most of the significant associations at 0.05 level of significance observed between knowledge and uptake of hepatitis B vaccination were those within the good knowledge categories. These were; type of institution (χ^2 = 0.001, P = 10.448 and 1 df), province (χ^2 = 0.015, P = 8.404 and 2 df), cadre (χ^2 = 0.007, P = 12.200 and 3 df), and gender (χ^2 = 0.007, P = 7.163 and 1df) as shown in **Table 4.12**.

Others were; marital status (Fisher's Exact Test = 0.005, P = 10.945 and 3 df), years of practice (χ^2 = 0.001, P = 15.793 and 3 df), outpatient (χ^2 = 0.001, P = 10.749 and 1df), and inpatient departments (χ^2 = 0.017, P = 5.747 and 1 df). Whereas the associations were significant as per the good knowledge, the same variables had no significant association as per those with poor knowledge. The only poor knowledge observation with a significant association was among those working in the laboratory department (Fisher's Exact Test = 0.002, and 1df) as shown on **Table 4.13**.

Table 4.12: Test of Association - Knowledge Categorized as Good and Poor as per Socio-demographic Characteristics of Respondents (N=384)

Variable		Knowledge	Vaccinated		P-Value
			Yes	No	
Type of Institution	Public	Poor	35	23	$\chi^2 = 0.389$; df = 1; P = 0.743
	Private		12	12	
	Total		**47**	**35**	
	Public	Good	105	91	$\chi^2 = 0.001$*; df = 1; P = 10.448
	Private		77	29	
	Total		**182**	**120**	
Province	Western	Poor	21	20	Fisher's Exact Test = 0.194; df = 2; P = 3.251
	Nairobi		9	2	
	Rift Valley		17	13	
	Total		**47**	**35**	
	Western	Good	75	35	$\chi^2 = 0.015$*; df = 2; P = 8.404
	Nairobi		54	31	
	Rift Valley		53	54	
	Total		**182**	**120**	
Cadre	Nurse	Poor	33	21	Fisher's Exact Test = 0.076; df = 3; P = 6.798
	Clinical Officer		8	5	
	Laboratory Technologist/Technician		2	8	
	Medical Doctor		4	1	
	Total		**47**	**35**	
	Nurse	Good	95	76	$\chi^2 = 0.007$*; df = 3; P = 12.200
	Clinical Officer		33	29	
	Laboratory Technologist/Technician		22	6	
	Medical Doctor		32	9	
	Total		**182**	**120**	
Gender	Male	Poor	14	15	$\chi^2 = 0.221$; df = 1; P = 1.499
	Female		33	20	
	Total		**47**	**35**	
	Male	Good	89	40	$\chi^2 = 0.007$*; df = 1; P = 7.163
	Female		93	80	
	Total		**182**	**120**	

Table 4.13: Test of Association – Continuation of Knowledge Categorized as Good and Poor as per Socio-demographic Characteristics of Respondents (N=384)

Variable		Knowledge	Vaccinated		P-Value
Marital Status	Single	Poor	20	18	Fisher's Exact Test = 0.620; df = 3; P = 2.180
	Married		24	17	
	Widowed/Widower		1	0	
	Separated/Divorced		2	0	
	Total		**47**	**35**	
	Single	Good	91	46	Fisher's Exact Test = 0.005*; df = 3; P = 10.945
	Married		90	67	
	Widowed/Widower		0	5	
	Separated/Divorced		1	2	
	Total		**182**	**120**	
Years of practice	Less than one year	Poor	12	4	Fisher's Exact Test = 0.291; df = 3; P = 3.784
	1 to 5 years		19	20	
	6 to 10 years		5	5	
	More than 10 years		11	6	
	Total		**47**	**35**	
	Less than one year	Good	54	22	χ^2 = 0.001*; df = 3; P = 15.793
	1 to 5 years		66	32	
	6 to 10 years		24	17	
	More than 10 years		38	49	
	Total		**182**	**120**	
Department – Outpatient	Yes	Poor	16	11	χ^2 = 0.803; df = 1; P = 0.062
	No		31	24	
	Total		**47**	**35**	
	Yes	Good	50	55	χ^2 = 0.001*; df = 1; P = 10.749
	No		132	65	
	Total		**182**	**120**	
Department – Inpatient	Yes	Poor	23	14	χ^2 = 0.421; df = 1; P = 0.647
	No		24	21	
	Total		**47**	**35**	
	Yes	Good	106	53	χ^2 = 0.017*; df = 1; P = 5.747
	No		76	67	
	Total		**182**	**120**	
Department – Laboratory	Yes	Poor	1	9	Fisher's Exact Test = 0.002*; df = 1; =
	No		46	26	
	Total		**47**	**35**	
	Yes	Good	21	9	χ^2 = 0.251; df = 1; P = 1.318
	No		161	111	
	Total		**182**	**120**	

Generally, knowledge categorized as poor or good resulted in no significant association with uptake of the hepatitis B vaccination by HCW. This was shown from $\chi^2 = 0.629$, P = 0.233 and 1df at 0.05 level of significance **(Table 4.14).**

Table 4.14: Test of Association between knowledge and uptake of hepatitis B vaccination

		Vaccination			P-Value
		Yes	No	Total	
Knowledge	Poor	47	35	82	$\chi^2 = 0.629$; df = 1; P = 0.233
	Good	182	120	302	
Total		**229**	**155**	**384**	

4.6.2 Test of Association between advocacy mechanisms and uptake of hepatitis B vaccination

The study tested the hypothesis that advocacy mechanisms did not have a significant association with uptake of hepatitis B vaccination among the HCW. Pearson chi-square value of $\chi^2 = 0.425$, P = 1.710 at 0.05 level of significance and 2 df showed that there was no significant association between advocacy mechanisms and uptake of Hepatitis B vaccination), (**Table 4.15)** accepting the hypothesis that there is no relationship between the two. This leads to the conclusion that advocacy mechanisms do not necessarily lead to uptake of vaccination by the HCW. Vaccination of HCW could be due to other factors other than advocacy mechanisms.

Table 4.15: Test of association: Advocacy mechanisms characterized as None, Inadequate and Adequate as per vaccination status

		Vaccinated			P-Value
		Yes	No	Total	
Advocacy Mechanism	None	109	84	193	$\chi^2 = 0.425$; df = 2; P = 1.710
	Inadequate	87	53	140	
	Adequate	33	18	51	
Total		**229**	**155**	**384**	

4.6.3 Test of association between attitude of HCW towards HB and uptake of hepatitis B vaccination

The study also tested the hypothesis that attitude of HCW towards HB did not have a significant association with uptake of hepatitis B vaccination. However, Pearson chi-square value of $\chi^2 = 0.051$, P = 3.808 at 0.05 level of significance and 1 df showed that there was a significant association between attitude of HCW and uptake of Hepatitis B vaccination (**Table 4.16**), rejecting the hypothesis that there is no relationship between the two. This leads to the conclusion that attitude, categorized as positive or negative has a significant association on uptake of vaccination by the HCW.

Table 4.16: Test of association: Attitude of HCW towards HB and uptake of hepatitis B vaccination

		Vaccinated			P-Value
		Yes	No	Total	
Attitude	Positive	213	135	348	$\chi^2 = 0.051$*; df = 1; P = 3.808
	Negative	16	20	36	
Total		**229**	**155**	**384**	

4.6.4 Test of association between advocacy mechanisms and attitude of HCW towards HB

The study further looked at the association between advocacy mechanisms and attitude of HCW towards HB vaccination. The results concluded that there was no significant association between the two as illustrated by Fisher's Exact Test = 0.572, P = 1.131 at 0.05 level of significance and 2 df (**Table 4.17**).

Table 4.17: Test of association: advocacy mechanisms and attitude of HCW towards HB

		Attitude			P-Value
		Positive	Negative	Total	
Advocacy Mechanism	None	172	21	193	Fisher's Exact Test = 0.572; df = 2; P = 1.131
	Inadequate	128	12	140	
	Adequate	48	3	51	
Total		**348**	**36**	**384**	

4.6.5 Test of association between knowledge and attitude of HCW towards HB

This study also assessed if there was a significant association between the knowledge of HCW on HB and attitude of HCW towards hepatitis B vaccination. Pearson chi-square value of $\chi^2 = 0.023$, P = 5.151 at 0.05 level of significance and 1 df showed that there was a significant association between knowledge of HCW and the attitude of HCW towards Hepatitis B vaccination (**Table 4.18**), rejecting the hypothesis that there is no relationship between the two. This leads to the conclusion that knowledge categorized

as good or poor has a significant association on attitude of HCW towards uptake of hepatitis B vaccination.

Table 4.18: Test of association between knowledge and attitude of HCW towards HB

		Attitude			P-Value
		Positive	Negative	Total	
Knowledge	Poor	69	13	82	$\chi^2 = 0.023$*; df = 1; P = 5.151
	Good	279	23	302	
Total		**348**	**36**	**384**	

CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion

5.1.1. Knowledge of HCW on HBV infection and vaccination

Generally, it is easy to assume that health care workers should have adequate knowledge about diseases and other health conditions, by virtue of their training and proximity to health facilities. The study findings found out that a fairly high number of HCW (78.6%) were within the good knowledge range while 21.4% showed poor knowledge about hepatitis B. The good knowledge results in this study were higher than results from a study in Haramaya University, Ethiopia where 56.2% showed adequate knowledge about HB (Mesfin and Kibret, 2013). Results from another study on knowledge of hepatitis B vaccine in Nigeria, found that majority of operating room personnel had good knowledge of the risk factors (Kesieme et al., 2011). These were similar to results from Cameroon that showed good knowledge scores (Noubiap et al., 2014).

The results of this study were, however, lower than 86.5% who had good knowledge of HB infection in a study among primary healthcare workers in North Central Nigeria (Daboer et al., 2010). The study results, also, contrasted with results from another study done in Erbil City, Iraq where a low proportion, 14%, of the respondents demonstrated a very low knowledge of hepatitis B infection (Othman et al., 2013). Another study that contrasted was in KwaZulu-Natal, South Africa where knowledge of respondents

regarding HBV was weak as only 33% of them knew the true risk of HBV transmission (Khan and Ross, 2013).

Specific knowledge items indicated that majority of the HCWs (97.9%) had heard about Hepatitis B and 97.7% knew that it was caused by a virus. This was much higher than in a study among Korean American where 85% had heard of hepatitis B prior to the study (Bastani, 2007), and 81% in Southern Nigeria (Samuel, 2009). The knowledge on causative organism as virus was also higher than 60% shown in Germany (Schenkel, 2008).

A study on hepatitis B in Moroccan HCW noted that 100% of them were aware of acquisition of hepatitis B infection through blood transfusion, slightly higher than 98.7% found in this study (Djeriri et al., 2008). That Moroccan study also found 85% of HCW citing that HBV is also a sexually transmitted disease, almost similar to 86.2% found in this study. Another study on hepatitis B testing for liver cancer control among Korean American identified two major routes of transmission; via sexual activity (64%) which was lower than results from this study and (79%) from mother to child during birth which was higher than 63% seen in this study (Bastani, 2007).

Regarding treatment, half of the respondents (50.2%) in this study thought that there was hepatitis B treatment. This is contrary to the fact that there is currently, no treatment available for acute hepatitis B, and that treatment of chronic hepatitis B is

aimed at eliminating infectivity to prevent transmission and spread of HBV (WHO, 2002).

Prevention then seems to be the best mode of halting spread of hepatitis B infection. Respondents in this study enlisted several methods they thought would prevent hepatitis B infection thus. In that regard, majority (96.6%) knew that vaccination is a means of prevention of hepatitis B infection, and only 78.1% knew that hepatitis B vaccine does exist. This compared well with results from another study in a tertiary hospital in Multan, where majority (96.56%) of HCW thought that it can be prevented by vaccination (Jadoon, 2009), as was 78% in Karachi (Memon, 2007). In Saudi Arabia, an overwhelming 100% of respondents knew about the availability of hepatitis B vaccine (Paul, 1999), as was 86.8% in Nigeria (Kesieme et al., 2011).

There was no statistically significant association between knowledge the uptake of hepatitis B vaccination. This contrasted with a study in North India where knowledge of infection was found to be significantly associated with acceptance of vaccine or completion of immunization schedule (Pathak et al., 2013).

5.1.2 Advocacy Mechanisms and the influence on HCW need for vaccination against HBV

About 3 million HCW face occupational exposure to blood borne viruses each year (2 million to HBV, 900,000 to HCV and 300,000 to HIV) and 90% of the infections that result from these exposures are in low income countries (WHO, 2002). A small

proportion of HCW in this study (13.3%), however, noted that the advocacy mechanisms in their institutions were adequate. Specific advocacy items assessed in this study included policy on pricks, where majority (95.3%) stated that this was available in their institutions. A very low proportion (17.4%) of HCW in this study had attended a workshop organized on hepatitis B. In a study among medical student in Cameroon, participants who had been sensitized by their training institutions about the importance of HBV vaccination were more likely to be vaccinated compared to those who had not been sensitized (Noubiap et al., 2013).

Not many studies have demonstrated existence of vibrant advocacy mechanisms against HB infection. This agrees with the conclusion made in "prevention of viral hepatitis reassessed", that unlike hepatitis C and HIV, HBV has not captured sufficient attention from policy makers, advocacy groups or the general public (Herck et al., 2008). This seems to also concur with key informant statement that "*there has been no policy for vaccination of Health Care Workers in the Ministry of Health. We are now presenting a draft vaccination policy which now includes HCW*", (words of Dr. Meriakol of Division of Vaccines and Immunization). Another key informant respondent, Mr. Kongai (Monitoring and Evaluation Officer at the Ministry of Health) said "*hepatitis B infection was not among the reportable conditions from health facilities*". There was no statically significant association between advocacy mechanisms and uptake of the vaccine, leading to the conclusion that advocacy mechanisms do not necessarily lead to uptake of hepatitis B vaccination among HCW. Therefore, vaccination could be due to other

factors other than advocacy mechanisms. The investigator did not come across studies that have looked into this relationship.

5.1.3 Attitudes of HCW towards Hepatitis B vaccination

Attitudes of majority (90.6%) of the HCW towards hepatitis B vaccination were positive while only 9.4% had negative attitudes. A high proportion (98.2%) of HCW in this study felt that their occupation is a risk for hepatitis B virus transmission. This was higher than a study in Nigeria, where 78.3% of operating room personnel thought that they were at a greater risk of becoming infected with HBV than the general population (Kesieme et al., 2011). The results of this study were almost similar to 92.6% of respondents in Southern Nigeria who had heard of hepatitis B infection and felt that their jobs put them at risk of contracting hepatitis B infection (Samuel, 2009). Similarly, 93% of HCW in Karachi knew that they are at increased risk due to their occupation (Memon, 2007), as were 93.11% in Multan (Jadoon, 2009).

A majority of the HCW (90.4%) felt that protection through hepatitis B vaccination was good. This was slightly lower than among Moroccan HCW where 98% acknowledged that vaccination was a necessary means against HBV transmission (Djeriri et al., 2008).

Generally in this study, attitude had a significant association with uptake of hepatitis B vaccination. This concludes that attitude, categorized as positive or negative has a significant association on uptake of hepatitis B. A study in North India found that there was a significant relationship between the components of perceived susceptibility (risk

of getting hepatitis B, potential seriousness of hepatitis B infection, splash blood and/or body fluid) and acceptance of hepatitis B vaccine (Pathak et al., 2013). Further, a study in Greek Military Hospitals also showed that HCW who perceived hepatitis B infection as a serious occupational threat had almost three times higher odds of vaccine acceptance (Tsoulas, 2009). In another study, 83.3% were of the opinion that the vaccine should be given to operating room personnel as part of the workplace safety measure (Kesieme et al., 2011).

Further, in this study, 93.8% of the respondents would be willing to refer other HCW for vaccination against hepatitis B. This compared closely to 81.1% in Nigeria who would recommend the vaccine to another surgical staff and this was statistically significant (Kesieme et al., 2011). Other results from study showed that 92.4% of the HCW were willing to take the vaccine if made available and 94% suggested that the vaccine be made a policy in the health care workforce. Almost similar results we observed among HCW in Morocco where 98% regarded vaccination against hepatitis B as essential in the workforce (Djeriri et al., 2008). In this study, there was a significant association between attitude categorized as positive or negative and uptake of hepatitis B vaccination.

5.1.4 Uptake of Hepatitis B Vaccination by HCW

Vaccination is an important measure in preventing HBV infection in health care workers. While it is tempting to assume that Health Workers will likely show a high

level of compliance with regards to beneficial health procedures and programmes, evidence from literature caution otherwise. Significant non-acceptance to hepatitis B immunization has been reported among various groups of Health Care Workers including those at greatest risk of contact with infected body fluids (Jha et al., 2012).

This study revealed a relatively low uptake of hepatitis B vaccine (59.6%) among the target HCW. This compared closely (52%) with a study among HCW in Karachi (Memon, 2007). The results were also closely comparable to 60% overall hepatitis B vaccination acceptance realized among HCW in North India (Pathak et al., 2013). Another study with close results to this study is one in a tertiary care hospital in Multan where hepatitis B vaccination rates was 62.07% (Jadoon, 2009). It was slightly higher than in Sudan where more than 50% of the healthcare workers were not vaccinated against hepatitis B virus (Bakry et al., 2012).

This study was however, lower in the uptake of hepatitis B vaccination as compared to a study in the United States where (83.8%) of HCW in Military hospitals, Veteran Administration hospitals (73.1%) and Indian Service hospitals were vaccinated (Simard et al., 2007). This study also was not comparable to high vaccination rates in India where 88% of dental interns, 89% of medical interns and 78.2% of nursing interns were vaccinated against hepatitis B (Setia et al., 2013).

This study results were, however, higher than 26.8% found among operating room personnel in Nigeria (Kesieme et al., 2011). It was also much higher than the

vaccination status 12.8% in a study done in Kenya (Suckling et al., 2006). The results were also much higher than from a study done in Haramaya University, Ethiopia where the vaccination status was 13.4% (Mesfin and Kibret, 2013). Another study that had low vaccination rate than this study is one done in Cameroon where 24.5% were vaccinated (Noubiap et al., 2014).

This study results revealed that complete vaccination had not been achieved, where only 32% of the respondents had received the required three dose vaccination. Partial vaccination comprised of 27.6% and none vaccination was 40.4% of the respondents. The results from this study were much lower than most of the studies reviewed. In one study in India, 69.3% of dental interns had received complete vaccination, as had 73% of medical interns and 72% of nursing interns (Setia et al., 2013).

The results of this study were also lower than the full immunization seen in a study in Southern Nigeria where 59.4% had completed vaccination (Samuel, 2009). In a study in Karachi, 52% of the healthcare workers were vaccinated, 33.6% were not vaccinated and 14.4% were partially vaccinated (Memon, 2007). Other studies revealed that 62.07% of health care workers were completely vaccinated, 12.64% were partially vaccinated while 25.29% were not vaccinated against hepatitis B in Multan (Jadoon, 2009). Another study showed that 60% of the respondents were completely immunized, 18% had complete immunization and 22% had no immunization at all in Lahore (Sheikh, 2007). In another study in a tertiary care hospital in Pakistan also showed high complete vaccination rate (57.6%) than results from this study (Hussain, et al., 2010).

The study also contrasted with another study assessing the hepatitis B vaccination status and identification of risk factors for hepatitis B in health care workers where 86% of the health care workers who participated in the study were completely vaccinated, 12% had incomplete vaccination and 2% didn't have even a single dose (Ali, 2005). In another study in Haji (Madani 2007), 66.3% of health care workers completed the three-dose series of the hepatitis B vaccine, 12.2% two doses, 7.1% one dose while 14.3% did not receive any dose.

A study in Haramaya University, Ethiopia had lower complete immunization rates than this study, as only 4.7% had completed the required three dose vaccination (Mesfin and Kibret, 2013). Another study among dental surgeons in Benin City, Nigeria also revealed lower vaccination completion rates than our study, where only 20.0% had received three doses of the hepatitis B vaccine (Azodo et al., 2012).

Regarding post-vaccination testing of antibodies to assess if vaccine caused immunity, a very small proportion (15.7%) of the respondents in this study had done post vaccination screening for confirmation of immunity, possibly giving some false sense of security against HBV infection. This was way too low as compared to 51.5% of HCW had post-vaccination tests to confirm development of immunity in Hajj (Madani, 2007). Another study among operating room personnel in Nigeria revealed that 47.5% of those that were completely vaccinated had undergone antibody testing, which showed good response to vaccination (Kesieme et al., 2011). These results contrast with the results of this study. Another study done in Brazil revealed almost close results to the results in

this study, at 85.2% of respondents not performing post-vaccination test (Resende et al., 2010). In the Brazil study, only 14.8% carried out post vaccination screening. In another study in Cameroon, 33.3% of the adequately vaccinated residents had post-vaccination testing for antibodies against hepatitis B surface antigen, to confirm a good immunological response and thus effective protection against HBV infection (Noubiap et al., 2014).

The post-vaccination test results of this study were, however, higher than 2% tested in Karachi (Memon, 2007). In Kenya, a similar study showed that none of the respondents who had received vaccination had been screened for immunity (Suckling et al., 2006).

The results of this study indicated that uptake of hepatitis B vaccination by the HCW was low (59.6%). The studies assessed the reasons for non-vaccination. The respondents cited a number of reasons for non-vaccination. Majority of the HCW (68.0%) indicated that the vaccine was not readily available making it hard for them to access. This was higher than results from a study in North India, where 20% of the respondents had difficulty in obtaining the vaccine because it was unavailable through government channels (Pathak et al., 2013). A much lower mention of unavailability of the vaccine was realized from a study in Pakistan where only 0.5% of the respondents cited this reason (Attaullah et al., 2011)

Another challenge that could have led to low uptake of the HBV vaccine in this study was the high cost as cited by 26.4% of respondents. This compared closely with 28% in

Lahore (Sheikh, 2007). It also compared closely to results from a study in Cameroon where 23.1% of the respondents had not been vaccinated because they lacked funds to pay for the vaccine (Noubiap et al., 2014). The results from this study were lower than from a study in Pakistan where 39.8% of the respondents cited unaffordability or high costs of the vaccine (Attaullah et al., 2011). The study results were, however, higher than those from a study in North India where 12% cited unwillingness to spend money or cost of the vaccine as reason for non-vaccination (Pathak et al., 2013). This reason also seems to agree with explanation given by Dr. Meriakol in Key Informant interview who said "*the government currently only provides hepatitis B vaccines for childhood vaccination. Any HCW who wishes to get the vaccine has to bear the cost, which is relatively high*" (Division of Vaccines and Immunization).

Type of facility was found in this study to have a significant association with uptake of hepatitis B vaccination. This compared well with a study in Northwest Pakistan (Yousafzai et al., 2014). This study also revealed that province had a significant association with uptake of hepatitis B. The investigator was unable to access studies that have isolated regional distribution. The cadre of health care workers was also found in this study to have significant association with uptake of hepatitis B vaccination. The same results were also observed in Northwest Pakistan (Yousafzai et al., 2014).

Age in this study was statistically significant in association with hepatitis B vaccination. A study on hepatitis B immunization in health care workers found statistically significant results as far as age and uptake of hepatitis B vaccination (Chaudhari et al.,

2009). Similar results were also observed in Jos, North Central Nigeria, (Daboer et al., 2010). Another study that also compared well with this study is one done on Hepatitis B vaccine coverage and factors relating to its acceptance in a tertiary care center in North India where age of respondents was significantly associated with uptake of the vaccine (Pathak et al., 2013). A study in Greek Military Hospitals also found age statistically significant factor associated with higher odds of hepatitis B vaccination (Tsoulas 2009). However, a study in Nigeria found contrary results with age (Kesieme et al., (2011). There was also no significant association between age and uptake of hepatitis B vaccination from results seen in a study in Cameroon (Noubiap et al., 2014).

Years of professional practice also was a significant determinant of hepatitis B vaccination uptake in this study. Similar results were found among Health Workers in Enugu, Nigeria where years of occupational practice had a predictive influence on vaccination (Ibekwe, 2006). Another study in India also found significant results with experience in reasons of respondents accepting hepatitis B vaccination (Pathak et al, 2013). Another study that compared well with this study as regards years of practice is one that was done in Greek Military Hospitals (Tsoulas, 2009). Another study among primary health care workers also showed significant association with uptake of hepatitis B vaccination (Costa, 2013). Another study among operating room personnel in Nigeria however found no significant difference between duration of practice and uptake of hepatitis B vaccination (Kesieme et al., 2011). The same contrasting results were realized in a study done in Edo State, Nigeria (Obi, 2013).

5.2 Conclusions

Based on the results of this study, the following conclusions were drawn:

i. Knowledge on Hepatitis B infection, categorized as good and poor, among the health care workers was generally high with 78.6% of the respondents being ranked within the good knowledge range. There was no significant association between the general knowledge and uptake of hepatitis B vaccination.

ii. Slightly more than half (50.3%) of the HCW indicated that their institutions did not have advocacy mechanisms in place. Only 13.3% had adequate advocacy mechanisms. There was, however, no significant association between advocacy mechanisms and uptake of the hepatitis B vaccination.

iii. Majority (90.6%) of the respondents had positive attitudes towards hepatitis B infection and vaccination. Attitude, categorized as positive or negative, demonstrated a significant association with uptake of hepatitis B vaccination by the HCW.

iv. Among the respondents, 59.6% had received hepatitis B vaccination. Of these, only 32.0% had completed the recommended three dose vaccination. The uptake was affected by the attitude, which was in turn affected by the knowledge. Among those who had not received any vaccination, majority (68.0%) indicated that the vaccine was not readily available and even where it was available, the cost was high (26.4%).

5.3 Recommendations

Based on the study findings, this study recommends;

i. Ministry of Health should come up with measures to increase the knowledge of hepatitis B.

ii. Though advocacy mechanisms did not proof to affect vaccination, there is need for the health institutions to put in place advocacy mechanisms because a minority (13.3%) had advocacy measures in place. The measures may improve the completion of the doses and post-vaccination test check for immunity.

iii. The attitude of HCW towards hepatitis B and vaccination is critical in uptake of the hepatitis B vaccination. The institutions should put in place programmes to keep promoting the positive attitudes of the HCW towards the HB.

iv. The government and the health institutions should make hepatitis B vaccine available for free or at a cost that most HCW can afford. HCW should be encouraged to get vaccinated and to take all the recommended doses.

5.4 Further Research

This study proposes the following studies:-

- Serological studies to assess the prevalence of hepatitis B among HCW.
- Assessment of anti-HBs titer after complete vaccination of HCW to find out the response to vaccination.

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APPENDICES

Appendix 1: Questionnaire

1. Letter of Introduction

Dear Sir/Madam,

My name is Leah Jepkios Bett, a postgraduate student in the Department of Public Health, Kenyatta University. I am carrying out research on the Uptake of Hepatitis B Vaccination and Its Determinants among High-Risk Health Care Workers in Selected Hospitals in Kenya. Kindly, answer the following questions to the best of your knowledge. The information provided will be treated with utmost confidentiality, and will not be used for any other purpose apart from guiding the outcome of this research. Thank you

Questionnaire Number: _____ Date of Interview: _____

Hospital Name: _____

Institution Type *(Ownership and Administration)*

☐ Government ☐ Private ☐ Mission

Province: _____

2. Questionnaire

SECTION A: BASIC INFORMATION

1. Professional Cadre

☐ Nurse ☐ Clinical Officer ☐ Laboratory Techologist/Technician

☐ Medical Doctor ☐ Surgeon

2. Sex:

☐ Male ☐ Female

3. Age:

☐ Below 29 years ☐ 30 - 39 years ☐ 40 - 49 years

☐ 50 years and above

4. Marital Status

☐ Single ☐ Married ☐ Widowed/Widower Separated/Divorced

5. How long have you been practicing?

☐ Less than one year ☐ 1 - 5 years ☐ 6 - 10 years ☐ More than 10 years

6. Which section(s) are you mostly stationed? **(Choose all that apply)**

☐ Outpatient ☐ In patient ☐ Operating theatres ☐ Laboratory

☐ Maternity/Delivery Ward

SECTION B: <u>KNOWLEDGE ON HEPATITIS B VIRUS</u>

7. (i) Have you ever heard about Hepatitis B?

☐ Yes ☐ No

(ii) What Causes Hepatitis B?

	Causes	**TRUE**	**FALSE**
	Fungi		
	Parasites		
	Viruses		
	Bacteria		

Others ……Specify_____

(iii) If YES above, by selecting TRUE or FALSE, identify the different modes of transmission of Hepatitis B Virus.

	Mode	**TRUE**	**FALSE**
a	Body cuts (tattoos, ear piercing, haircuts)		
b	Blood products		
c	Contact with pets		
d	Droplet infection		
e	Mosquito bites		
f	Needle pricks		
g	Shaking hands		
h	Sharing Dishes		
i	Unprotected sexual intercourse		
j	Vertical Transmission		

Others ---------Specify_____

8. (i) Do you think your occupation is a risk for Hepatitis B Virus transmission?

☐ Yes ☐ No

(ii) To what extent do you feel that your occupation poses a risk to transmission of Hepatitis B Virus?

☐ To a very large extent ☐ To a large extent

☐ To a small extent ☐ It is not a risk at all

(iii) How does your occupation pause a risk to transmission of Hepatitis B Virus?

_____

_____

9. What do you think are the major complications caused by hepatitis B viral infection?

a)_____

b)_____

c)_____

10. Is Hepatitis B Virus infection treatable?

☐ Yes ☐ No

11. Identify some of the preventive measures

	Item	TRUE	FALSE
a	Condoms		
b	Vaccination		
c	Use of protective gloves		
d	Treatment		
e	Isolation		
f	Screening of blood before transfusion		

Others --------Specify_____

SECTION C: <u>OCCUPATIONAL EXPOSURE, HEPATITIS B VACCINATION COMPLIANCE AND ATTITUDES</u>

12. (i) In your professional practice, have you ever handled a case of hepatitis B infection?

☐ Yes ☐ No

(ii) If YES above, state any preventive measure(s) that you took to avoid infection on your part

a) _____

b) _____

c) _____

13. (i) Have you been pricked by a contaminated object during your practice?

☐ Yes ☐ No

(ii) If YES, when?

☐ Within the last one month ☐ In the last six months

☐ In the last one year ☐ More than one year ago

(iii) What did you do about this accidental prick? (**Tick all that apply**)

☐ I did not report the accident

☐ I reported the accident ☐ Blood was screened for possible contraction of HBV

☐ Nothing was done

☐ The patient(s) blood sample was analyzed for Hepatitis B

☐ I was tested for HIV and put on Post Exposure Prophylaxis

Any other *(Please specify)*_____

(iv) What is the policy of your employer regarding pricks?

☐ Report the prick

☐ There is no policy

☐ Take the blood sample from the source for screening for HIV

☐ Take blood sample from the source for screening of hepatitis B virus

☐ I don't know

☐ Other _____

14. (i) Have you been vaccinated against Hepatitis B Virus?

☐ Yes ☐ No

(ii) If NO to (i) above, what are some of the reasons that have hindered you from being vaccinated?

☐ There is no need for Hepatitis B vaccination

☐ The vaccine is not readily available

☐ The cost of vaccine is high

☐ I hate injections

☐ The time between the doses is prolonged

☐ I have suffered from Hepatitis B infection before

Others *(Please specify)* _____

(iii) If you have been vaccinated against hepatitis B virus, how many doses did you receive?

☐ Only one dose ☐ Two doses ☐ All the three doses

(iv) Have you ever had your blood checked to ascertain that the HB vaccination administered has given you immunity?

☐ Yes ☐ No

(v) If yes, what was your motivation for Hepatitis B vaccination?

☐ My fear of contracting Hepatitis B

☐ The vaccine was readily available

☐ It is my employer's policy

Others (Specify) _____

15. (i) Has your spouse been vaccinated against Hepatitis B virus?

☐ Yes ☐ No

(ii) If no, why not?

☐ He/she is not at risk

☐ The vaccine is expensive

☐ The vaccine is not available

☐ He/she declined

Others (Specify) _____

16. Was the need for vaccination against HBV mentioned to you by your employer before your employment?

☐ Yes ☐ No

17. (i) Are there any advocacy measures in your institution that encourage vaccination of health care workers against Hepatitis B Virus?

☐ Yes ☐ No

(ii) If YES above, state them

a) _____

b) _____

c) _____

(iii) If YES in 17 (i) above, how would you rate their efficacy?

☐ Very Effective ☐ Effective

☐ Partially Effective ☐ Not Effective

18. Has your institution organized any workshop to educate staff on dangers of hepatitis B?

☐ Yes ☐ No

b) Have you ever attended any workshops organized in your institutions on prevention of Hepatitis B?

☐ Yes ☐ No

19. a) Have you ever suffered from Hepatitis B infection?

☐ Yes ☐ No

b) If yes, how were you infected?

☐ Needle prick ☐ Handling contaminated blood or blood products

☐ Blood transfusion ☐ Through my sexual partner ☐ I don't know

20. Please tick the number that best describes your attitudes and opinions towards the Hepatitis B Vaccination. The numbers represent the following responses:

(1 = Agree, 2= I am not sure, 3= Disagree)

		Agree	**I am not sure**	**Disagree**
	A vaccine for hepatitis B does exist	1	2	3
	It is meant for children under five alone	1	2	3
	It can be administered to adults	1	2	3
	Protection by Hepatitis B is good	1	2	3
	I would be willing to get a hepatitis B vaccination if recommended	1	2	3
	I would refer other health care workers for hepatitis B vaccination	1	2	3
	Hepatitis B vaccination should be made a policy in the health care workforce	1	2	3

21. Any other remarks/recommendations that you would wish to make concerning vaccination of Health Care Workers against Hepatitis B Virus

a) _____

b) _____

c) _____

d) _____

Thank you for taking time to answer the questions above.

Appendix 2: Interview Guide for Key Informants

1. Letter of Introduction

Dear Sir/Madam,

My name is Leah Jepkios Bett, a postgraduate student in the Department of Public Health, Kenyatta University. I am carrying out research on the **Uptake of Hepatitis B Vaccination and Its Determinants among High-risk Healthcare Workers**. Kindly, answer the following questions to the best of your knowledge. The information provided will be treated with utmost confidentiality, and will not be used for any other purpose apart from guiding the outcome of this research. Thank you

2. Interview Guide

Questionnaire Number: _____ Date of Interview: _____

Name *(optional)* _____

Institution/Department _____

Section _____

Your Position _____

Type of facility

☐ Government ☐ Private ☐ Mission

Province: _____

1. Kindly describe the general trends of Hepatitis B virus contraction amongst healthcare workers in the past decade.
2. How do the prevalence rates compare between the following categories:
    i. Government and private hospitals?

ii. Rural and urban based hospitals?

iii. Male and female healthcare workers?

3. How would you rate the efficiency of the current preventive strategies that the government is employing in combating occupational infection of healthcare workers with Hepatitis B virus, especially uptake of Hepatitis B vaccine?
4. Kindly name the factors that may be hindering the optimal efficiency of the uptake of Hepatitis B vaccine amongst healthcare workers.
5. In your own understanding, what measures should be put in place to promote uptake of hepatitis B vaccination among health care workers?

Thank you for taking time to answer the questions above.

Appendix 3: Map showing study regions

Appendix 4: Ministry of Higher Education Science and Technology Authorization

REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams:"SCIENCETECH", Nairobi
Telephone: 254-020-241349, 2213102
254-020-310571, 2213123.
Fax: 254-020-2213215, 318245, 318249
When replying please quote

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref: **NCST/RRI/12/1/MED011/141**

Date: **6th September, 2011**

Leah J. Bett
Kenyatta University
P.O.Box 43844
Nairobi

Dear ,Madam,

RE:RESEARCH AUTHORIZATION

Following your application for authority to carry out research on; ***"Perception and uptake of hepatitis B vaccination among Health Care workers in Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **selected Districts in** Kenya for a period ending **30th March 2012**

You are advised to report to **The District Commissioner, The District Education Officer and The Medical Officers of Health of the selected Districts** before embarking on the research project.

On completion of your research project you are advised to submit **one hard** copies and **one soft** copy of your thesis/ project to this office.

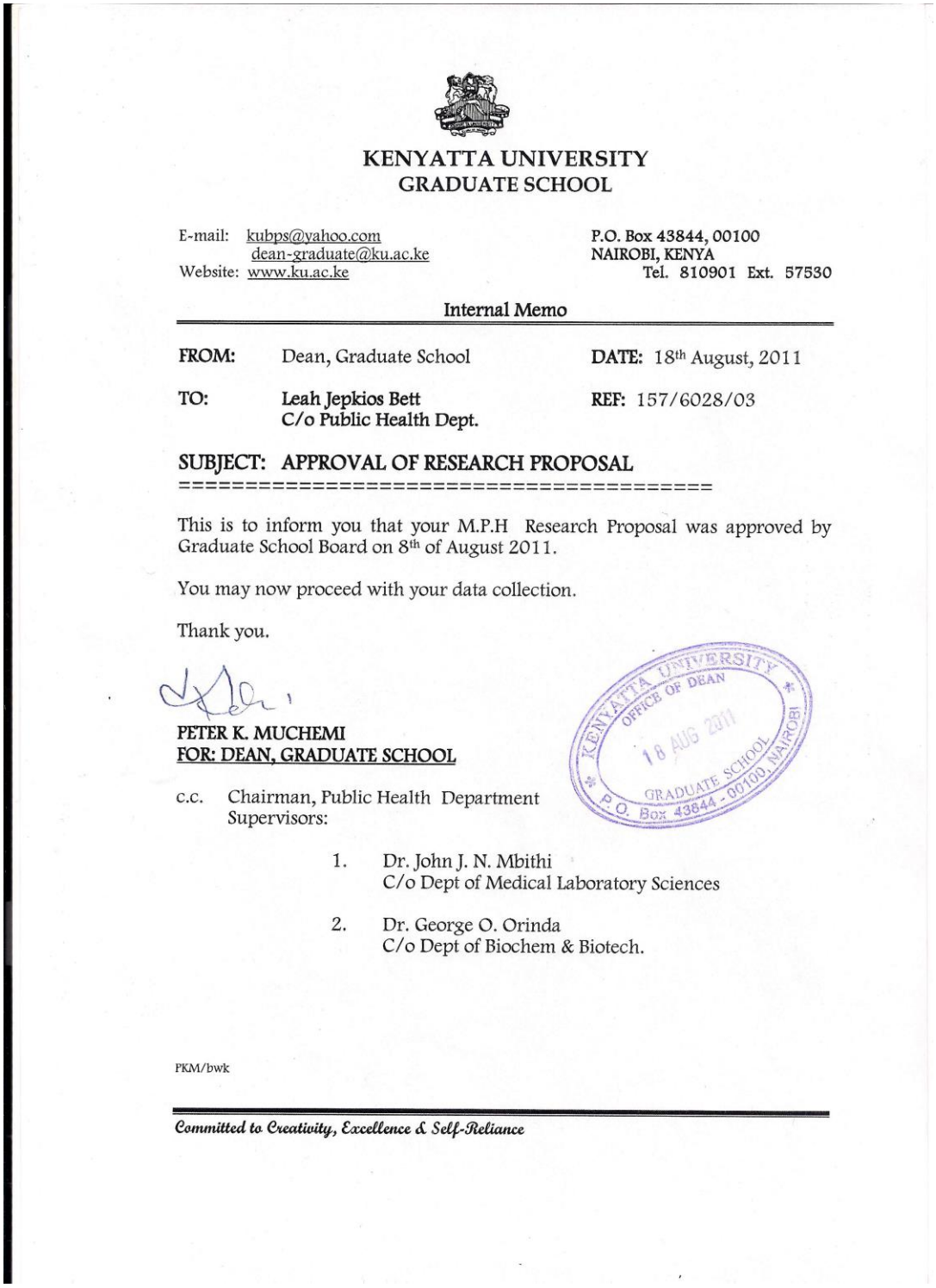
P.N NYAKUNDI
FOR: SECRETARY/CEO

Copy to:

The District Commissioners
Selected Districts

The District Education Officers
Selected Districts

Appendix 5: Kenyatta University's Approval



KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: kubps@yahoo.com
dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 810901 Ext. 57530

Internal Memo

FROM: Dean, Graduate School **DATE:** 18th August, 2011

TO: Leah Jepkios Bett
C/o Public Health Dept.

REF: 157/6028/03

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that your M.P.H Research Proposal was approved by Graduate School Board on 8th of August 2011.

You may now proceed with your data collection.

Thank you.

KENYATTA UNIVERSITY OFFICE OF DEAN 18 AUG 2011 GRADUATE SCHOOL P.O. Box 43844 - 00100, NAIROBI

PETER K. MUCHEMI
FOR: DEAN, GRADUATE SCHOOL

c.c. Chairman, Public Health Department
Supervisors:

1. Dr. John J. N. Mbithi
   C/o Dept of Medical Laboratory Sciences
2. Dr. George O. Orinda
   C/o Dept of Biochem & Biotech.

PKM/bwk

Committed to Creativity, Excellence & Self-Reliance

Appendix 6: Western Province Authorization

MINISTRY OF PUBLIC HEALTH AND SANITATION

Telephone: 056-31110

Email:
dmohkakamegacentral@gmail.com
When replying, please quote

REF: TR.9. VOL.I/99

The Medical Officer of Health,
Kakamega Central District
P.O. Box 750,
Kakamega

Date: 29th September 2011

TO ALL FACILTY IN CHARGES

RE: RESEARCJH AUTHORIZATION
KEAH J. BETT

The above named person is authorized to conduct her research in health facilities within Kakamega Central District. You therefore requested to kindly assist her.

Yours Faithfully,

Samuel Waweru
For: District Medical Officer of Health
Kakamega Central District

Appendix 7: St. Mary's Mission Hospital Authorization

ST. MARY'S MISSION HOSPITAL
P.O. BOX 3409 – 00506 Nairobi
Tel: 604235/38

01st August 2011

Ms. Leah Jepkios Bett
HND Registration No. 157/6028/2003
Department of Public Health
School of Health Sciences
Kenyatta University
P.O Box 19852-00202
NAIROBI

Dear Leah Jepkios Bett

RE: APPLICATION FOR PERMISSION TO CARRY OUT STUDY TITLED "PERCEPTION AND UPTAKE OF HEPATITIS B VACCINATION AMONG HEALTH CARE WORKERS IN KENYA"

We write to acknowledge receipt of your application to use our hospital as a research site for your study on the above subject matter. We are also in receipt of the copy of your research proposal.

We have reviewed your proposal and found it to be current, relevant and appropriate. We are glad to inform you that we have no objection in granting you permission to carry out your study at our hospital during the proposed period. We however require that before you embark on the research you submit to us a letter of ethical approval from your institution.

This permission is granted on condition that during the period of your study you ensure that:-

1. All information you come across during your study will be treated as confidential
2. All information obtained will only be used for the intended purpose of this study
3. The study will not cause unnecessary delays or jeopardize patient care in any way
4. The study will not interfere with the smooth running of the hospital services

At the end of your study you will be requirement to submit to the hospital a copy of the final report of your research findings and recommendations.

Yours sincerely

Dr. Konya W.P
MEDICAL DIRECTOR

cc. Hospital Admin