Prevalence and Socio-Demographic Factors Associated with Hepatitis B among Blood Donors at Mogadishu Turkey Training and Research Hospital in Somalia

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DECLARATION

I declare that this is my original work and has not been presented to any other institution

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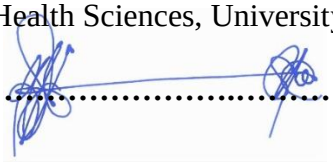
Signature:  **Date:** 03/FEB/2023

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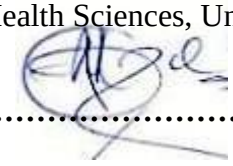
Signature:  **Date:** 06/FEB/2023

DEDICATION

First, I would like to dedicate this work to the almighty God, by whose strength and gracious provision, I have been able to reach this far. To my beloved parents and my sister, Dr Zeinab Mohamud Derow, who have supported me financially and encouraged me throughout my education. To my supervisors: Dr Moses Muia Masika, Mr Kasim Abdi Jimale and Prof. Omu Anzala, The Mogadishu Turkey Training and Research Hospital, and others who have contributed a lot in making my master's program a wonderful experience. Without them, the experience of undertaking this program would most likely have been unsatisfactory.

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LIST OF ACRONYMS

ANOVA	Analysis of Variance
CDC	Center for Disease Control
dsDNA	Double-stranded deoxyribonucleic acid
ELISA	Enzyme-linked Immunosorbent Assays
HBeAg	Hepatitis B e antigen
HBsAg	Hepatitis B surface antigen
HBV	Hepatitis B virus
HCV	Hepatitis C virus
HIV	Human Immunodeficiency Virus
IgG	Immunoglobulin G
IgM	Immunoglobulin M
KNH-UON ERC	The Kenyatta National Hospital –University of Nairobi Ethics and Research Committee
MTTRH	Mogadishu Turkey Training and Research Hospital
rpm	Revolutions per minute
S/co	Signal to cut-off ratio
SPSS	Statistical Package for social sciences
WHO	World Health Organization
µl	Microliter

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ABSTRACT

Background: Hepatitis B is a highly transmissible infection which can occur due to contact with infected body fluids during blood transfusion, mother-to-child transmission, needle stick injuries and sexual contact. Hepatitis B remains a common severe infection of the liver worldwide despite the availability of vaccines and antiviral drugs. Due to health situations such as accidents and anaemia among others, the demand for blood transfusions is high in Somalia. However, information on the occurrence of hepatitis B among donors of blood in Somalia is limited.

Aim: The aim of the study was to determine the prevalence of hepatitis B virus amid blood donors at Mogadishu Turkey Training and Research Hospital and the associated factors.

Methodology:This cross-sectional study was conducted in Mogadishu Turkey Training and Research Hospital laboratory between August and September 2022. The study employed convenience sampling to collect personal data on profession, gender, age, residence and medical history using a questionnaire. A blood samples (5ml) was collected from each of the 881 consenting blood donors. Enzyme-Linked Immunosorbent Assay (VITROS® 3600) was used to detect the presence of hepatitis B surface antigen in the blood samples.The data collected was stored in Excel worksheets and analysed using IBM SPSS Software Version 26 of collected data. Binary logistic regression analysis was conducted to test any associations between hepatitis B infection and the independent variables. A p-value of <0.05 was regarded as statistically substantial.

Results: We recruited 881 study participants and 23 (2.6%) tested positive for Hepatitis surface antigen (HBsAg).The preavalence of HBV was 3.2% among the unvaccinated participants and 0% among the vaccinated. The prevalence of HBV was also higher among participants aged 40 years and above (7.1%). Participants over 40 years of age were 7.26 (95%CI; 1.039 – 50.668) times more

likely to be infected with hepatitis B than those aged 40 years and below. In the logistic regresion analysis participants aged over 40 years was the only factor associated to HBV infection ($p<0.05$). Other variables including education, marital status, income and number of spouses were not statistically related to HBV infection ($p >0.05$).

Conclusion: Study results emphasize the importance of extensive testing of blood donated for transfusion for HBV infection among blood donors, especially those who are not vaccinated against HBV. There is also a need for more studies to know the seroprevalence of the Hepatitis B virus in the larger population. The findings in this study will inform the health sector and policy formulators on the current occurrence of hepatitis B as well as the associated sociodemographic characteristics among blood donors in Mogadishu, Somalia.

CHAPTER ONE

1.1 Introduction

One of the most prevalent causes of viral hepatitis is hepatitis B virus (HBV) with over two billion infections being reported globally. Among the two billion infected people, more than 350 million live with chronic hepatitis B (MacLachlan and Cowie, 2015). Geographically, incidences of HBV are high in the South of the Sahara where the frequency is approximately 6.1% (Spearman, 2017).

This virus is classified in the family of *hepadnaviridae* with an enclosed and partly double-stranded DNA genome. Hepatitis B virus replication takes place in the hepatocytes and impairs liver function and is transmitted by blood and other body fluids with an average incubation period of 90 days: Hepatitis B is a highly transmissible infection which can occur due to contact with infected body fluids during blood transfusion, mother-to-child transmission, needle stick injuries and sexual contact. Clinical manifestations of hepatitis B include nausea, vomiting, myalgia, anorexia, fatigue, and low-grade fever, for the acute phase and hepatic encephalitis, coma, hepatomegaly, liver cirrhosis, jaundice and mental confusion in the chronic phase (Lok and McMahon, 2009; WHO, 2021).

To mitigate the health risks that are linked to HBV, high-risk groups in the population are usually targeted for them to benefit from education programs on HBV. Since HBV can be found in the blood and other fluids of an infected person, there is a need to do proper blood testing of blood before transfusion. HBV antigens and antibodies, such as the hepatitis B core antibody and hepatitis B surface antibody, are detected through blood tests (Krajden et al.,2005). Through a focus on programs meant to control hepatitis B infections and

proper blood testing , reduction of infection rates for hepatitis B among the high-risk groups (babies born to HBV-infected mothers, sexual partners of individuals with HBV, people sharing sharp objects to inject/abuse drugs, blood recipients etc.) can be achieved.

The mortality from hepatitis B in various parts of the world has increased over time. From 2000 to 2015, reported cases of deaths due to viral hepatitis worldwide went up by about 24 million. Of these deaths, about 66% were a result of chronic hepatitis B complications (WHO, 2017). About 296 million people had chronic hepatatis B infection resulting in 820000 deaths in 2019 (WHO,2022). Among indivituals living with HBV, African region accounted for 81 million (27%) of chronically infected indivituals(WHO,2022).

Currently, there is limited data in Somalia on the current prevalence of hepatitis B amid blood donors. There are very few studies that have been done to ascertain the occurrence of hepatitis B among different populations in Somalia. A recent study done in 2021 by Öznur reported that 6,893 out of 84,505 people who were tested for HBV turned positive, a prevalence of 8.2% (Öznur, 2021). Hepatitis B prevalence was determined to be 7.3% in a recent study comprising patients receiving hemodialysis at the Mogadishu Somali Turkish Training and Research Hospital (Jeele et al., 2021). From these recent studies, the prevalence of HBV is still high and these studies alone are not enough since without sufficient current literature, it is challenging to determine whether initiatives taken by the Somalian government and other health organizations in the fight against hepatitis B are successful. Furthermore, the access to safe blood and transfusion in Somalia remains an ardous process that is hampered by security challenges occasioned by terrorism, accidents, and insufficient storage capacity.

Mogadishu Turkey Training and Research Hospital (MTTRH) is located in Mogadishu has a blood bank and offers free blood transfusion services. The hospital receives 2,000 patients per day, more than any other hospital in the city. The hospital also carries out 20 to 30 blood transfusions per day. This study aimed at establishing the occurrence of hepatitis B amid the people donating blood at the MTTRH and the socio-demographic factors that are related to the disease. All donors presenting at the hospital ought to be screened and donated blood should be tested for HIV, hepatitis B, hepatitis C and syphilis. Any donated blood that tests positive for any of the above infections should not be used in transfusion . . Findings from this study will therefore be important to the health sector and policy formulators as they will fill this gap and show the current distribution and occurrence of hepatitis B as well as the associated socio-demographic features among blood donors in Mogadishu, Somalia.

1.2 Rationale

Infection by Hepatitis B virus is still a universal public health challenge with over two billion cumulative infections. According to the WHO, Africa is one of the high-burden HBV regions with approximately 82 million (23%) of the estimated 296 people living with chronic HBV infection residing in the African region. Reports further indicate the sub-Saharan Africa region as the epicentre of these infections with approximately 70-90% of the adult population in this region being exposed to HBV (WHO, 2021). There is scanty data on the seroprevalence of HBV amid blood donors given that most of the studies on the seroprevalence of HBV in Somalia were done more than two decades ago. There are no recent studies that have been done to shed light on the prevalence of HBsAg amid donors of blood who pose a risk of transmitting HBV. There is hence a need for

documentation of the present prevalence of HBV amid blood donors who play an integral part in the blood transfusion process and can give an impression of the infection of hepatitis B in the community. Blood infected with the hepatitis B virus risks the lives of the recipients if transfused. Consequently, this research aimedto determine the current prevalence and socio-demographic features related to hepatitis B infection amid blood donors at MTTRH which is a public hospital in Mogadishu, Somalia. Data collected and analyzed from this study will be used to inform policy formulators on necessary steps to be taken in the blood transfusion process since hepatitis B infection is of health importance globally.

1.3 Questions

1. What is the hepatitis B prevalence among Blood donors at the Mogadishu Turkey Training and Research Hospital?
2. What socio-demographic factors of blood donors at the Mogadishu Turkey Training and Research Hospital are linked to hepatitis B?

1.4 General objective

To assess the prevalence and socio-demographic factors related to hepatitis B amid blood donors at Mogadishu Turkey Training and Research Hospital.

1.5 Specific objectives

1. To determine the prevalence of hepatitis B among blood donors at Mogadishu Turkey Training and Research Hospital.
2. To describe the socio-demographic factors related to hepatitis B infection among blood donors at Mogadishu Turkey Training and Research Hospital.

CHAPTER TWO

LITERATURE REVIEW

2.1 Epidemiology of hepatitis B

Hepatitis B is one of the main diseases with serological evidence showing approximately 30% of the global population has had HBV infection (Trépo et al., 2014). In 2019, the WHO report indicated that 296 million individuals globally had chronic hepatitis B infection. HBV prevalence varies in different regions. A WHO report indicated that 81 million individuals have chronic hepatitis B infection in Africa (WHO, 2017). The Eastern Mediterranean region to which Somalia belongs accounts for 18 million people suffering from chronic hepatitis B infection. Studies in the West African sub-region, East African sub-region and Asian countries have reported a seroprevalence of 3 to 22% among blood donors (WHO, 2021) . From a study carried out on 200 blood donors in India in 2012, 3.5% tested positive for HBsAg while 5.7% were positive for IgM antibodies against hepatitis B core antigens. The prevalence of anti-HBc (both IgM and IgG) and anti-HBs antibodies was 10.9% and 3% respectively (Levanya et al., 2012).

Low-prevalence areas, unlike high-prevalence areas, have low horizontal and vertical transmission of HBV where most incident infections occur during adolescent and adult stages through blood-borne exposures and sexual contact. The hepatitis B infection preventive measures and programs put in place in different regions of the world may have been some of the responsible factors for the variance in occurrence in those areas.

Health outcomes can be affected by other socio-demographic factors like ethnicity, age, gender, religion, occupation, educational level and income (Tosun et al., 2018). In some

cultures in the Islamic religion, a man is allowed to marry more than one wife or up to four wives. Consequently, in case one of the partners develops a sexually transmitted disease, it is likely that if safe sex is not practised the rest can get infected with the same. A study done among Turkish migrants in Belgium determined that socio-demographic characteristics such as income levels and educational level especially that of mothers was key to informing the decision to whether to take HBV vaccination (Koc et al., 2020). A recent study done in Somalia reported that the population of males testing positive for hepatitis B was higher than that of the female participants. Two-thirds of those whose tests turned positive were males. Age was also a significant factor related to the frequency of hepatitis B where participants in the age subgroup 61 – 80 years accounted for 50% of those who tested positive (Öznur, 2021).

2.2 Transmission, clinical manifestations and prevention of HBV infection

HBV may be present in body fluids for example genital secretions, whole blood or even various blood products and therefore can be transmitted through unsafe blood transfusions. The danger of getting the virus is high in individuals engaging in unprotected sex, injecting drugs, sharing sharp objects such as razor blades and needles as well as undergoing medical procedures (El-Kamary, 2013). Vertical transmission which occurs between the mother and the child is the mode through which most HBV infections occur worldwide (WHO, 2021).

People infected with HBV may have an acute illness and may exhibit symptoms such as jaundice, fatigue, vomiting, dark urine, abdominal pain, and nausea (WHO, 2021). Persistent infection may lead to chronic hepatitis which may cause liver cirrhosis and hepatocellular carcinoma (WHO, 2021).

The Hepatitis B vaccine is one of the most effective preventive measures (Liaw and Chu., 2009). WHO recommends that babies be vaccinated immediately after birth (within 24 hours) and within 6 months. Other preventive measures include using condoms during sexual intercourse and not sharing sharp objects that may be infected as well as avoiding direct contact with bodily fluids and blood. The use of these measures has resulted in fewer reported HBV cases of transmission globally.

2.3 Transfusion-associated hepatitis B virus infection

HBV infection through blood transfusion is one of the main issues of concern in transfusion medicine (Seo et al., 2015). Testing for HBV before the transfusion of blood is important in the prevention of the spread of HBV infection in a population. A study on sexually transmitted agents from samples collected from hospitalized children and blood donors in Mogadishu, Somalia revealed that at the time the prevalence of HBsAg was at 19.1% among blood donors(Nur et al., 2000).

Aceti, et al. (1989) did a similar study showing a prevalence of 19.3% among 1,138 subjects who were tested for HBV in Somalia. From a recent systematic review of 23 studies on HBV infection, a total of 8,756 participants in Somalia were examined and the data analyzed. The prevalence from the systematic review was reported at 18.9% (Hassan-Kadle, Osman and Ogurtsov, 2018). Despite the difference in time between the two studies done on the Somalian population, both studies show higher prevalence rates for hepatitis B. However, the data used for the recent study relies on the older secondary information contained in previous studies. Therefore, there is a need to establish the current level of prevalence of HBV, especially amid blood donors.

2.4 Diagnosis of HBV

HBV testing in sub-Saharan African countries remains limited in comparison to developed countries as there is a lack of access to advanced testing technologies and specialized staff training (Allain & Opare-Sem, 2016). Molecular detection and identification of HBV infection involve the amplification of HBV genomes, detection, and quantification. These testing technologies are limited or often unavailable in developing countries. Alternative testing methods for HBV have often been limited to the discovery of hepatitis B surface antigen (HBsAg) (Allain & Opare-Sem, 2016).

Enzyme-linked immunosorbent assay (ELISA) is used to identify the main markers of hepatitis B virus such as HBV surface antigen (HBsAg), HBV envelope antigen (HBeAg), antibodies to HBsAg (anti-HBs), antibodies to HBV core antigen (anti-HBc) and antibodies to HBeAg (anti-HBe) in blood or serum. The technique is based on the use of microtiter plates that are pre-coated with monoclonal anti-HBs antibodies and polyclonal HBsAb for the qualitative detection of HBsAg. A study on a panel of solid-phase enzyme-linked immunosorbent tests used for serologically detecting hepatitis B virus infection found that they are equally sensitive and highly specific for the diagnosis of HBV (Tsitsilonis et al. ,2004).

2.5 Blood bank and transfusion process in Somalia

Acesss to safe blood supply and transfusion remains a challenge in Somalia due to inadequate storage capacity and frequent blood shortages .Whereas Somalia does not have a fully functional national bank, intiatives have been taken to constract one in Mogadishu(Mohamud et al., 2022). Varous hospitals like MTTRH, however, have their own blood transfusion services.

Blood donation process in Somalia involves potential donor screening followed by collection of blood from those who are eligible. The donor screening process in Somalia involves registration

and provision of educational material on blood donation to the donor . Health officials also ask a set of questions to collect information on the donors' medical history to asses the suitability of potential donors. All donated blood is tested for HIV, HBV, and syphilis (*Treponema pallidum*) before being used for transfusion.

2.6 Sociodemographic factors of blood donors in Somalia

Blood donors in Somalia are indivituals aged 16 to 65 years weighting at least 50 kilograms. The donors comprise of patient' realtives and friends who are relied on during emergencies and voluntary donors. Althought both genders qualify as donors, men are more likely do donated blood in comparison to women in Somalia. This is attributed to social –cultural and religious perception towards blood donation as well as the strict eleigibility criteria for blood donation which are unfavorable to Somalia women whom the majority were either pregnant, lactating , menstruating among other reasons (WHO, 2012; Madrona, 2014).

2.7 Somalia policy on HBV vaccination and diagnosis

HBV vaccination is integrated in Somalis'national immunization program for children. The pentavalent vaccine, which includes Hepatatis B, was introduced in Somalia in 2013 (EMRO, 2022). While some studies have reported HBV vaccination uptake among various groups such as health workers (16.4%) (Hussein,Ismail & Jama, 2022), there is shower no published literatureon HBV vaccination coverage or uptake in the general population.

Although the World Health Organization recommends accessto advanced testing technologies and inadequate specialized staff training (Allain & Opere-Sem, 2016). HBV testing is however done as part of the regular tests done all donated blood.

CHAPTER THREE

METHODOLOGY

3.1 Study design

This study was carried out among blood donors at the Mogadishu Turkey Training and Research Hospital (MTTRH) using a cross-sectional study design.

3.2 Study site

This study was done at Mogadishu Turkey Training and Research Hospital which in the Hodan district of Mogadishu. The hospital receives 20 to 30 blood donors per day on average.

The blood donor screening process involved registration and provision of educational material on blood donation to the blood donor and collection of information on the donor's medical history to assess suitability of potential donors to donate blood . The hospital further tested potential donors for bloodborne and sexually transmitted infections before blood collection from the donors.

All donors had to be tested for HIV-1 & 2, hepatitis B & C and *Treponema pallidum* before blood donation. Any donors who tested positive for any of the above infections were dropped from the blood collection process. Information on donation including post-donation information as well as information on adverse donation events was managed as part of the blood donor screening process.

3.3 Study population

Blood donors at the MTTRH agreed to be part of the study. The common types of blood

donors in Somalia were family members of patients in need of blood transfusion and volunt blood donors.

3.3.1 Inclusion criteria

- Blood donors at the Mogadishu Turkey Training and Research Hospital
- Aged 18 years and above.
- Donors who consented to be part of this study

3.4 Sample size

A census approach to sample size determination was used where all the consenting study participants were enrolled.

This study took place from 17th August 2022 to 17th September 2022 with a final sample size of 881.

3.5 Sampling technique

We used convenience sampling. Sampling was done by the study investigator and laboratory staff at MTTRH. Blood donors who voluntarily accepted to give their blood were approached at the MTTRH. The participants in this study only included those who provided written informed permission to be part of the study.

3.6 Study procedures

After obtaining consent, the participants were asked to fill out a questionnaire on demographics, medical history and vaccination status against hepatitis B. No direct identifier was captured during the study since each participating blood donor was allocated

a code number which was used in place of the name of the study participant to hide his/her identity and it was linked with his/her sociodemographic data.Samples for this study were collected as part of the hospital's routine donor screening process. The blood was collected by laboratory staff at the blood transfusion unit of MTTRH. A vacuum gel collection tube was used to draw 5 ml of blood from each participant. The collected blood samples were then transferred to the MTTRH laboratory for testing . Briefly, the blood samples were centrifuged at 2500 rpm for about 10 minutes to obtain serum. We carried out HBsAg Enzyme-linked Immunosorbent Assays (ELISA) test using the VITROS® 3600 Immunodiagnostic System following the manufacturer's instructions. The reagents and equipment used for testing included ELISA microwells, a conjugate, positive control and negative control.

To do the HBsAg test, 20 µl of each serum sample was pipetted into the reaction vials on a rack. The rack holding the vials containing the serum samples was placed in the machine to run the assay. Positive and negative control was incorporated in every run in ensuring that the results are valid. Each of the testing reagents was equilibrated to room temperature and mixed well before being loaded into the machine where the reagent inventory was automatically updated in the system. The assay involved the addition of 20 µl of each sample into microwells coated with recombinant antibodies to HBsAg. A conjugate was automatically aliquoted to each microwell before incubation. A stop reagent was automatically added to each well before the results were determined by measuring the absorbance of each well. The assay was automated and took 40 minutes before the rack moved to the holding area. The results were then displayed on the equipment screen.

For a positive test result, ≥1 s/co anti-HBs had to be be detected but if less than 1 s/co

anti-HBs is detected, then the test result was negative. . Lab results were linked to the demographic data obtained through the questionnaire using a code number assigned to both the questionnaire and blood collected from by each participant.

3.7 Variables

Independent variables for this study included:

- Demographic features (gender, age, marital status, number of spouses, , occupation, , level of education and income)
- Hepatitis B vaccination status
- Number of blood donations an individual had done in their lifetime

The dependent variables in the study were:

- Hepatitis B infection status

3.8 Data collection and analyses

Once a donor was recruited his/her sociodemographic data were collected. Each participating donor's code number in place of a participant's name was recorded with his/her sociodemographic data. Primary data was then collected from participants and keyed into Excel. Cleaning of raw data was done and transferred to IBM SPSS Statistics Version 26 software for analysis.

In our cross-sectional study, the prevalence was calculated as a measure of frequency. The resultant prevalence helped to describe how frequently HBV occurs amid blood donors at the time of the study. The total number of those who tested positive for hepatitis B was

divided by the total number of people who took part in the study to determine the prevalence in a representative sample and the percentage provided in the report.

Descriptive analysis using frequencies/proportions was done for categorical variables and also measures of central tendency for analysis of numerical variables.

Test for associations with the main outcome variable was also done using binary logistic regresion .

3.9 Ethical considerations

The study protocol was forwarded to the Kenyatta National Hospital –University of Nairobi Ethics and Research Committee (KNH-UoN ERC) for approval. Approval was also sought from MTTRH ethics board to be allowed to conduct the study. After the approval was granted, this study was done in hospital blood transfusion and laboratory sections.

We informed and assured all participants that their health, integrity, dignity, the confidentiality of personal information and right to self-determination are guaranteed as outlined in Helsinki Declaration. They were also informed that the decision for their participation was entirely voluntary and was free at any time to withdraw without a reason from the study and that any services they are entitled to receive from any health institution were not to be affected upon their refusal to take part in the research study.

All participants agreed to provide written informed permission to take part in the study. All donated blood was tested for HIV-1 & 2, hepatitis B & C and *Treponema pallidum* before being availed for transfusion . The principal investigator was authorized to practically participate in all the processes involved in their specific studies. We were able

to practically work with the hospital laboratory staff to screen donors for their appropriateness for blood donation.

To increase privacy and protect the identity of participants, we used unique codes in place of their names. For data safety, the data collected was also stored in a password-protected computer and backed up on google drive accessible only to the investigators.

3.10 Quality assurance

During data entry, entry errors were controlled by ensuring that the data entered was double-checked thereby eliminating the need for re-entering the data during the study. We identified the sources of inaccuracies, did the causal analysis, reduced the redundancy of data and standardize the data collection process to improve the integrity of the data collected. To control the quality of data and the process of the collection as a whole, we ensured that the vacutainer blood collection tubes were sterile before using them, the vacutainers were labelled similar to the code numbers given for each study participant, the vacutainers containing blood samples were to be transported to the lab in a cold box where they would be kept at 2°C to 10°C awaiting serological tests. We practically worked with the hospital laboratory staff who were well-trained and experienced in screening blood donors for their suitability for blood donation.

3.11 Study result dissemination plan

Study findings were presented to the department of Medical Microbiology, University of Nairobi and also shared with the Mogadishu Turkey Training and Research Hospital, the University of Nairobi journal club and also through a peer-review publication.These findings shall also be share with the local government in Mogadishu to promote a proper

policy development framework regarding the control of hepatitis B and other related viral infections.

CHAPTER FOUR: RESULTS

4.1 Socio-demographic characteristics

A total of 905 blood donors were present at the time of the study with 23 participants declining to participate. One participant was below 18 years of age and was excluded from this study. Thus, in the final analysis, 881 blood donors were included.

The sociodemographic characteristics in this study were age, occupation, level of education, marital status, number of spouses, and income levels as shown on as table 4.1.

Table 4.1 Social demographic characteristics among the study participants

Characteristic	**Counts**	**Per cent**
Age groups (years), n=881		
<40	797	90.5
≥40	84	9.5
Occupation, n=881		
Employed	576	65.4
Student	187	21.2
Self-employed	96	10.9
Unemployed	22	2.5
Level of education, n=881		
Primary	45	5.1
Secondary	226	25.7
Tertiary	610	69.2
Marital status, n=881		
Married	572	64.9
Single	264	30.0
Divorced	45	5.1
Number of spouses, n=881		
None	289	32.8
One	536	60.8
Two	50	5.7
>two	6	0.7
Income levels, n=881		
<$200	345	39.2
$200 - $500	512	58.1
>$500	24	2.7

Eight hundred and eighty-one participants were blood donors in the hospital.The mean age was 29 years (SD 6.42, Range 18 – 51). All study participants were male. Age was categorised in to 18-25, 26-35, and 36 years and above. Participants aged 26 -35 years were the majority (52.8%) while participants aged 36 years above are the least (16.4%). With regards to occupation, employed persons were 576 (65.4%), students were 187 (21.2%), self-employed 96 (10.9%), while unemployed persons were 23 (2.5%) (Figure 4.1).

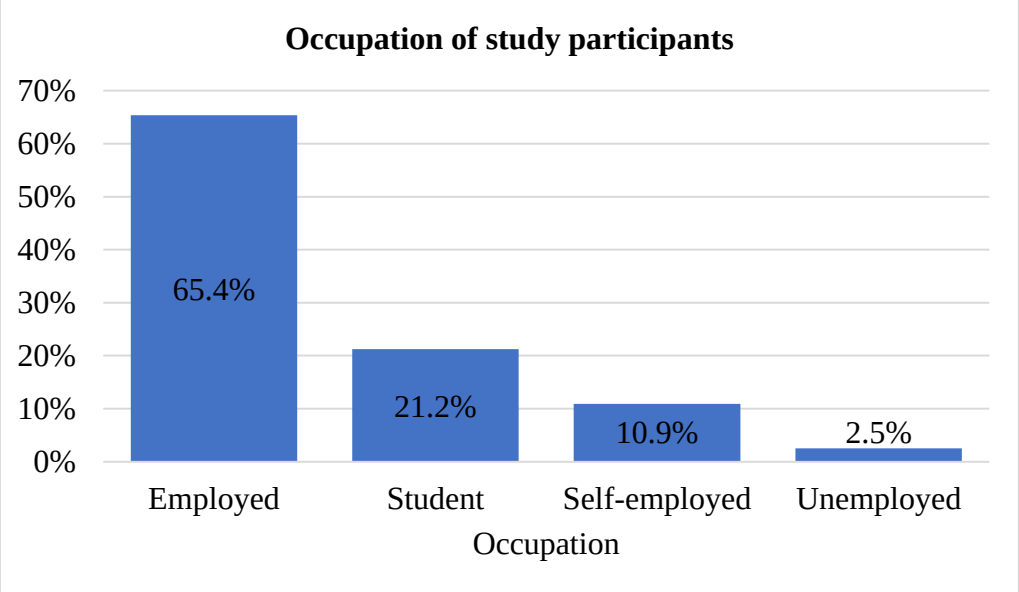

Figure 4.1 Occupation of the study participants

By marital status, 572 (64.9%) were married, 265 (30.1%) were single while 45 (5.1%) were divorced. When categorized by number of spouses, 290 (32.9%) had no spouse, 536 (60.8%) had one spouse, 50 (5.7%) had two spouses while 6 (0.7%) had more than two spouses. With regards to income levels, 512 of the participants earned $200 - $500 (58.1%) while those who earned less than $200 were 345 (39.2%). Participants who earned more than $500 were the least (2.7%) (Table 4.1).

4.2 Clinical characteristics

Table 4.2 Clinical characteristics among the study participants

Characteristic	Counts	Per cent
Blood group		
A+	215	24.4
A-	10	1.1
AB+	52	5.9
AB-	10	1.1
B+	85	9.6
B-	1	0.2
O+	483	54.8
O-	26	2.9
Blood donation before		
None	3	0.3
Once	319	36.2
Twice	318	36.1
Thrice	186	21.1
>Thrice	56	6.3
HBV vaccination		
Yes	172	19.5
No	710	80.5

When analyzed by clinical characteristics, majority of the study participants had blood group O-positive (54.8%). Most of the study participants had donated blood once (36.2%) while those who had no prior blood donation experience were the least (0.3%). Most of the study participants indicated that they were not vaccinated against HBV (80.5%) in comparison to those who indicated that they were vaccinated (19.5%). (Table 4.2)

4.3 Prevalence of HBV infection

The frequency of HBV infection by HbsAg ELISA was 23 / 881 (2.6%, 95% CI 1.7 – 3.9) (Figure 4.2). The prevalence of HBV among blood donors at Mogadisho Turkey Training and Research Hospital in this study was therefore 2.6%.

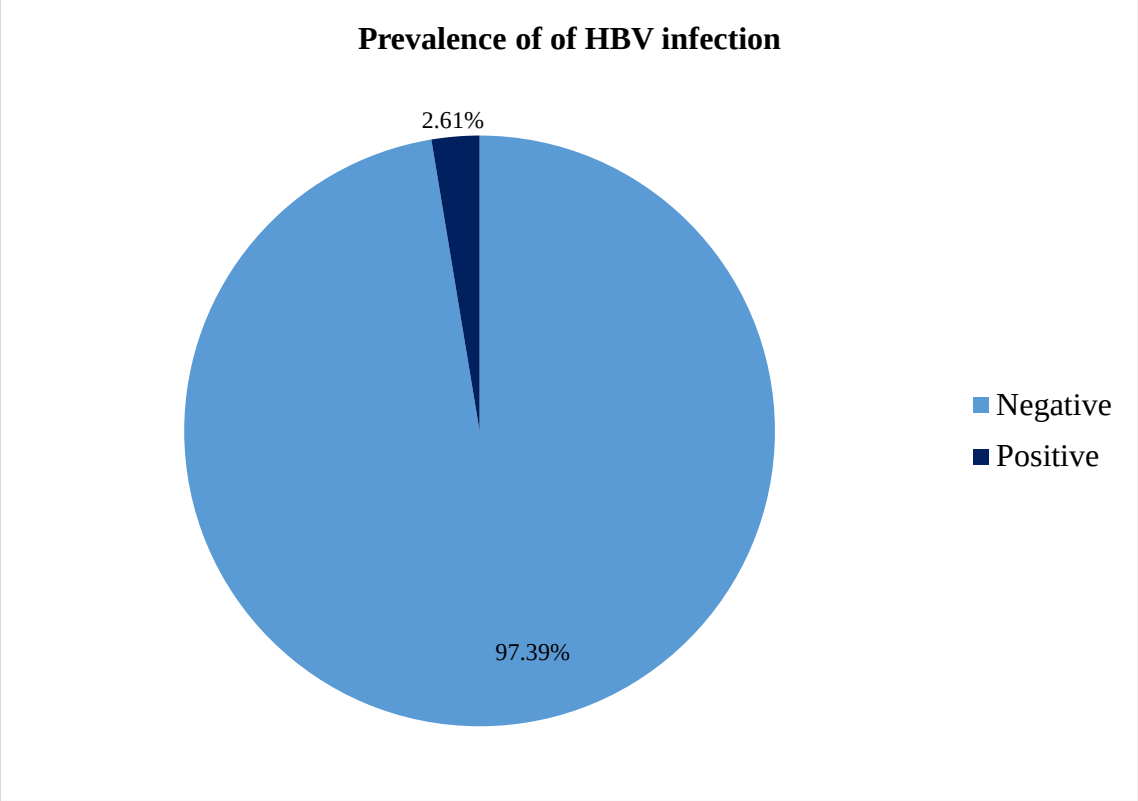

Figure 4.2 Prevalence of HBV infection among the study participants

4.4 Sociodemographic characteristics of participants with HBV infection

The study also determined prevalnevce by age, occupation ,level of education , marital status , number of spouses , income levels, and HBV vaccination among participants (Table 4.3).

Table 4.3 HBV infection and sociodemographic characteristics

Variable		HBV Positive (percentage)
Age	<40–	17/797 (2.1%)
	>40–	6/847 (7.1%)
Occupation	Employed	17/576 (3.0%)
	Self-employed	3/96 (3.1%)
	Student	3/187 (1.6%)
	Unemployed	0/22 (0.0%)
Level of education	Primary	1/45 (2.2%)
	Secondary	7/226 (3.1%)
	Tertiary	15/610 (2.5%)
Marital status	Single	6 (2.3%)
	Married	14/572 (2.4%)
	Divorced	3/45 (6.7%)
Number of spouses	None	9/289 (3.1%)
	One	14/536(2.6%)
	Two	0/50 (0.0%)
	More than two	0/6 (0.0%)
Income	<$200	8/345 (2.4%)
	$200 - $500	15/512 (2.9%)
	>$500	0/24 (0.0%)
Blood group	O+	10/452 (2.1%)
	O-	2/26 (7.7%)
	AB+	0/52 (0.0%)
	AB-	1/10 (10.0%)
	A+	4/215 (1.9%)
	A-	1/10 (10.0%)
	B+	5/85 (5.9%)
	B-	0/1 (0.0%)
Vaccination status	Vaccinated	0/172 (0.0%)
	Unvaccinated	23/709 (3.2%)

In the analysis of HBV prevalence by sociodemographic characteristics, participants aged 40 years and above had a higher HBV positivity (7.1%) compared to those aged below 40 yeras (2.1%) . A higher HBV prevalence was observed among the self-employed (3.1%) in comparison to other occupations. When analyzed by marital status, HBV prevalence was higher among the divorced (6.7%) in comparison to those who were married (2.4%) and single (2.3%). With regards to the number of spouses, the prevalence of HBV was higher among those who reported having no spouse

(3.1%) when compared to those who reported having one (2.6%), two (0%), and more than two spouses (0%). By income level, HBV prevalence was higher among those who earned $200-$500 (2.9%) as compared to those who earned below $200 (2.4%) and above $500 (0%). The prevalence of HBV was 3.2% among those who were unvaccinated and 0% among the vaccinated (Table 4.3).

Table 4.4 Odds ratio for factors associated with HBV infection

Parameter	**HBsAg Positive**	**Odds Ratio (95%CI)**	**P value (FET)**
Age above 40			
Under 40 years	17/798 (2.1%)	3.35 (1.359 – 8.273)	0.006
40 years & above	6/84 (7.1%)		
Student			
Yes	3/187 (1.6%)	0.557 (0.167 – 1.853)	0.443
No	20/694 (2.9%)		
Unemployed			
Yes	0/22 (0.0%)	NA	1.000
No	23/859 (2.7%)		
Employed			
Yes	17/576 (3.0%)	1.50 (0.598 – 3.766)	0.507
No	6/305 (2.0%)		
Married			
Yes	14/572 (2.4%)	1.19 (0.521 – 2.718)	0.680
No	9/309 (2.9%)		
Divorced			
Yes	3/45 (6.7%)	0.359 (0.111 – 1.163)	0.108
No	20/836 (2.4%)		
Polygamous			
Yes	0/56 (0.0%)	NA	0.392
No	23/825 (2.8%)		
Vaccination			
Yes	0/172 (0.0%)	NA	0.013
No	23/709 (3.2%)		
Income			
Below $200	8/345 (2.4%)	0.829 (0.355 – 1.933)	0.829
Above $200	15/536 (2.7%)		

The significant factors related to the occurrence of HBV infection were age (above 40 years) and vaccination status, with a hepatitis B with the p-value of the Fisher's Exact test being 0.006 and 0.013 respectively ($P \leq 0.05$). Other features like occupation, educational level, marital status, number of spouses, and blood group were not significantly related to the occurrence of HBV infection. (Table 4.4).

4.5 Logistic Regression Model

The hepatitis B virus test result was a binary outcome. Binomial logistic regression was conducted to establish the relationship between HBV with the socio-demographic variables. Association between these variables and HBV infection was seen as statistically significant at $P \leq 0.05$ while $P > 0.05$ was statistically insignificant. The outcome was reported by odds ratio and the corresponding 95% confidence intervals (Table 4.5).

Table 4.5 Binary logistic regression analysis of association between sociodemographic factors and hepatitis B infection

Variables in the Equation	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Age	.036	.059	.383	1	.536	1.04	0.924	1.164
Age > 40 years	-1.982	.992	3.996	1	.046	7.26	1.039	50.668
Married	.392	.540	.529	1	.467	1.48	0.514	4.264
Polygamous	-17.965	5253.091	.000	1	.997	0.00	0.000	.
Tertiary education	-.172	.476	.131	1	.718	0.84	0.331	2.139
Income > $200	.530	.562	.890	1	.346	1.70	0.565	5.114
Constant	20.353	5253.091	.000	1	.997	690876841.07		

In the logistic regression model, only age above 40 years had a significant association with HBV infection ($p<0.05$). Participants over 40 years of age were 7.26 (95%CI; 1.039 – 50.668) times more likely to be infected with hepatitis B than those aged 40 years and below. No other factors listed in table 4.5 had statistically significant association with hepatitis B infection ($p>0.05$).

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Discussion

Globally, Hepatitis B is the main cause of viral hepatitis and infections vary significantly with the South of the Sahara reporting the highest rates. Geographically, HBV infection is widespread in Sub-Saharan Africa with a prevalence of 6.1% (Spearman et al., 2017). According to a study on transfusion medicine, HBV infection through blood transfusion was a significant concern (Seo et al., 2015). This transmission of HBV infection is closely associated with certain risk factors. Most of the studies on the seroprevalence of HBV in Somalia were done more than two decades ago, and there are limited or no recent studies that have been done to shed light on the occurrence of HBsAg amid blood donors. This study was to determine the current occurrence and socio-demographic factors related to hepatitis B infection among blood donors at Mogadishu Turkey Training and Research Hospital (MTTRH).

The study reported a prevalence of HBV among blood donors at 2.6%. HBV seroprevalence in this study was significantly lower than that of the latest study involving hemodialysis patients in MTTRH, where the prevalence of hepatitis B was 7.3% (Jeele et al., 2021). The prevalence of HBV in this study was also lower when compared to a study done by Öznur which reported an HBV prevalence of 8.2% among 84,505 patients who were admitted at MTTRH between January 2017 and June 2019(Öznur, 2021). HBV among blood donors in this study describes the seroprevalence of infections as lower compared to previously done studies. The findings in this study add to the literature on the

current prevalence of hepatitis B amid blood donors in Somalia. This study also illustrates that vaccination initiatives undertaken by the Somalian government and other health organizations in the fight against hepatitis B could be progressive.

The seroprevalence of HBV amid blood donors in this study (2.6%) was comparable to studies done in West Africa, East Africa, and Asia where the reported seroprevalence of HBV among blood donors ranged between 3 to 22 % (Uneke et al., 2005; Dongdem et al., 2012; Hassan-Kadle, Osman, Ogurtsov, 2018). Hepatitis B infection preventive measures and programs in different regions of the world may have been some of the factors for the disparity in prevalence in those areas.

Socio-demographic characteristics like ethnicity, age, gender, religion, language, level of education, and income, among others can have an impact on health outcomes, (Tajvar, M., Arab, M., & Montazeri, A. 2008), (Pappa et al., 2009, 2015), (Kivits, Erpelding and Guillemin, 2013), (Song et al., 2015). This study analysed HBV prevalence by age, educational level, income level, marital status, and number of spouses. HBV prevalence was higher among the divorced (6.7%) in comparison to those who were married (2.4%) and single (2.3%). When further analyzed by number of spouses, HBV prevalence was higher among those who reported having no spouse (3.1%) when compared to those who reported having one (2.6%), two (0%), and more than two spouses (0%). These findings contrast a study done in Nigeria where the prevalence of HBV was higher among the married (13.2%) in comparison to singles (4.2%) (Cookey et al., 2022).

In the analysis by income levels, the prevalence of HBV was higher among those who earned $200-$500 (2.9%) as compared to those who earned below $200 (2.4%) and above $500 (0%). These findings corroborate a study done in Hainan, China where HBV

prevalence was higher among those with a lower income. The study in China was however done among women (Zhang et al., 2013). Participants who earned more than $200 were however 70% (OR=1.70, 95%CI: 0.565 – 5.114) more likely to be infected with HBV in comparsion to those who eraned less than $200 (Table 4.5). The association in this study was however not significant ($p<0.05$). The low prevalence of HBV among participants who earned above $500 (Table 4.3) could have been due to these participants being able to access and pay for better healthcare services.

Most of the participants in this study had attained tertiary level of education (69.2%) while least comprised of those who had attained primary level of education (Table 4.1). In the analysis of HBV prevalence by level of education, a higher prevalence was observed among participants who had attained secondary education (3.1%) followed by those who had tertiary education (2.5%). A lower prevalence was reported among participants who had primary education (2.2%) (Table 4.3). This could have been due to individual differences in levels of awareness on HBV despite the level of education. The findings in this study complemented a study done in Ethiopia that showed higher HBV positivity rates among participants with highest education levels (Tadesse, 2022).

From this study, the only significant factor related to the occurrence of HBV infection was age category above 40 years ($p<0.05$). The effects of other sociodemographic factors on HBV infection outcomes were possibly curtailed by the participants' vaccination status as none of the vaccinated participants tested positive for HBV. All the other sciodemographic factors analysed were not significantly associated with HBV infection (Table 4.5).

Men aged 40 years and above had a higher prevalence of HBV infection (7.1%) in comparison to men below 40 years (2.1%) (Table 4.3). This age category was also

significantly associated with HBV infection in the logistic regression analysis (Table 4.5). These findings are in line with the literature that has already been published, which revealed a higher prevalence of HBV in older males. Due to an increased risk of exposure with time, there is an established correlation between older age groups and HBV infection. These results build on existing evidence and are similar to studies in a similar setting that determined age was a significant factor associated with hepatitis B where participants in the age subgroup 61 – 80 years accounted for 50% of those who tested positive (Öznur, 2021).

High-coverage use of the hepatitis B vaccine is one of the most effective preventive measures (Liaw and Chu., 2009). WHO has recommended that babies be vaccinated immediately after birth (within 24 hours) and within six months (CDC, 2019). In this study, lack of HBV vaccination was a determinant of HBV infection as none of the vaccinated individuals tested positive for HBV (Table 4.4). Fisher's exact test also determined that vaccination is a significant factor related to HBV infection among our study population with a p-value of 0.013. To mitigate the health risks that are related to hepatitis B, high-risk groups in the population are targeted for them to benefit from education programs, including vaccination sensitization on HBV (el Beltagy et al., 2008).

The interpretation of these study findings had some limitations. First, this was a cross-sectional study making it hard to assess the underlying associations. Our study participants comprised only the male population which limits the broad applicability of the findings in the general population. In a similar setting, our study population was compared with a study done in Gondar, Ethiopia which reported that 94 (66.6%) of blood donors were male (Melku et al., 2016). Men were 5 times more likely than women to donate blood. The

probable reason for this variance is attributed to the educational level, social-cultural and religious perception towards blood donation as well as the strict eligibility criteria for blood donation which are unfavorable to Somalia women whom the majority were either pregnant, lactating, menstruating among other reasons (WHO, 2012; Madrona et al., 2014). The results confirm the significance of focused, culturally sensitive recruitment, retention, and targeted interventions to increase blood donation among women in the community. The study was conducted in a single centre thus, the catchment population of the hospital is smaller compared to conducting the study in many centres. Moreover, there was no confirmatory PCR test for hepatitis B at MTTRH. To mitigate this limitation, the HBsAg ELISA test with a sensitivity of 95% and a specificity was 99% was used to determine hepatitis B infection among blood donors. This served as a highly sensitive, highly specific and affordable method of HBV testing among blood donors.

5.2 Conclusions

This study determined the seroprevalnce of HBV among blood donors at MTTRH. According to our findings, the occurrence of HBV amid blood donors at the MTTRH was 2.6%. The prevalence of HBV is fairly low when compared to other studeis in a similar setting.However, HBV infection has significant morbidity, especially in those who develop complications associated with it such as hepatocellular carcinoma and liver cirrhosis. The high positivity observed in the age group above 40 years and above could point to a need to test older populations for the disease as well as increase HBV vaccination coverage.

5.3 Recommendations

1. A standard HBV vaccination schedule is an essential approach used to lower the HBV infection incidence in the community. HBV vaccination is protective and should be upscaled.

2. Epidemiological studies would be helpful to better understand other predisposing risk factors, infection mechanisms, and circulating HBV genotypes in this group of people and region are required. Additionally, it would present opportunities for HBV transmission prevention measures.

3. To offer the vaccination and promote ongoing education on the mode of infection and transmission of HBV as well as infection control measures used among blood donors, targeted community awareness and education are required.

4. Targeted screening program for HBV infection could be used to identify the infected individuals, and their contacts and institute measures to prevent further transmission of HBV.

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APPENDICES

Appendix 1. Study Questionnaire:

Prevalence of Hepatitis B Infection among Blood Donors at Mogadishu Turkey Training and Research Hospital in Mogadishu, Somalia

Investigators: Ms. **Saido Mohamud Derow,** Dr. **Moses Muia Masika,** prof **Omu Anzala** and Mr. **Kassim Abdi Jimale**

Department of Medical Microbiology, University of Nairobi

Department of Microbiology, Somali National University

NOTE: This questionnaire is anonymous, please do not write your name anywhere on the form.

- What is your age in years?.....
- What is your gender: □ Male □ Female
- Where do you live?.....(City)……..(District)
- What is your occupation?.....
- What is your marital status? □ Single □ Married □ Divorced □ Other
- What is your level of education?

  □ Primary □ Secondary □ Bachelor degree □ Postgraduate

- How much (in dollars) do you earn per month?

  □ None □ Below $200 □ $201 - $500 □ $501 - $3000

  □ $3001 - $5000 □ Above $5000

- How many spouses do you have?

  □ None □ One □ Two □ More than two

- How many spouses have you had in the last year? ……...

- What is your blood type?

  □ O+ □ O- □ AB+ □ AB- □ A+

  □ A- □ B+ □ B- □ Don't know

- How many times have you donated blood before?.....

- Are you vaccinated against the hepatitis B virus? □ Yes □ No

- HBV infection result: □ Positive □ Negative

2A. Informed Consent Form

Prevalence of Hepatitis B among Blood Donors at Mogadishu Turkey Training and Research Hospital in Mogadishu, Somalia

I would like you to participate in a research study that we are doing, the topic is the **Prevalence of Hepatitis B Infection among Blood Donors at Mogadishu Turkey Training and Research Hospital in Mogadishu, Somalia.** The researchers: Ms **Saido Mohamud Derow,** Dr **Moses Muia Masika,** Dr **Omu Anzala** and Mr **Kassim Abdi Jimale** will conduct the study. The purpose of this consent form is to give you the information you will need to help you decide whether or not to be a participant in the study, the possible risk and benefits, your rights as a volunteer and anything else about the research or this form that is not clear. Once you understand and agree to be in the study, we will request you to sign your name on this form.

These are the general principles that all participants in medical research should understand:

- Your decision on participation is entirely voluntary
- You may withdraw from the study at any time without necessarily giving a reason for your withdrawal
- Refusal to participate in the research will not affect the services you are entitled to in this health facility.

What is this study about?

We are doing the study to determine the prevalence of hepatitis B infections among the persons donating blood in Mogadishu Turkey Training and Research Hospital in Mogadishu, Somalia.

What will happen if you decide to be in this research study?

If you agree to participate in this study, the following things will happen;

- We will ask you a few questions which will take approximately five minutes. The questions will be about age, gender, occupation, marital status, level of education, blood type and the number of times you have donated blood.
- We will insert a needle in a vein in your hand and draw 5 ml of blood. This is the blood that will be tested for hepatitis B.

Are there any risks, harms discomforts associated with this study?

You may feel some pain when we insert a needle into your vein, however, after a few minutes you will feel better. You may also feel uncomfortable when answering some of the questions. If there are any questions you do not want to answer you can skip them. You have the right to refuse any questions asked during the conduct of the study.

How will my personal information be protected?

The information we collect from you will remain confidential. This will be achieved through the use of a code number to identify you in a password-protected computer database and we will keep all of our paper records in a locked file cabinet.

Are there any benefits to being in this study?

There is only one National Blood Bank in Somalia, the rest are operated by privately owned hospitals. In regards to this, unlike the National Blood Bank which offers free transmission-transmissible infections tests, due to the high costs of use of test kits, the private facilities resort to charging the blood donors. You may therefore benefit by receiving free testing for hepatitis B surface antigen since we will cover the cost of the test. In case your test turns positive for hepatitis B surface antigen, we will refer you to hospital care and support you where necessary. The information that you provide will also help us to better understand the distribution of hepatitis B infection. This information is a contribution to science.

What if you have questions in the future?

If you have further questions about participating in this study, please call or send a text message to the principal investigator: Ms **Saido Mohamud Derow** **Contact: +252617533424**

Lead Supervisor: **Dr Moses Muia Masika, E-mail: mosmasika@gmail.com Contact: +254721770306**

For more information about your rights as a research participant, you may contact the Secretary/Chairperson, Kenyatta National Hospital-University of Nairobi Ethics and Research Committee Telephone No. 2726300 Ext. 44102 email uonknh_erc@uonbi.ac.ke.

Participant's Statement

I have read this consent form or had the information read to me. I have had the chance to discuss this research study with a study counsellor. I have had my questions answered in a language that I understand. The risks and benefits have been explained to me. I understand that my participation in this study is voluntary and that I may choose to withdraw at any time. I freely agree to participate in this research study.

I understand that all efforts will be made to keep information regarding my identity confidential.

By signing this consent form, I have not given up any of the legal rights that I have as a participant in a research study.

I agree to participate in this research study:	**Yes**	**No**
I agree to have my blood sample preserved for later study:	Yes	No
I agree to provide contact information for follow-up:	Yes	No

Participant print

name: _____

Participant signature / Thumb stamp: _____

Date: _____

Researcher's statement

I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believe that the participant has understood and has willingly and freely given his/her consent.

Researcher's Name: _____

Role in the study: _____

Signature: _____ **Date**: _____

2B. Informed Consent Form (Somali Language)

FOOMKA OGOLAANSHAHA KA QEYB QAADASHADA BAARITAANKA

Cinwaanka Daraasada:Si loo qiimeyo cudrka beerka kudhaca ee (Hepatitis B virus) dadka dhiiga shubaayo ee isbitaalka Mogadisho Turkey Training and Research HOSBITAL in Mogadisho SOMALIA. Waxaan doorbidnay in in nagalaqaybqatan cilmi baaristaas ciwaankiisa yahay Si loo qiimeyo heerka cudurka beerka kudhaca ee (Hepatatis B virus) dadka dhiiga shubaayo ee imaanaya isbitaalka Mogadisho Turkey and Research Hosbital in Mogadisho Somalia.

Draaaseeyaha: Saido Mohamud Derow Msc medical microbiology University of Nairobi iyo 2dadayda suberfaysar Dr. Moses Mui Masika, Dr. Omu Anzala and Mr Kasim Abdi jimale aya wadno baaritaanka cilmi barista ah ujeedadana tahay in qofka inuu nagu caawin karo warbixintiisa wax qasab ahna kuma ahan wuu diidi kara wuuna aqbali kara cilmi barista wax halis ahna kuma keeni karto, markaat fahamto baritanka aadna aqbasho b waxaan kacodsanayna inaaad aqbasho magacaada si laguu buuxiyo foomka

Waxyabahan soo socda dadka kaqayb qaadanayo cilmi baaristan lafahmsiinayo.

1.inuu goaanka leeyhay inuu kaqayb qaato six or ah cilmi baaristan.

2.ka qaybqaadsahada baaritanka cilmiyeed waa iqtiyaari hadii aad rabto wax qayb qaadankarta

3. hadii aad rabto waad diidi kartaa, xor baad tahay, wax dhib ah oo diidmadaada kaaga imaanaayana ma jiri doonto, waxna uma dhibi doonto daryeelkaada caafimaad ee isbitaalka.

Cilmi baaristan maxay kusaabsantahy

Cilmi baarsitan lasameynayo waaa in laogaada inta uukayaha cudurkan kudhaca beerka ee looyaqano (Hepatais b vidrus) dadka dhiiga shub aayo ee imaana isbitalak Mogadisho Turkey Training and Research Hosbital in Mogadisho Somalia .

Maxaa dhacaayo hadii uu qofka uuu aqbal cilmi baristan

Hadii uu qof kaqayb qaadanaayo cilmi baaristan uuu aqbalo waxaa dhacayo waxyaabhan soosocdo.

- In laweydiinayo suaal qaadanayo mudo shan daqiiqo ah , suaalaha waxay kusaabsanaan doonan qofka Dadiisa , lab iyo dhidig midka uuyahay , inuu yahay yahay qof aanguursanin, ama xaas ah , ama xaas kalatageen. Herka waxbarashadiisa., Dhiigiisa qofka nuuca uuyahay iyo inta jeer uu dhiig shubay
- Waxaan oogu qaadi doona dhiiga cirbad anoo kaqadaynayo xididka qaybta gacanta ah kudhawaas shan ml.

  Wax dhib ah makaimaankrta cilmi baaristan

  Waxaad dareemi doonta waxyar oo xanuun ah markay cirbada kugasho laakin wax yar kadib waxaad dareemi doono si caadi ah . hadii aadan kuqanacsanyn suaalaha qaar xor waxaad utahay inaadan kajawabin.. hadii suaal lagu weydiiyo aysan macquul ahayn inaad kajawabo yacnii iskiga tag suaashas

  Marka waxa lagu weydiina suaalo qaar cadi ah iyo kuwo cilmi kusalaysan inta kugudo jirno cimi baaristan.

Sidee kuilaalinkarna xogta dadka kaqaybdabqadanyo cilmi barista

Xogta kuugu saabsan ee aan kaa qoridoono waa sir aanan la wadaagi doonin dad kale mgacaagana waan qarin doonaa markan soo bandhigaayo macluumaadka ku saabsan

baaritaanka cilmiyeed. Comuter databas xeran ayaan usamyna .

Wax faaido ah maleeyahay cilmi bnaaristan

Wadanka waxooleyaha hal mee loo dhiiga lakugediyo iyo isbitalka garga looleyahy hestan. Qof ka markuu dhiiga bixinayo baritano ayaa lodiraa oo ay kamidyihiin cudurada faafo. Sawaba laxariiro dhaqalaha isbitalada garga looleyahy bilaash kuma bixikaraan baritan ka lkn mesha dhiiga laku geediyo waxay ku bixiyaan bilaash baritanada. Haa wuu kuleeyahy waxad helyasa baaritan lacag laan ah oo aan kabarayo cudurka , hadii aad cudrkan kugu soobaxo inaad qabto , waxaan ku diri doona isbitaal kucaawiyo , warbixintaan waxaad waxaad kahelysa in lagu caawiyo aadna fahamto cudrkan . warbixintaan waxay aruurinaysa cilmi .

Hadii aad suaal qabto mustaqbalka ah

Hadii aad qabto wax suaal ah kusabsan cilmi baaristan iga soo wac ama iigasooqor qoraal

Cilmi baaraha :Saido Mohamud Derow , contact +252617533424

Hogamiyaha baritanka: **Dr. Moses Muia Masika, E-mail: mosmasika@gmail.com**

Contact: +254721770306

Hadiiaad u baahato macluumaad dheeri ah oo ku saabsan xuquuqdaada ku saabsan ka qeyb qaadashada baaritaanka cilmiyeed la xiriir madaxa ama xoghaynta gudiga akhlaakhiyaadka baaritaanka cilmiyeed ee Isbitaalka Qaran ee Kenyatta iyo Jaamacada Nayroobi cinwaankooda Telefon No. 2726300 Ext. 44102 email: uonknh_erc@uonbi.ac.ke.

Foomka Ogolaanshaha ka qeybqaataha Baaritaanka Cilmiyeed

ahba waan Waxaan aqrin doona foomka ogalaanshahaaniga waxaad fursad ah jiro in kalaa hdal , cilmibaaristan oo adiga kuquseeyo , waxaan kuweydiina suaaalo aaad ogujawaabi kartid luqadaaada hooyo si aaad ufahamto , wax dhib ah iyo wixii faaido kushega , waxaana lagu sheega inaad thay qof xor ha baaritaan waaad kaqaybqadankarta mana kaqabqadankrto Adoo saxiixayo warqadan aqbalada ah si sharci ah

Waan aqabalay cilmi baaristan Haa Maya

Maku aqbalaysa in dhiigada lagu saeeyo cilmi baaris Haa Maya

Maku aqabalaysa in lagu siiyo meela aad nogalasoo xariirto si warbixintan dib ooogu raacdo Haa Maya

Magaca ka qeyb qaataha _____

Taariikda _____

Saxiixa _____

Foomka Ogolaanshaha ka qeybqaataha Baaritaanka Cilmiyeed

Anigoo ah _____ waxaan halkan ku cadeynayaa inaan si xor ah uga qeyb qaadanayo baartiaankan cilmiyeed. Waan fahamsanahay qatarta iyo faaiidada ku jirta, waxaana si cad iigu sharaxay baaraha baaritaanka cilmiyeed. Sidaa daraadeed waxaan halkan ku cadeynayaa inaan si xor ah uga qeyb qaadanayo baaritaankan cilmiyeed.

Magaca cilmi baaraha : ____ Saido Mohamud Derow**_____**

Saxiixa _____

Taariikda _____