



ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE

DEPARTEMENT OF PUBLIC HEALTH

**ASSESSMENT OF HEPATITIS B VACCINE UTILIZATION
AMONG HEALTH CARE PROFESSIONALS AT ST. PAUL'S
HOSPITAL MILLENNIUM MEDICAL COLLEGE**

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**A RESEARCH REPORT SUBMITTED TO THE DEPARMENT OF PUBLIC
HEALTH, SPHMMC, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF MEDICINE**

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Acronyms

Anti-HBcAg:	Antibody for Hepatitis B core Antigen
Anti-HBeAg:	Antibody for Hepatitis B e Antigen
Anti-HBsAg:	Antibody for Hepatitis B surface antigen
BBP	Blood Borne Pathogens
HBeAg	Hepatitis B e Antigen
HBV	Hepatitis B Virus
HBsAg	Hepatitis B Surface Antigen
HCWs	Health Care Workers
PEP	Post Exposure Prophylaxis
SPSS	Statistical Package for Social Sciences
STD	Sexually Transmitted Disease
SPHMMC	St. Paul's Millennium Medical College
TAH	Tikur Anbessa Hospital
WHO	World Health Organization

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ABSTRACT

Background: People at high risk for Hepatitis B virus (HBV) include health care workers (HCWs) in contact with blood and human secretions. HBV is unique compared to other sexually transmitted diseases, because it can be prevented with vaccine which is highly efficacious that protects against HBV infection 90- 100%. However, little is known about the utilization of the vaccination among health care professionals in Ethiopia.

Objective: The aim of this study was to assess hepatitis B Vaccine utilization and potential factors for not getting vaccinated among health care professionals at St Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia

Methods: Institutional based cross sectional analytic study was conducted on health care workers (HCWs) at St Paul Hospital Millennium Medical College. Systematic random sampling technique was employed to select eligible study participants from list of health workers. Data was collected by self-administered questionnaires and analysis was performed with SPSS.

Results: A total of 266 health care professionals participated in this study with response rate of 100%. Among which 138 (51.9%) of them were vaccinated. Out of those who are vaccinated 21 (15.2%) took only one dose while 51 (37.0%) and 66 (47.8%) took two and three doses respectively. In multivariate analysis socio-demographic factors didn't show significant association while using of infection prevention [AOR: 80.14, 95% CI, (9.05-1107.82)], HBV screening [AOR: 175.90, 95% CI, (238.08-1299.65)] and encountering exposure to HBV [AOR: 6.16, 95% CI, (1.402-27.059)] were associated significantly with HBV vaccine utilization.

Conclusion and Recommendation: In this study 51.9% of HCWs have received at least one dose of HBV vaccine which is relatively better than other studies done in Ethiopia but still compared to the threat HBV pose to HCWs. There is a need to promote hepatitis B virus screening and vaccination among health care professionals the ministry of health and hospitals should play its part by increasing health care budgets and put priority on hepatitis B prevention by establishing a national awareness campaign, spreading screening and vaccination services all over public hospitals

1. INTRODUCTION

1.1 Back ground

Hepatitis B infection is a potentially life-threatening blood born liver infection caused by hepatitis B virus (HBV) (1). It is the tenth leading cause of death among all diseases worldwide (2), and the fifth leading cause of death from infectious diseases worldwide, surpassed only by lower respiratory tract infections, diarrheal diseases, Human Immuno deficiency Virus/ Acquired Immuno-Deficiency Syndrome (HIV/AIDS) and Tuberculosis (3).

There are more than 2 billion individuals with serological evidence of hepatitis B infection worldwide. Of these, 400 million are chronic carriers and 500,000 to 1.2 million will die annually from cirrhosis and hepatocellular carcinoma (1). Throughout the world, millions of healthcare professionals work in health institutions and it is esteemed that 600,000 to 800,000 cut and puncture injuries occur among them per year. The annual proportion of health care workers exposed to blood borne pathogens was 5.9% for HBV, corresponding to about 66,000 HBV infections in HCWs worldwide (4).

Hepatitis B virus was discovered in 1965 when Blumberg and co-workers found the Hepatitis B surface antigen which was originally called the Australia antigen because it was found in serum from an Australian patient. A few years later, Dane (1970) visualized the HBV (5). HBV is a 42-nm DNA virus classified in the Hepadnaviridae family. The liver is the primary site of HBV replication. After a susceptible person is exposed, the virus enters the liver via the blood stream. HBV infection can produce either asymptomatic or symptomatic infection. The average incubation period is 90 days from exposure to onset of jaundice and 60 days from exposure to onset of abnormal serum alanine aminotrans- ferase (ALT) levels (6).

The spectrum of clinical manifestations of HBV infection varies in both acute and chronic disease. During the acute phase, manifestations range from subclinical or anicteric hepatitis to icteric hepatitis and, in some cases, fulminant hepatitis. During the chronic phase, manifestations range from an asymptomatic carrier state to chronic hepatitis, cirrhosis, and hepatocellular carcinoma. Extra hepatic manifestations also can occur with both acute and chronic infection (1).

People at high risk for HBV include health care workers (HCWs) in contact with blood and human secretions, hemodialysis staff, oncology and chemotherapy nurses, all personnel at risk of needle stick/sharps injuries, which includes those working in

operating rooms and clinical laboratories, respiratory therapists, surgeons, doctors, dentists, as well as medical, dental and nursing students (7).

An exposure that might place health care professional at risk for HBV is defined as a percutaneous injury (a needle stick or cut with a sharp object) or contact of mucous membrane or non-intact skin with blood, tissue, or other body fluids that are potentially infectious: cerebro spinal fluid (CSF), synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid and amniotic fluid are also considered potentially infectious (8).

HBV is unique compared to other sexually transmitted diseases, because it can be prevented with vaccine. Currently available hepatitis B vaccines are extremely safe and have an efficacy of >90 percent and are effective against all HBV serotypes and genotypes. Thus, HBV infection can potentially be eradicated through global vaccination.

(1). Primary vaccination consists of more than three doses of hepatitis B vaccine administered intramuscularly. with the interval of one month between the first and the second dose and six months between the second and the third dose produces a protective antibody response in approximately 30%–55% of healthy adults aged less than 40 years after the first dose, 75% after the second dose, and greater than 90% after the third dose (9)

1.2 Statement of the problem

HBV infections are problems in both developed and developing countries and are important causes of death (8). HCWs are potentially exposed to blood and body fluids containing transmissible diseases and are at increased risk to acquire these pathogens (9, 10).

Hepatitis B is by far the most dreaded and more infectious than the other blood-borne pathogens, it is 100 times more contagious than HIV/AIDS. The estimated risk of a single needle stick injury indicate a risk of 300 hepatitis B virus infection (30% risk), 30 hepatitis C virus infection (3% risk) and 3 HIV infection (0.3% risk), per 1,000 respective exposures (12).

In Sub-Saharan Africa, a study done in Uganda on the seroprevalence and risk factors for HBV infection among HCWs found a seroprevalence of HBV markers of 8.1% indicating current infection, and 48.1% had evidence of previous exposure to HBV). In Tanzania, 7% of HCWs tested positive to HBV this shows the high burden of HBV among HCWs in Tanzania [9]. Nigeria being among the group of countries endemic for HBV infection with about 18 million of its residents being infected with HBV [13], 17% of HCWs in Nigeria were said to be positive to HBsAg based on a screening for hepatitis B surface antigen (HBsAg) carried out among HCWs in an urban community south-south Nigeria [13]. In Egypt, prevalence of HBV was also seen to be high among HCWs (7.3%) compared to the non HCWs (0.9%). This is in line with the high number of needle stick injury which was reported among the HCWs [14]. All these prevalence studies of hepatitis B virus among HCWs show that HBV still pose a great threat to the health of many health workers.

Hepatitis B vaccine knowledge and vaccination status among health care workers of Bahir Dar City Administration, Northwest Ethiopia was studied and it was found that of the total respondents, 370 responded to the question whether they were vaccinated or not at the time of interview. Only thirty seven (10%) respondents reported that they received one or more doses of hepatitis B vaccine. From these, only 20 (54%) received three or more doses which was only 12, 5.4% of the total HCWs. Among 333 respondents who were not vaccinated, 201(60.36%) and 133 (39.93%) reported that the vaccine was not available and costly respectively (15). In another study done at Tikur Anbessa hospital hepatitis B vaccine utilization status of health care professionals was 22.3% out of 394 health care professionals and the reasons put for not vaccinating were forgot the schedule (34.8%), it is costly (17.4%), missed doses (17.4%) and unavailability of the vaccine (8.7%) (16).

WHO Report estimates that 40% of HBV infection is a result of occupational exposure, it has been estimated that 14.4% of hospital workers are infected with HBV. Nurses were most commonly exposed to infection (41%) than other HCWs (14).

A range of measures and interventions can contribute to reduce HBV transmission to HCWs to low levels. One among them is being vaccinated with the three dose HBV vaccine which is protective in more than 90% of users who have completed all the doses at 0, 1 and 6 months. Ninety percent of healthy adults and 95 percent of infants, children, and adolescents have protective serum anti-HBs antibody (anti-HBs) concentrations after the vaccine series has been completed.

In spite of availability of safe and effective vaccine against HBV throughout the world many HCWs especially in resource poor countries remain at risk because they are not vaccinated against HBV (16). WHO's estimation that HBV vaccination coverage amongst HCWs is only 18-39% in low and middle-income countries (17).

1.3 Significance of the study

While Hepatitis B vaccine utilization is universally accepted as an important strategy to decrease the transmission of HBV all over the world and in developing countries like Ethiopia, the rate of infection is still increasing.

Knowing the magnitude of utilization and factors responsible for utilization of Hepatitis B vaccine among HCWs at St Paul Hospital Millennium Medical College will help to show if there is gap of service utilization practice.

The results of this study will further assist the clinical facilities managers, governmental and non-governmental organizations in collaboration with Ministry of Health to be aware of the extent of vaccination uptake, and develop strategies for promoting awareness creation and improving HBV immunization uptake among HCWs. The end results of this study can also be used as a baseline data for further studies.

2. LITERATURE REVIEW

2.1. Epidemiology of HBV

The Hepatitis B Foundation estimates that there are more than 2 billion people infected with HBV, of whom about 400 million are chronically infected and approximately 10-30 million people become infected and 1 million die from HBV induced liver disease per year, which equates to about 2 HBV related deaths occur per minute worldwide (19)

The WHO has therefore demarcated the world according to chronic hepatitis B prevalence into three major blocks which include high, intermediate and low prevalence (fig. 1). High prevalence areas have a prevalence of chronic hepatitis B infection that is 8% and above made up of countries with large population from North America, South America, Sub-Saharan Africa and most Asian countries where at least 8% of the population are HBV chronic carrier and 70–95% of the population shows past or present serological evidence of HBV infection (2). Ethiopia, being part of this region, is ranked as an area with medium to high endemicity for HBV infection, based on previous population surveys (20). Intermediate prevalence areas have a prevalence rate which ranges between 2% and 7% and include countries from South America, North Africa, Western Europe, Eastern Europe and the Indian subcontinent. Between 10-60% of the population have evidence of infection; 2-7% is chronic carriers. Low prevalence areas are estimated to have a prevalence of chronic infection less than 2% which includes most of the North American countries, Australia and most of Western Europe including the United Kingdom. Overall, approximately 45% of the global populations live in areas of high chronic HBV prevalence (2).

Hepatitis B transmission route varies according to the prevalence rate of the virus. Countries with very high prevalence rate usually have vertical transmission as the main route of transmission which is mostly found during childhood. Countries with intermediate prevalence rates normally have horizontal transmission as its major route where the disease is transmitted through sexual contact or through injecting of drugs. In countries with low prevalence rates the epidemic is mostly acquired during adulthood through sexual intercourse or injecting of drugs. In regions of the world where hepatitis B is highly endemic, HBV accounts for around 3% of the total mortality

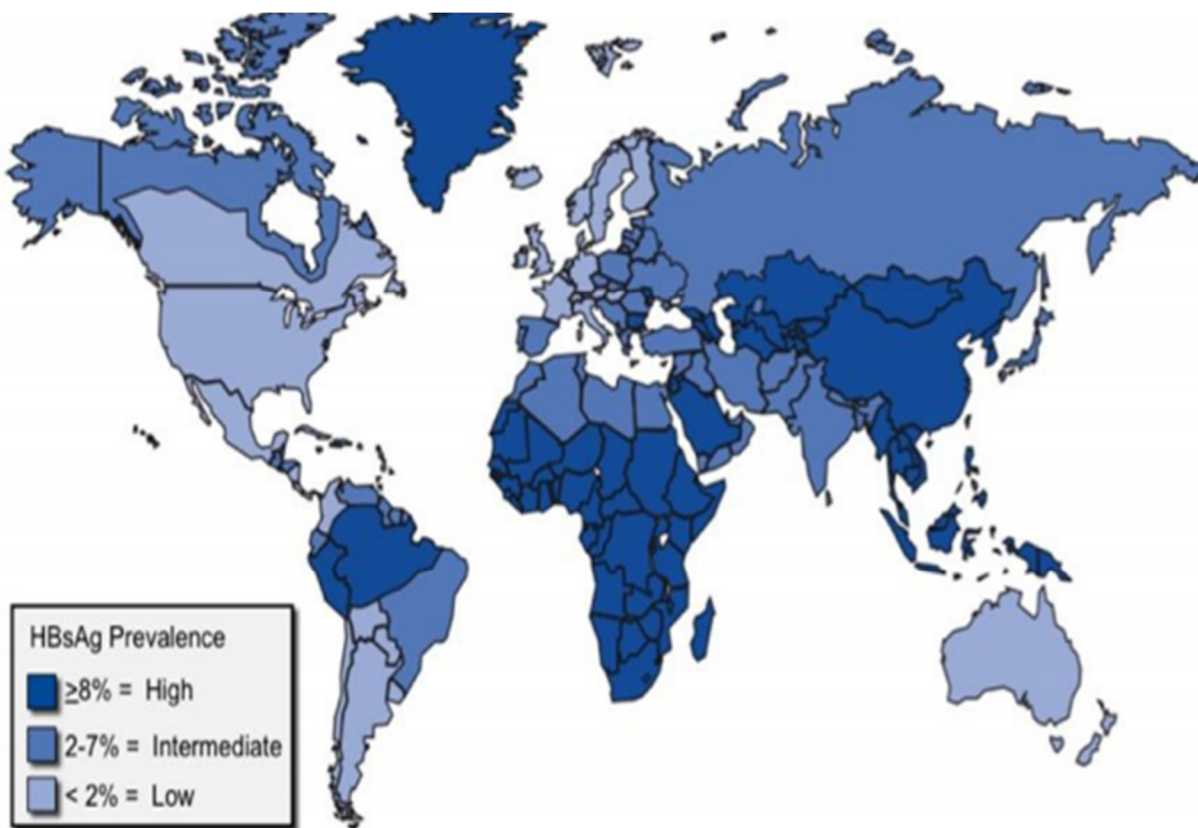


Figure 1: *Magnitude of hepatitis B viral infection as shown in HBsAg prevalence in the world by country, adapted from the World Health Organization with courtesy.*

In Africa, infections with HBV play a major role in the etiology of most liver diseases. The WHO African region includes all of Sub-Saharan Africa estimated HBsAg seroprevalence ranges between 5% and 19% which falls into the high endemicity category.

In Ethiopia the first documented HBsAg prevalence rate was 3.9% in 1968 [29]. Then later the magnitude of the peak HBsAg prevalence (10.8%) was available in 1986 and 1989 [30, 31] and then decreased to 6.2% in 2003 [32] and 5.3% in 2007 [33] from the community based studies (Fig. 2a). However, studies conducted in blood donors (Fig. 2b) reported a slightly higher median prevalence of 8.7% than the 6.2% median prevalence rate in the community based studies.

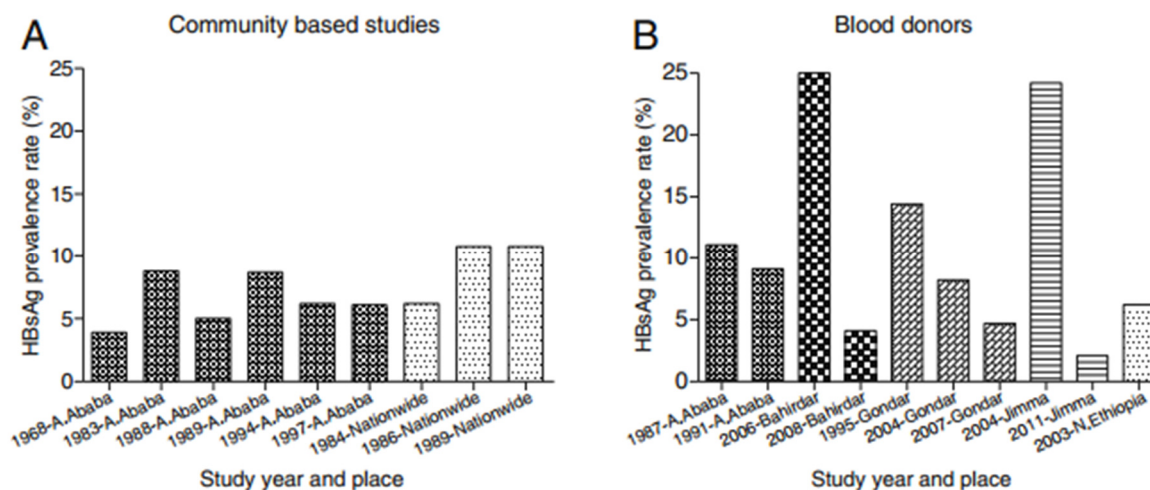


Figure 2. HBsAg prevalence among the community based studies (a), blood donors (b)

2.2 Prevalence of Hepatitis B Virus among Health Care Workers

The worldwide annual proportion of HCWs exposed to HBV infection were reported to be about 5.9% and the risk of contracting hepatitis B by HCWs being fourfold higher as compared to general adult population, thus, reaffirming HBV a major occupational hazard for HCWs [29]. The World Health Organization (WHO) also reported that about two million health care workers (HCWs) in sub-Saharan Africa face occupational exposure to HBV each year [30]

In Africa in a study done among HCW in Uganda, Tanzania, Egypt, and Nigeria 8.1%, 7%, 7.3% and 17% of health care workers respectively were seropositive to HBV (36).

In Ethiopia a study done on 110 health care and 110 non health care workers, hepatitis B virus was detected in 8 (7.3%) and 1 (0.9%) of health care and non-health care workers, respectively. Significant differences were observed in the detection rate of HBV in HCWs compared to non-health care workers. Hepatitis B serological markers; HBsAg, anti-HBc and anti-HBs were determined, and the overall prevalence rate was 9.02% for HBsAg, 46.25% for anti-HBs, 73.6% for anti-HBc and 76.38% for at least one marker positive by another study[32].

In a study done at St Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia on 2014 the overall prevalence rate was 2.6 % (8 / 313) for HBsAg ,25.6 % (80 / 313) for anti -HBc,26.2 % (8 / 313)for anti -HBs, and 28.8 % (90 / 313) for at least one marker positive.

All these prevalence studies of hepatitis B virus among HCWs show that HBV still pose a great threat to the health of many health workers.

2.3 Overview of Hepatitis B Vaccination among Health Care Workers

Health care workers are at a high risk of HBV infection through occupational exposure to blood, and the incidence of this infection among them has been estimated to be 2-4 times the level in the general population (11). As part of occupational safety measures, all health care workers are required to be vaccinated against HBV. Unfortunately, WHO has estimated that HBV vaccination coverage amongst HCWs is only 18-39% in low and middle-income countries compared to 67-79% in high-income countries (40). Hepatitis B vaccination coverage among health care personnel in the United States showed that overall, 69.5% and 63.4% of HCP reported receiving one and three doses of Hepatitis B vaccine respectively which remained below the healthy people 2010 coverage goal of 90% (38).

In a studies done in Nigeria (in tertiary hospital), India (in tertiary hospital), Ethiopia (at Tikur Anbessa Hospital) among the socio demographic factors younger age, being married and having higher educational status were significantly associated with higher rate of hepatitis B vaccination status of the respondents where as sex, religion, current unit of work and income were not found to be associated with hepatitis B vaccine utilization (13, 41, 16).

In addition factors like negligence, work load and not feeling at risk and availability and accessibility of the vaccine have shown to affect hepatitis B vaccine utilization in studies done in Northern India (in tertiary hospital), Kuwait (in primary hospital), Nigeria (in tertiary hospital), South Africa (KwaZulu-Natal) Ethiopia (Bahirdar city, Tikur Anbessa Hospital) (41, 42, 16).

2.4 Conceptual Framework

The conceptual framework is adapted from different literatures. It showed that factors such as, socio-demographic, behavioral and health service factor are considered to affect hepatitis B vaccine utilization among health care professionals. In this frame work, these three factors influence each other.

- ✓ Socio-demographic factors include , age, sex, educational status, religion, current marital status, job category, and department current working in
- ✓ Behavioral factors include negligence, and work load affects hepatitis B vaccine utilization. And

- ✓ Health service factors include availability and accessibility of the vaccine and cost influences hepatitis B vaccine utilization.

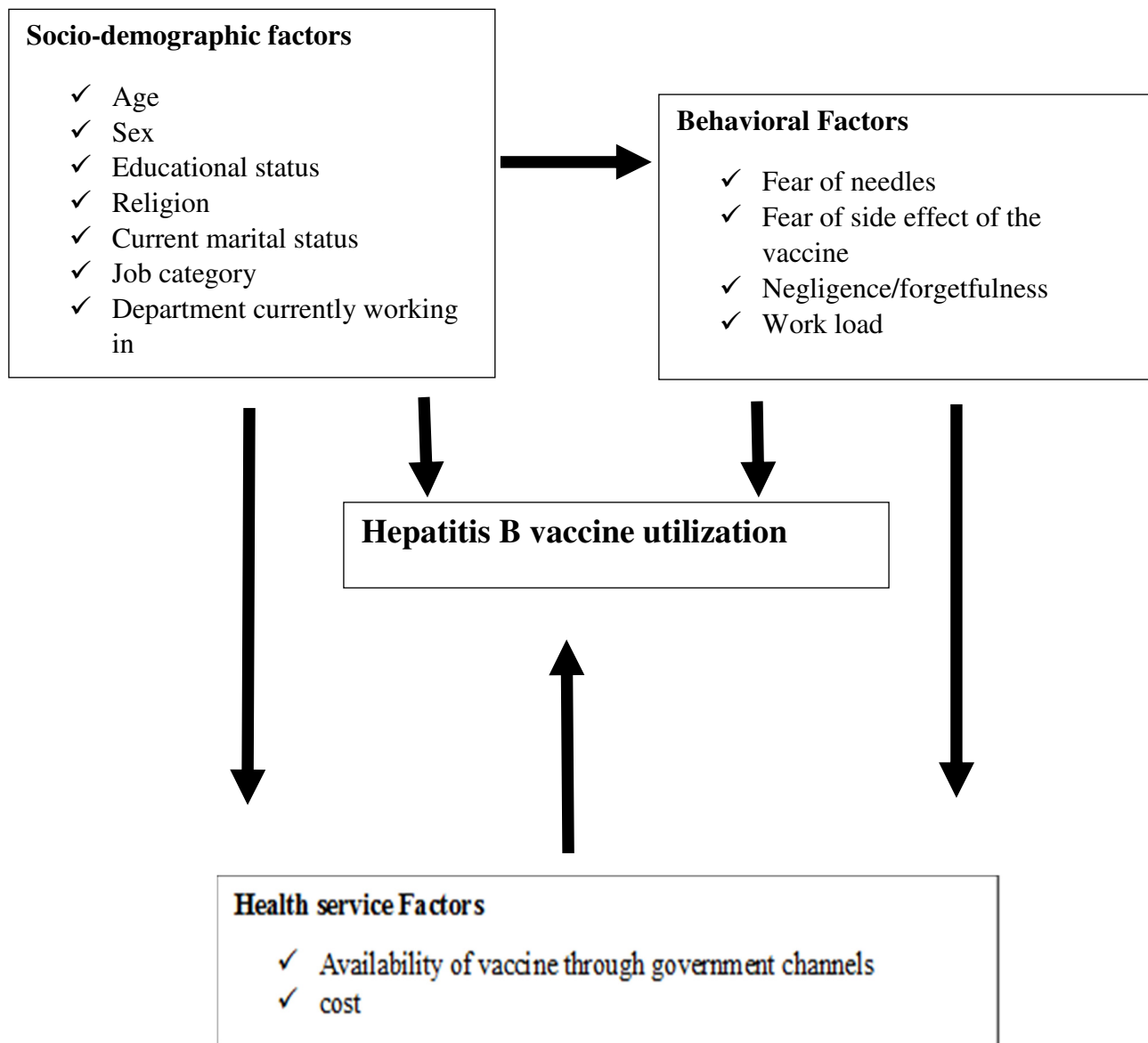


Figure. 3 Schematic presentation of conceptual frame work on factors affecting Hepatitis B vaccine utilization among HCWs (adapted from research done at TAH)

3. OBJECTIVE

3.1 General objective

To assess hepatitis B Vaccine utilization and potential factors affecting vaccination among health care professionals at St Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia

3.2 Specific objectives

- To determine the magnitude of utilization of hepatitis B vaccine among health care professionals at St Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia
- To assess potential factors affecting vaccination among health care professionals at St Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia

4. METHODS

4.1 Study setting

St. Paul Hospital Millennium Medical College (SPHMMC) is the second largest public hospital in Ethiopia with the mission to provide preventive, promotive, curative, and rehabilitative health care service in the country. The Hospital was built in 1969 and since then it has been a source of medical care for underserved populations. The hospital currently has more than 300 beds and provides service with an annual average of 200,000 patients through its emergency, outpatient and inpatient services. The hospital has over 1486 clinical and nonclinical staffs and 13 departments.

4.2 Study design

Institutional based cross sectional descriptive study will be carried out

4.3 Source population

The source population includes all healthcare providers working in St Paul Hospital Millennium Medical College in Addis Ababa, Ethiopia.

4.4 Study population

The study population are all healthcare providers working in St Paul Hospital Millennium Medical College in Addis Ababa, Ethiopia who are working at Internal medicine, Surgical, Pediatric, and OBGYN departments.

Inclusion criteria

- Health professionals who are doctors, nurses, clinical laboratory technologists, Anesthetists and midwives.
- Health professionals who are voluntary to participate

Exclusion criteria

- Health who were not voluntary or absent were excluded from the study.
- Health workers who work at administration and have less contact with patients are excluded

4.5 Sample size

Using the prevalence of related study conducted at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, the p value is 22.3%. With 95% confidence level and 0.05 margin of error a sample size is calculated by using single proportion formula

$$n = \frac{(Z_{\alpha/2})^2(p)(1-p)}{d^2} = \frac{(1.96)^2(0.223)(1-0.223)}{(0.05)^2} = 266.25 \approx 266$$

4.6 Sampling technique

Systematic random sampling technique was employed to select eligible study participants from list of health workers. The sample size was proportionally divided into each health care professionals (doctors, nurses, clinical laboratory technologists, Anesthetists and midwives). We divided the total number of health professionals by total sample size to get the interval (k) = $1010/266=3.79 \approx 4$. So, the questionnaires were given for 4th professional available during the data collection period based on the list from each unit. The first person was selected using lottery method from the list of health care professionals (Figure 4).

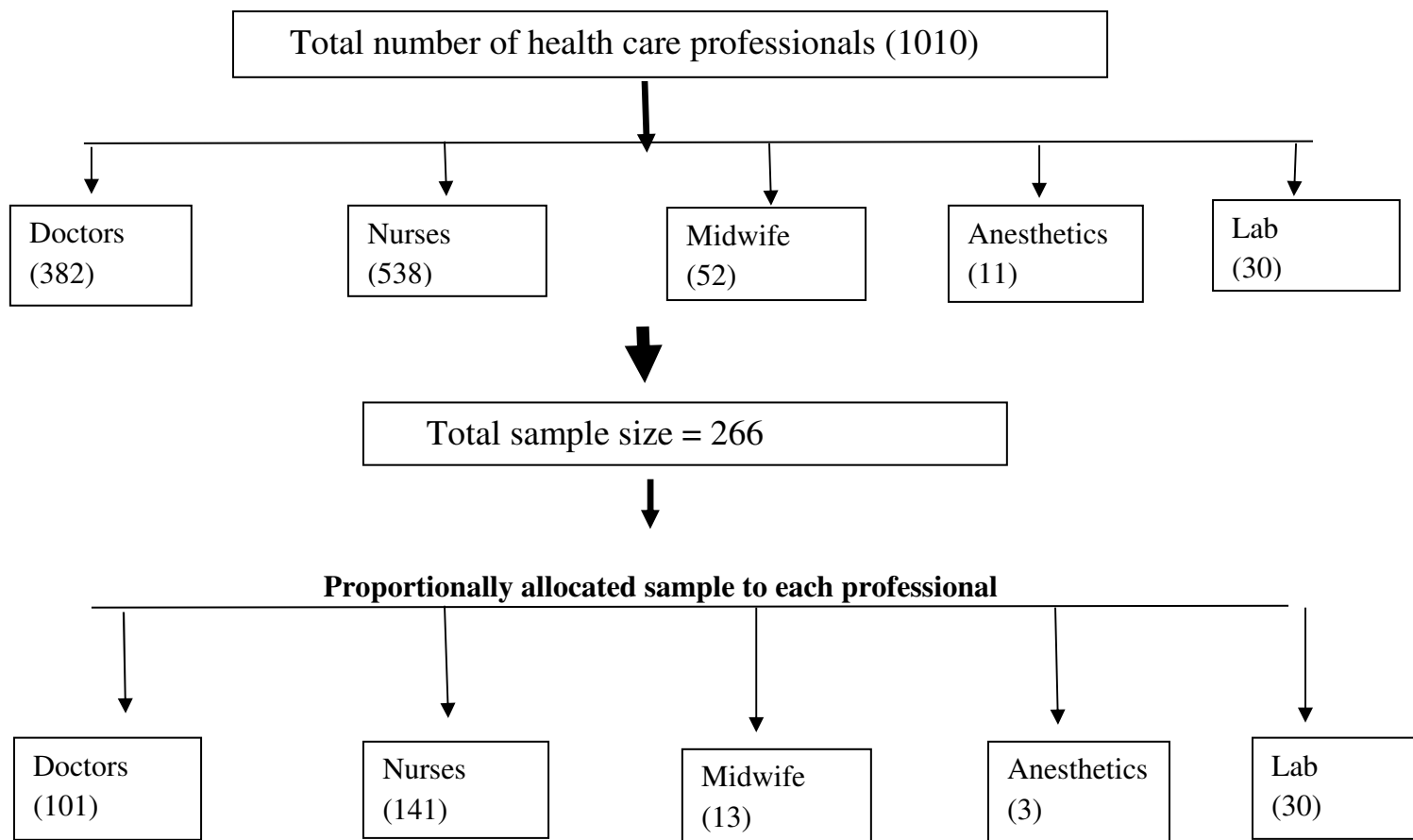


Figure 4: Schematic presentation of sampling procedure for each Category of Health Professionals

4.7 Study variables

Dependent variable: The utilization of hepatitis B vaccination

Independent variable

Socio-demographic variables: Age, Sex, Educational Status, Religion, Marital Status, Job category, Current unit of work,

Behavioral factors: Fear of needles, Fear of the side effect of the vaccine, Negligence/forgetfulness, Work load

Health service factors and information: Availability of vaccine through government channels, Cost

4.8 Data collection procedure

The data was collected from study subjects by using structured, self-administered questionnaire adopted from previous researches on the same topic. The questions were divided into three sections that cover questions to assess socio demographic characteristics, exposure, and HBV screening and hepatitis B vaccine utilization of respondents including questions about factors for non-utilization. The questionnaire was developed in English language. Pretest was conducted in 5% of the sample size at Ras Desta Damtew Memorial Hospital. The data collection was carried out in April 1-30, 2017.

4.9 Data quality management

Objective based, logically sequenced, free of scientific terms and non-leading structured questionnaire is prepared. Pre-test was undertaken on the questionnaire before the actual data collection starts. The collected data was checked by investigator incompleteness and/or inconsistency.

4.10 Data Processing, Management and Analysis

The collected data was reviewed and checked for completeness and relevance by the principal investigators. The processing and analysis was carried out using SPSS.

4.11 Operational definitions

HealthCare Workers (HCWs): persons who work in a healthcare setting in direct contact with patients, blood and body fluids

Exposed- the HCW who had needle stick injury, blood or fluid contact to Hepatitis B patients during medical practice

Screened- the HCW who has been tested for HBV at least once in his life time

Incomplete vaccination status- the HCW who took one or two doses of hepatitis B vaccine or who is waiting for the schedule between doses

Completely vaccinated –the HCW who took all the three doses of hepatitis B vaccine with the appropriate schedule

Not Vaccinated- the HCW who has never been vaccinated for HBV

4.12 Ethical consideration

Before starting the actual data collection there was a letter and authority permission from the public health department. The purpose of the study, the right to participate and refuse was told to the study subjects. Verbal consent from the study subjects was obtained. Confidentiality of the information was guaranteed.

4.13 Dissemination of findings

The result of this research report will be provided for St Paul Hospital Millennium Medical College. If any need arises for this study to be used as reference it can be presented to any authority.

5. RESULTS

5.1 Socio demographic characteristics of the study population

A total of 266 respondents participated in the study. The median age of respondents was 26years with the minimum and maximum age of 22 and 43 years respectively. From the respondents 141(53%) of them were male, 169(63.3%) were single and 155(58.3%) were orthodox Christians. Regarding educational status around half of them are degree holders, 134(50.4%) and majority of them were nurses 141(53%) (Table 1).

Table 1: Socio-demographic characteristics of HCWs, SPHMMC, Addis Ababa, Ethiopia, 2017

Characteristics	Frequency	Percentage
Age		
20-24	47	17.7
25-29	148	55.6
30-35	43	16.2
>35	28	10.5
Sex		
Male	141	53.0
Female	125	47.0
Marital status		
Single	169	63.5
Married	86	32.3
Widowed	4	1.5
Divorced	7	2.6
Religion		
Orthodox	155	58.3
Muslim	59	22.2
Catholic	13	4.9
Protestant	39	14.7
Educational status		
Diploma	7	2.6
Degree	134	50.4
Masters	16	6.0
Doctorate	109	41.0
Job category		
Doctor	101	38.0
Nurse	141	53.0
Laboratory technician	8	3.0
Anesthetics	3	1.1
Midwife	13	4.9

Departments currently working in		
Internal medicine	49	18.4
Surgery	81	30.5
Pediatrics	41	15.4
Gyn/Obs	68	25.6
lab	8	3.0
Emergency medicine	16	6.0
Anesthesia	3	1.1

5.2 Hepatitis B exposure of study participants

Out of the 266 respondents, 214(80.5%) of them identify patients with HBV out of which 180(85%) of them review patient's medical records to identify patients with HBV. Whereas half 27(50%), who don't identify patients with HBV, said it is because they are busy (Table 2).

Table 2: Practice of identifying patients with HBV among HCWs at SPHMMC, Addis Ababa, Ethiopia, 2017

Variables	Frequency	Percentage
Identify patients with HBV		
Yes	214	80.5
No	52	19.5
How do you identify patients with HBV		
Asking Patients	24	11.2
Reviewing medical records of patients	180	85
Send patients for laboratory diagnosis	90	43.5
Reasons for not identifying patients with HBV		
Negligence	24	42.3
Being busy	27	50
No mechanism of identifying	19	34.6

Note: due to multiple responses for identification methods and reasons for not identifying is possible, sum of percentages >100

Regarding the use of infection prevention precautions when caring for patients with HBV infection, 186(69.9%) of study participants responded yes. Among them 168 (90.3%) said they dispose sharp materials properly. Among the 80(30.1%) participants who responded no to use of infection prevention precautions 61 (76.3%) said that it is because of negligence (Table3).

Table 3: Use of infection prevention precautions among HCWs, SPHMMC, Addis Ababa, Ethiopia, 2017

Variables	Frequency	Percentage
Infection Prevention Precautions		
Yes	186	69.9
No	80	30.1
Precaution methods		
Wearing of double gloves	95	51.1
Wearing of goggles	48	25.8
Proper disposal of sharp materials	168	90.3
Avoid Patients diagnosed with HBV	8	4.3
Use antiseptics after contact	116	62.7
Hand washing after each contact	59	31.7
Reasons for no precaution		
Don't think I am at risk	4	5
Negligence	61	76.3
Don't have access to protective devices	22	27.5

Note: Due to multiple response for mechanisms of precautions and reasons for not using them is possible, sum of percentages >100

62 (23.3%) of the participants have encountered exposure specifically from HBV infected patient. Out of which 30 (48.4%) of them took post exposure prophylaxis (Table 4).

Table 4: HBV Exposure status of HCWs, SPHMMC, Addis Ababa, Ethiopia, 2017

Variables	Frequency	Percentage
Ever encountered exposure specifically from HBV patient		
Yes	62	23.3
No	204	76.7
Measures you took after exposure concerning HBV		
Rinsed it with water	23	37.1
Took post exposure prophylaxis	30	48.4
Did nothing	9	14.5

5.3 Hepatitis B Screening and Vaccine utilization status of study participants

From 266 respondents, 198 (74.4%) of them were screened for HBV while 68 (25.6%) participants were not screened and the most common reason they have given is workload which constitutes about 50% (Table 5).

Table 5: Screening for HBV and reasons for not getting tested among HCWs, SPHMMC, Addis Ababa, Ethiopia, 2017

Screening	Frequency	Percentage
Ever Screened		
Yes	198	74.4
No	68	25.6
Reason for not being screened		
Unavailability of the diagnosis	11	16.3
Cost	12	17.6
Negligence	29	42.6
Fear of positive results	13	19.1
Workload	34	50

Note: Due to multiple response for reason for not getting tested is possible, sum of percentages >100

Regarding HBV vaccine utilization, 138 (51.9%) responded they have ever received hepatitis B vaccine whereas 128 (48.1%) responded they have never received Hepatitis B vaccine. Out of those who are vaccinated 21 (15.2%) took only one dose while 51 (37.0%) and 66 (47.8%) took two and three doses respectively (Figure 5).

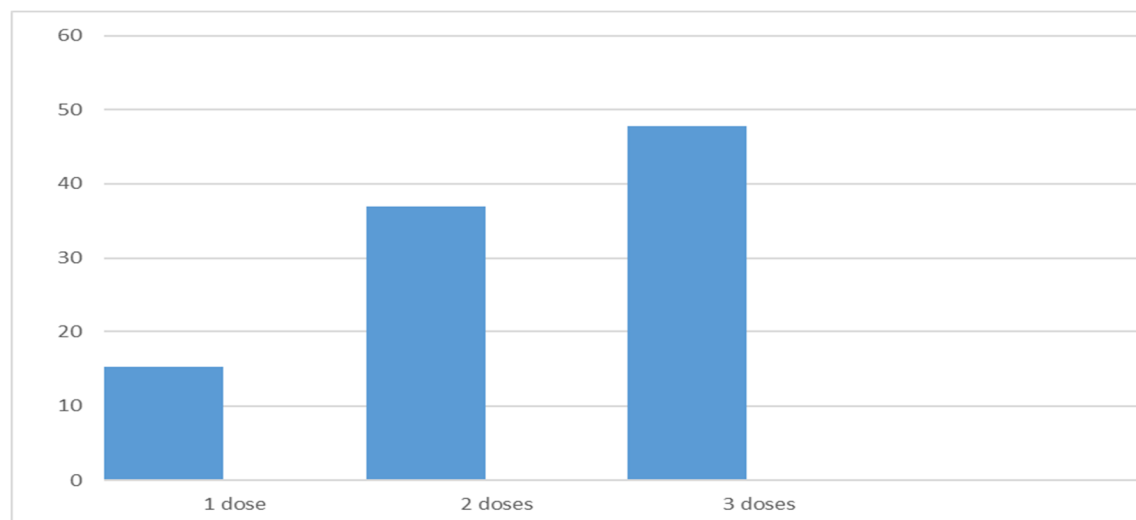


Figure 5: Number of hepatitis B vaccine doses taken by HCWs, SPHMMC, Addis Ababa, Ethiopia, 2017

Among those who are not vaccinated the most common reason that was stated was unavailability of vaccine through governmental channels which account about 67.7% and

among those who are vaccinated 66 (47.8%) of the respondents have completed vaccination while 72 (52.2%) have not and out of the reasons mentioned for not completing vaccination the commonest was forgetting the schedule which account for about 47.2% (Table 6).

Table 6: *Hepatitis B vaccination status and reason for not yet vaccinated and not completing vaccination among HCWs at SPHMMC, Addis Ababa, Ethiopia, 2017*

Vaccination Status	Frequency	Percentage
Reasons for not yet vaccinated		
Unavailability of the vaccine through government channels	86	67.7
Cost	22	17.3
Fear of needles	10	7.9
Fear of side effects of the vaccine	9	7.1
Negligence	45	35.4
Workload	58	45.7
Completed vaccination with appropriate schedule		
Yes	66	47.8
No	72	52.2
Reasons for not completing vaccination		
Forgot the schedule	34	47.2
Costly	2	2.8
Unavailability of the vaccine	11	15.3
Waiting for the next dose	25	34.7

Note: Due to multiple response for reasons not yet vaccinated is possible, sum of percentages >100

5.4 Association between socio-demographic variables and hepatitis B vaccine utilization

Binary logistic regression was used to assess association and in bivariate analysis out of the socio-demographic variables only age is found to have a significant association with hepatitis B vaccine utilization. Respondents with in age group 20-24 [COR: 2.84, 95% CI, (1.08-7.48)] were 2.8 times more likely to get vaccinated than those who are >35 years old (table 7).

In the multivariate analysis, all socio-demographic variables didn't show any association with hepatitis B vaccine utilization.

Table 7: Association between socio-demographic characteristics and vaccine utilization

Characteristics	Vaccination status		COR (95% CI)	AOR (95% CI)
	Yes (%)	No (%)		
Respondent age group				
20-24	32 (68.1)	15 (31.9)	2.84 (1.08-7.48) *	6.1 (0.86-42.98)
25-29	73 (49.3)	75 (50.7)	1.3 (0.57-2.93)	0.52 (0.09-2.91)
30-35	21 (48.8)	22 (51.2)	1.27 (0.48-3.31)	0.75(0.23-2.47)
Above 35	12 (42.9)	16 (57.1)	1.00	1.00

*Significant association, COR-crude odds ratio, AOR-Adjusted Odds ratio

5.5 Association between respondents' exposure and screening status with hepatitis B vaccine utilization

Binary logistic regression was used to assess association and in bivariate analysis responders who usually identify patient with HBV, use infection prevention methods, encountered exposure and tested for HBV have shown significant association with hepatitis B vaccine utilization. And in multivariate analysis all except those who usually identify patient with HBV have shown significant association (table 9).

Responders who use infection prevention methods [AOR: 80.14, 95% CI, (9.05-1107.82)] were 80 times more likely to get vaccinated than those who don't use infection prevention methods and out of those who use infection prevention those who dispose sharp materials properly were 2 times more likely to get vaccinated those who don't (table 9).

Respondents who encountered exposure [AOR: 6.16, 95% CI, (1.402-27.059)] were 6 times more likely to get vaccinated than those who didn't. And those respondents who were tested for HBV [AOR: 175.90, 95% CI, (238.08-1299.65)] were 175 times more likely to get vaccinated than those who didn't (table 9).

Table 8. Association between respondents' exposure and screening status with hepatitis B vaccine utilization

Variables	Vaccination status		COR (95% CI)	AOR (95% CI)
	Yes (%)	No (%)		
Usually Identify patients with Hepatitis B				
Yes	128 (59.8)	10 (19.2)	6.25 (2.97-13.12) *	0.12 (0.01-1.35)
No	86 (40.2)	42 (80.8)	1.00	1.00
Use infection prevention method				
Yes	133 (71.5)	5 (6.2)	37.64 (14.41-98.27)*	80.14 (9.05-1107.82) *
No	53 (28.5)	75 (93.8)	1.00	1.00
Encountered exposure				
Yes	40 (64.5)	98 (48)	1.96 (1.09-3.54) *	6.16 (1.40-27.05) *
No	22 (35.5)	106 (52)	1.00	1.00
Tested for HBV				
Yes	136 (68.7)	2 (2.9)	72.38 (17.1-305.05) *	175.90 (125-899.65) *
No	62 (31.3)	66(97.1)	1.00	1.00

*Significant association, COR-crude odds ratio, AOR-Adjusted Odds ratio

6. DISCUSSION

The study assessed HBV vaccine utilization among HCWs at St Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia and it also assessed factor affecting its utilization.

According to the result 138 (51.9%) of respondents had received at least one dose of HBV vaccine. The finding was higher than WHO estimate of HBV vaccine coverage among HCWs in low and mid-income countries which is 18-39% (1). The result was lower compared to a study done at Ile-ile, south west Nigeria where 65% of HCW were at least vaccinated once but it is comparable to studies done in tertiary hospitals in India, Pakistan and Tanzania where 50%, 50.2% and 48.8% of HCWs were vaccinated respectively (41,27) and it is higher Compared to study done in Bahir dar city and TAH, in Ethiopia where only 37 (10%) and 88 (22.3%) of the respondent were at least once vaccinated respectively (15, 16). This could be because of a knowledge gap or attitude toward the vaccine.

Among the vaccinated only 66 (47.8%) of them completed the vaccination appropriately which is lower than study done in Kuwait, Nigeria and TAH, Ethiopia where 84%, 71.6% and 73.9% of the respondent completed the vaccination. This could be because out of those who started vaccination in this study 25 (34.7%) of them are waiting for the next dose.

Top three reasons mentioned for not getting vaccinated by respondents in this study were unavailability of vaccine through governmental channels 67.7%, work load 45.7% and negligence 35.4%. There is some similarities with studies done in India where 41.6% of HCWs mentioned negligence, in Bahir dar city, Ethiopia 60.36% of HCWs mentioned unavailability of vaccine through governmental channels and in TAH, Ethiopia where 56.5% and 40.8% mentioned unavailability of vaccine through governmental channels and negligence respectively (41, 15, 16).

In this study 186 (69.9%) of the respondents use infection prevention that is lower compared to a study done at TAH which is 91.6%. Among the methods mentioned proper disposal of sharp materials accounts for about 90.3% followed by using of antiseptics after contact which account for 62.7%. It is similar to a study done at TAH, Ethiopia where 94.7% use proper disposal of sharp materials and 64.7% said they wash their hand after each contact. Result from multivariate analysis shows that HCWs who use infection prevention methods are more likely to get vaccinated than those who don't. This could be due to knowledge gap between those who use infection prevention and those who don't.

Out of the 266 respondents 62 (23.3%) of them had exposure from HBV infected patient. This is comparable to a study done in Ile-ile, south west Nigeria which is 25.3% but it is slightly higher than the study done at TAH, Ethiopia which was 12.9%.

Result from multivariate analysis shows that HCWs who had exposure are 6 times more likely to get vaccinated than those who didn't. The result is similar to a research done in Ido, Nigeria where HCWs who had exposure were 4 times more likely to get vaccinated but in a study done at TAH, Ethiopia they have found that exposed HCWs were less likely to get vaccinated (16, 13). The reason could be that in our study most of the exposed HCWs, 30 (48.4%), took PEP where as in the TAH study around 72.5% of the exposed HCWs just rinsed it with water only. This could be due to knowledge gap or availability of PEP.

Among the 266 HCWs 198 (74.4%) of them were tested for HBV which is higher than in a study done in Ile-ile, south west Nigeria and TAH, Ethiopia where 64,2% and 58.4% respectively. In multivariate analysis those HCWs who were tested were more likely to get vaccinated. This could be because getting tested for HBV is requirement before vaccination.

7 LIMITATION OF THE STUDY

❖ Limitation of the study

- ✓ Since this study used a cross sectional study design, it is difficult to infer causal association
- ✓ The study was limited to SPHMMC in Addis Ababa, where the research results are limited to that particular hospital and may not be generalized to all HCWs particularly those in other health settings within the country

8. CONCLUSION

- In this study HBV vaccine utilization by HCWS is relatively better than other studies done in Ethiopia but still low compared to the threat HBV pose to HCWs.
- Out of those who started vaccination most of them didn't completed the vaccination and the most common reason for not completing vaccination was forgetting the schedule. This shows us that there should be some kind of remaindering system in place since HCWs are usually busy.
- The most common reason mentioned for not getting vaccinated was unavailability of vaccine through governmental channels. This results shows that the government should work on the availability of HBV vaccine.
- Using infection prevention methods are positively associated with HBV vaccination and the most common reason mentioned for not using precaution was negligence followed by lack of protective devices. This shows that there is knowledge gap as well as lack of equipment which the hospital should work on.
- Regarding HCWs who encountered exposure from HBV infected patient around half of them didn't take post exposure prophylaxis therefore they could be potentially infected so this should be a major wake up call to the ministry of health as well as SPHMMC to have post exposure management protocol.

9. RECOMMENDATION

Based on the results of this study the following recommendations are made.

❖ **For Ministry of health**

- ✓ Nationwide vaccination campaign against HBV for all HCW should be available yearly
- ✓ The vaccine should be available at no cost to all HCWs
- ✓ The ministry of health should implement a post exposure management plan at all health care level

❖ **For SPHMMC**

- ✓ They should provide HCWs standard personal protective equipment
- ✓ They should have training packages and seminars on HBV related issues to all HCWs so that there won't be a knowledge gap
- ✓ They should develop a reminder system in place for HCWs who have started HBV vaccination.

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11. APPENDIX

❖ Annex I: English version of verbal consent format for key informants

Hello! My name is Dr. Mikias Wondwesen and I'm a an intern at St. Paul's Millennium Medical College and I am conducting my research on Assessment of hepatitis b vaccine utilization among health care professionals at St. Paul's hospital millennium medical college.

I'd like to conduct a self-administered questioner to gain some insight about the current status of vaccination among health care workers at SPHMMC with emphasis to factors that can affect their vaccination status.. I am asking you for a little of your time, only about 15-20 minutes. Your participation in this interview is fully based on your consent. However, your information is very important for the study. The information provided in this questioner will be used for the research purpose only and strictly kept confidential. No identifiers will be used in the documentation process of the interview and in case there is any information that may identity you, they will be kept under strict confidence.

If you agree go ahead with the interview.

❖ **Annex II:** A Self-administered structured questionnaire to assess Hepatitis B vaccine utilization among health care professionals at St Paul Hospital Millennium Medical College, Addis Ababa.

Questionnaire code

Instruction: Circle the responses for questions with alternatives and write for open ended questions on the space provided

Part I: Respondents Socio-demographic characteristics

QUESTIONS	ANSWERS	SKIP
101. Age in completed years	 years	
102 Sex	1. M 2. F	
103. Educational status	1. Diploma 2. Degree 3. Masters 4. Doctorate 5. PhD 7. Other specify).....	
104. Religion	1. Orthodox 2. Muslim 3. Catholic 4. Protestant Other (specify).....	

105. Current marital status	1. Single 2. Married 3. Widowed 4. Divorced 5. Separated	
107. Job Category	1. Doctor 2. Nurse 3. Laboratory Technician 4. Anesthetist 5. Midwife	
108. In which department are you currently working?		

Part II: Questions regarding exposure of health care professionals

109. Do you identify patients with Hepatitis B?	1. Yes 2. No	
110. How do you identify patients with Hepatitis B? (Multiple responses are possible)	1. By asking them 2. By reviewing their medical record 3. By sending them for laboratory diagnosis 4. Other, (specify).....	
111. If you don't identify, patients with Hepatitis B, why? (Multiple responses are possible)	1. Because of negligence 2. Because I am busy	

	3. Because there is no mechanism of identifying 4. Other, (specify).....	
112. Do you use infection prevention precautions when you care for patients with Hepatitis B?	1. Yes 2. No	
113. If yes, what precautions do you use? (Multiple responses are possible)	1. Wearing of double gloves 2. Wearing of goggles 3. Proper disposal of sharp materials 4. Avoid patients diagnosed with hepatitis B 5. Use antiseptics after contact 6. Hand Washing after each contact 7. Other (specify)	
114. If you don't use precautions, Why? (Multiple responses are possible)	1. I don't think I am at risk 2. Negligence 3. I don't have access to protective devices 4. Others(specify)-----	
115. Have you ever encountered exposure specifically from Hepatitis B patient?	1. Yes 2. No	
116. What measures did you take after the exposure concerning Hepatitis B? (Multiple responses are possible)	1. I rinsed it with water 2. I took post exposure prophylaxis	

	(PEP)	
	3. I diagnosed for Hepatitis B	
	4. I did nothing	
	5. Other (specify).....	

Part III: Questions concerning HBV screening and Hepatitis B vaccine utilization

117. Have you ever been tested for Hepatitis B virus?	1. Yes 2. No	
118. If you have never been tested for hepatitis b virus, what is your specific reason? (Multiple responses are possible)	1. Unavailability of the diagnosis 2. Cost 3. Negligence 4. Fear of positive results 5. Work load 6. Other (specify)	
119. Have you ever received Hepatitis B vaccine?	1. Yes 2. No	
120. If not yet vaccinated, what are your reasons? (Multiple responses are possible)	1. Unavailability of the vaccine through government channels 2. Cost 3. Fear of needles 4. Fear of side effects of the	

	vaccine 5. Negligence 6. Work load 7. Others (specify)	
122. How many number of doses of vaccine you received?	1. 1dose 2. 2 doses 3. 3 completed doses 4. 3 completed doses and a booster dose 5. I do not remember	
123. Have you completed the vaccination with the appropriate vaccination schedule?	1. Yes 2. No	
124. If you did not complete the appropriate vaccination schedule, why? (Multiple responses are possible)	1. I forgot the schedule 2. Because it is costly 3. Unavailability of the vaccine 4. Waiting for the next dose 5. Others (specify)	