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Determinants of Hepatitis B Infection and Mitigation Strategies Utilized to Prevent and Control Infection in Population Health of Nyabiheke Refugee Camp in Rwanda

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Abstract

A review of the determinants of viral hepatitis infections shows a serious impact on population health, with over 325 million people infected annually. Hepatitis infection is primarily attributed to HBV and HCV, which are leading causes of hepatitis-related comorbidities and high mortality rates. In the study area, a refugee camp, a high number of cases and contributing factors related to hepatitis infection remain undocumented. Despite various government efforts to initiate measures for preventing and controlling the spread of infection over the last decade, millions continue to suffer from HBV without comprehensive data on the underlying factors. This gap in documentation led to the study on determinants of hepatitis infections and mitigation strategies employed in Nyabiheke Refugee Camp to prevent and control Hepatitis B infection in the camp's population. Specifically, the study aimed to determine the prevalence of hepatitis B infections among the camp's population, evaluate the socio-cultural and environmental risk factors affecting hepatitis spread, and assess the influence of knowledge, attitudes, and practices (KAP) on the effectiveness of the Ministry of Health's prevention and control strategies within the camp. The study employed a mixed-methods approach, combining descriptive, cross-sectional, and cohort study designs, with purposive sampling conducted retrospectively over the last five years and prospectively for three months of data collection. Data collection tools included semi-structured questionnaires for surveys, in-depth interviews, and focus group discussion guides. Data was managed using SPSS version 25.0. Results from the first objective indicated that among the 7,100 refugees screened, 3.4% were diagnosed as Hepatitis B positive. Findings for the second objective identified key transmission sources, including overcrowding (87.9%), unsafe injections (44.5%), and vertical transmission (20.4%), with a p-value below 0.05 indicating insignificant relationships with infection rates in the camp. The availability of sanitation facilities was significant, with a p-value of 0.53 and an odds ratio (OR) of 0.64, signifying a protective role in the camp's health environment. The third objective found that 38% of participants

pointed to the influence of taboos, while 45% agreed with cultural norms as factors affecting healthcare-seeking behavior. Objective four confirmed that the influence of KAP on the spread of Hepatitis B in the camp remains limited, underscoring the need for health education to promote effective prevention and control of Hepatitis B infection. In conclusion, the prevalence of Hepatitis B among refugees in Nyabiheke Refugee Camp is lower than the national prevalence. The study recommends that the Ministry of Health increase HBV vaccination coverage, while health implementation partners in the camp should educate refugees on HBV transmission and prevention. There is a need for ongoing follow-up campaigns and universal access to affordable, high-quality diagnostic tests and vaccines for unscreened individuals. Further studies should investigate vertical transmission levels in Nyabiheke and other refugee camps in Rwanda.

Keywords*: Hepatitis Infections, Mitigation Strategies, Utilized, Nyabiheke Refugee Camp, control of the Infection, Rwanda*

1.0 Introduction

Globally, regionally, and locally in Rwanda, the determinants of viral hepatitis endemic infections continue to affect over 325 million population health annually, *(Pubmed. (2017)*, the major cause of infection has been attributed to a strain of Hepatitis B Virus and Hepatitis C virus which is the leading cause of hepatitis comorbidity and increased mortality. However the noted High number of positive case of HBV remain undocumented in Nyabiheke refugee camp, thus timely need to study determinants of hepatitis B infections and mitigation strategies utilized in the Nyabiheke refugee camp to prevent and control infection in population health, specifically determining the prevalence of hepatitis B infections in the refugee camp health , evaluating socio-cultural and environmental risk factors on the spread of hepatitis, determine the influence of knowledge attitude and practice on the prevention and control strategies put in place by MOH to prevent and control Hepatitis B infection in Nyabiheke refugee camp in Rwanda .to mediate quality prevention control of Hepatitis endemicity and new policy make or amendments existing mitigation strategies in Nyabiheke Refugee Camp.

The motivation for this study stemmed from the urgent need to address the growing health impact of viral hepatitis globally, regionally, and specifically within Rwanda. With over 325 million people affected annually worldwide, viral hepatitis—primarily caused by strains of the Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV)—was a significant contributor to both hepatitis-related comorbidities and mortality (PubMed, 2017). In Rwanda's Nyabiheke Refugee Camp, the risk of HBV transmission was particularly high due to unique environmental and socio-cultural factors inherent to refugee settings. Despite these risks, comprehensive data documenting HBV prevalence and contributing factors within this population remained scarce, creating challenges in designing targeted interventions. This gap highlighted the need for an in-depth investigation into the determinants of hepatitis B infection and the effectiveness of mitigation strategies implemented at the time. The study aimed to quantify the prevalence of hepatitis B in the camp, examine the influence of socio-cultural and environmental risk factors on HBV spread, and assess the role of knowledge, attitudes, and practices (KAP) in shaping the effectiveness of the Ministry of Health's control measures. Through this focused examination, the study sought to provide insights to enhance the quality of HBV prevention and control in Nyabiheke. Additionally, it aimed to inform potential policy amendments and recommend tailored health interventions addressing the specific challenges faced in refugee camps, where factors such as overcrowding, inadequate sanitation, and cultural

beliefs significantly influenced health outcomes. By addressing these critical knowledge gaps, the study contributed to a more robust and sustainable approach to managing hepatitis B in refugee settings.

1.1 Objectives

i. To determine the prevalence of hepatitis B infections among the population health of Nyabiheke Refugee Camp.
ii. To identify the main health risk factors attributed to the spread of hepatitis in the camp.
iii. To Determine the main socio-cultural risk factors associated to the spread of hepatitis B in the camp
iv. To evaluate how knowledge attitude and practice (KAP), of the health population influence the prevention controls and mitigation strategies employed in the camp.

2.0 Literature Review

2.1 Empirical Literature

2.1.1 Prevalence of Hepatitis B Infection among the Population Health

Prevalence rates were reported in refugee populations from different countries, including Syria, Myanmar, Afghanistan, and Africa. In African among South Sudanese refugees in Ethiopia, the prevalence was 7.3%. Burundian refugees in Uganda had a prevalence of 3.8%., migrants and asylum sicks from the Central African Republic in Cameroon reported a prevalence of 7.7%. (11. World Health Organization (WHO) WHO Executive Board. by the Secretariat. EB126/15, 2009). The study conducted in Ethiopia in 2020 with objectives of determines the prevalence and associated risk factors for hepatitis B and C viruses among refugees in Gambella, Ethiopia. It sought to assess the knowledge, attitude, and practices regarding hepatitis B and C viruses among refugees arriving from surrounding countries. The prevalence of HBsAg and anti-HCV among displaced and asylums sicks was 7.3% (33/453), 2.0% (9/453) respectively. Specifically, 6.8% (25/370) of females were positive for HBsAg, while 1.4% (5/370) were positive for anti-HCV. In contrast, 9.6% (8/83) of males were positive for HBsAg, and 4.8% (4/83) were positive for anti-HCV. (CDC, 2014)Despite analyzing proposed risk factors, the conducted research did not find a significant association between these factors related to hepatitis B virus and HCV infections. The knowledge assessment revealed that 86.5% (392/453) of participants did not know how HBV and HCV infections are transmitted, and 86.8% (393/453) had no information about the availability of the HBV vaccine. ((Pubmed, 2020). The study demonstrated an intermediate prevalence of hepatitis B and hepatitis C viruses in a large refugee camp in Ethiopia. While the prevalence of hepatitis C virus was observed to increase with age, no other significant risk factors for either virus were identified. The limited knowledge of hepatitis B among refugees underscores the necessity for the implementation of a screening policy as well as linkage with other health related services and awareness campaigns about the infection in all refugee camps of Gambella. ((UNHCR, 2018),) It's important to note that wile provides information on the prevalence of HBV in refugee from various countries, there is no specific information on Rwanda's refugee overall prevalence. The literatures mainly focus on refugee populations within global and African country.

2.1.2 Health Risk and Environmental Factors Attributed with the Spread of Hepatitis B Virus

The global determinants of Viral Hepatitis are a substantial health challenge affecting millions annually. This study focused to determine prevalence of Hepatitis B virus (HBV) in Turkey, exploring its correlation with economic factors, a dimension not thoroughly investigated in current literature. Conflict and displacement amplify population vulnerability, posing recognized public health risks, particularly in the context of infectious diseases like Hepatitis, which become major contributors to mortality during crises. In humanitarian crises, managing communicable diseases, including Hepatitis, becomes imperative. Due to the reason like overcrowding, inadequate water and sanitation, insufficient vaccination, delayed diagnosis, and limited treatment access contribute to heightened Hepatitis infection recurrence, severity, and case fatality rates. However, the impact and mechanisms differ across displacement settings. Displaced individuals outside camps struggle with accessing affordable health services, while those within camps face elevated infection risks due to insufficient sanitation facilities, leading to water source contamination and increased hepatitis transmission. ((UNHCR, 2018). Specific regional differences underscore that migrants from economically disadvantaged areas are more susceptible to infection. Economic indicators play a pivotal role, as households with better welfare indicators exhibit a reduced likelihood of HBV. Higher income groups are less prone to HBV, with increased awareness of prevention methods serving as a significant protective factor. Addressing environmental risk factors in the Nyabiheke camp is crucial to mitigating Hepatitis B transmission. Implementing control styles such as enhancing sanitation infrastructure, ensuring access to clean water, promoting hygiene education, instituting proper waste management systems, and improving healthcare services can help reduce the environmental risks within the camp. Additionally, efforts to alleviate overcrowding and raise awareness about Hepatitis transmission modes are essential in preventing its spread. This study aims to contribute by analyzing these environmental risk factors, filling a significant gap in the existing literature. ((Tosun, MAY 2022)

2.1.3 Socio-Cultural Risk Factors Contributing to the Spread of Hepatitis in the Camp.

Viral Hepatitis poses a significant global health challenge, impacting millions annually. In Turkey, the prevalence of HBV is influenced by a range of social and economic factors, a dimension that has been underexplored in existing literature. Turkey's research aims to contribute to this gap by elucidating the determinants of such factors on HBV prevalence, utilizing clinical data and employing the Binary Probit Model (BPM) as a robust analytical tool. While controlling for medical factors, this research emphasizes the role of social and determinants in HBV prevalence. The Binary Probit Model not only identifies these factors but also provides insights into the specific impacts of each, enhancing our understanding of the dynamics involved. Key demographic factors such as age, gender, migration, education, awareness, social welfare, occupation emerge as pivotal in determining HBV prevalence. Results reveal that individuals with age range between 46 to 66+ age group exhibits a higher HBV prevalence compared to the younger population. Moreover, 5% of male have been show Hight susceptible to HBV than females. Region-specific differences are notable, with migrants from economically disadvantaged areas, specific attention have been identified in eastern and south-eastern regions of turkey, near 16% more prone to infection. Economic indicators also play a crucial role, as households with better welfare indicators, such as a higher number of rooms, experience a reduced probability of HBV. Additionally, richest groups are found to be less susceptible to HBV compared to poorest one. The awareness factor emerges as a significant

protective element, with individuals knowledgeable about HBV prevention methods, there less to be infected at 6% but client with history of infection in previous period have the chance of high probability of reinfection at 17%. Which highlight the importance of prevention measure? ((Tosun, MAY 2022)

2.1.4 Effect of Knowledge Attitude and Practice, to the Health Population on the Effectiveness of Current Mitigation Strategies Employed in the Camp

The determinants of HBV remain a global health challenge affecting millions annually. KAP surveys are integral in understanding community perspectives on health issues. The different study has been conducted aims to evaluate Knowledge Attitude and Practice towards Hepatitis B among the healthy population in a camp setting, focusing on the effectiveness of current mitigation strategies. The Effect of KAP towards Hepatitis B, and to understand the effectiveness of current mitigation strategies put in place at comp setting. A cross-sectional study was conducted in Quetta city, Pakistan, distributing 1000 questionnaires with a 78.0% response rate. The sample included 420 males with average age of 32.76 ± 9.40 years. Education levels varied, with 26.7% having intermediate education, while unemployed show 45.4%. Mean scores for knowledge, attitude, and practice were 8.74 ± 2.7, 3.72 ± 1.2, and 2.76 ± 1.1, respectively. Significant positive correlations were observed between knowledge-attitude ($r = 0.296$, $p < 0.01$), knowledge-practice ($r = 0.324$, $p < 0.01$), and attitude-practice ($r = 0.331$, $p < 0.01$). in strict area which was local identified was the only variable significantly associated with mean KAP. (Siddig, 2018) (Mixson-Hayden et al., 2014)

2.2 Theoretical Framework

Even though various studies, have indicated that the determinants of hepatitis B prevalence can be reduced through primary prevention measures like vaccination, isolation, and early screening of the health population. Demonstrate how the health risk behaviors and environmental factors of congested population may influence the endemicity of the determinants of Hepatitis infection, similar way to sociocultural factors on the persistence of Hepatitis B infection, there is a need to demonstrate how knowledge, attitude, and practices of the population health influence the spread of Hepatitis B infection in Nyabiheke camp as well as prevalence late of Hepatitis B in refugee population specifically in Congolese refugee of Nyabiheke camp in Rwanda

2.3 Conceptual Framework

The conceptual framework is presented in Figure 1.

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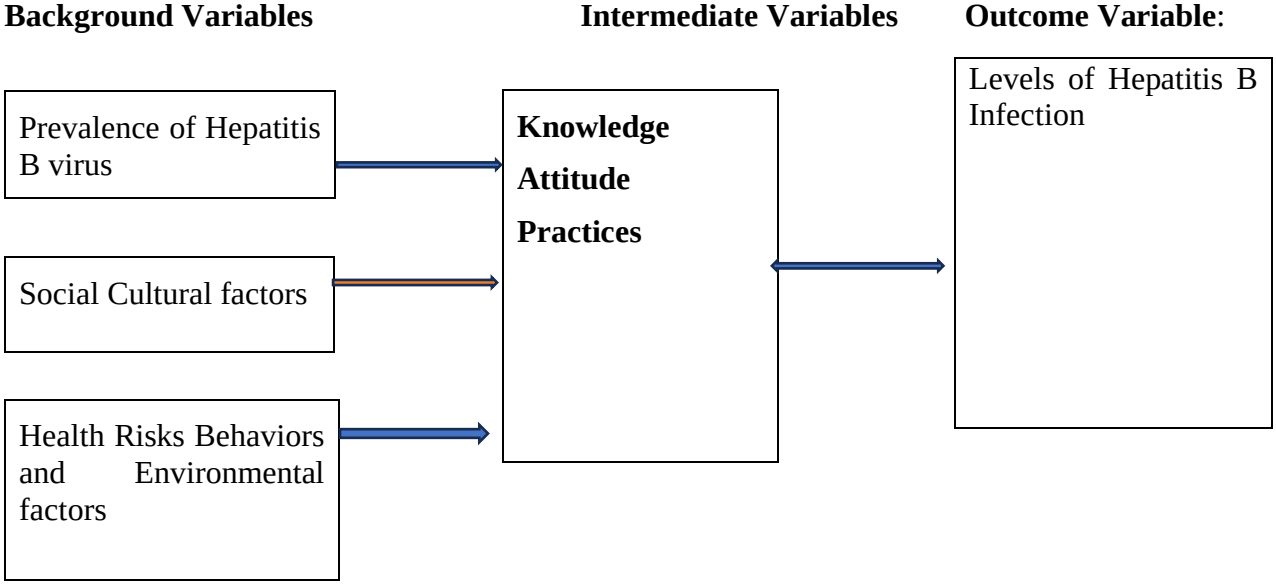

Figure 1: Conceptual Framework

Source (Silali *et al*, 2018)

3.0 Research Methodology

The study examined the determinants of Hepatitis B infection and mitigation strategies in Nyabiheke Refugee Camp, focusing on households vulnerable to the infection. The research employed a mixed-methods approach combining descriptive cross-sectional and cohort study designs, utilizing both qualitative and quantitative methods. The sample size was determined using Fisher's formula and adjusted with finite population correction, resulting in 241 respondents. The study population included camp residents who underwent Hepatitis B testing 5 years and 3 months prior to the study, along with key stakeholders involved in implementation and evaluation of mitigation strategies. Data collection was conducted through semi-structured questionnaires, purposive interviews, observation, key informant interviews, and focus group discussions. The data was analyzed using SPSS Version 25, employing descriptive statistics, regression analysis, and multivariate analysis to investigate factors influencing hepatitis infection prevalence within the camp. Statistical significance was determined at a 95% confidence interval with a P-value threshold of less than 5%. The study utilized both structured questionnaires to assess socio-cultural factors and quantitative data from existing databases to examine prevalence and distribution patterns of Hepatitis B infection among camp inhabitants.

4.0 Presentations of Findings

The presentations of the findings were done in sections.

4.1 Prevalence of Hepatitis B Infections among Refugees in Nyabiheke Refugee Camp

The objective one was determine the prevalence of hepatitis B infection among the population health of Nyabiheke Refugee camp in Rwanda and were measures using mixed method where secondly data from DHIS from Screening was analyzed and primary data scored by assessing variables. The response was as per figure 2

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The response was as per figure 2

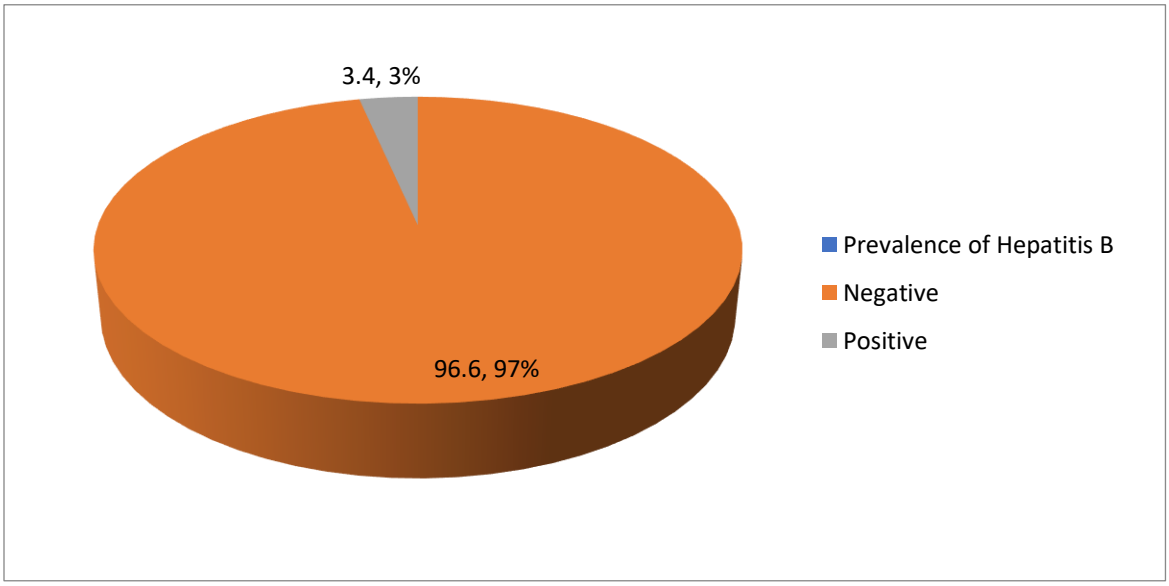

Figure 2: Prevalence of Hepatitis B among among Refugees in Nyabiheke Refugee Camp

In this regards, based on statistics of people screeing in Nyabiheke refugee camp in Rwanda, the total number of screned people was 7100. In this regards, only 241 (3.4%) people have diagnonzed with positive while 6859 (96.6%), meaning they they are living with hepatitis B.

4.2 Health and Environment Risks Contributing to the Spread of Hepatitis B

Table 1: Health and Environment Risks Contributing to the Spread of Hepatitis B

Variables	Frequency	Percentage
Documented Instances of Overcrowding Within Living Quarters		
Yes	212	87.9
No	29	12.1
Adequate Sanitation Facilities Available		
Yes	108	44.8
No	133	55.2
Contaminated Water Sources or Inadequate Water Sanitation		
Yes	8	3.2
No	233	96.5
Poor Waste Management Practices		
Yes	208	86.4
No	33	13.6
Unsafe Injection Practices		
Yes	107	44.5
No	134	55.5
Vertical transmission of Hepatitis B from infected mothers to their infants		
Yes	51	21.2
No	190	78.8
Climate Or Geographical Location		
Yes	49	20.4
No	192	79.6

The results opined that the major source of spreading HBV in camps mainly 87.9% of respondents revealed overcrowding in living quarters low uptake of waste management practices and inadequate water sanitation. Use of unsafe injection practices was 44.5% of respondents and, 20.4% of respondents attributed HBV infection with, vertical transmission of Hepatitis B from infected mothers with a p-value below 0.05 showing insignificant relations with infections in the camp. Provision of the sanitation in the facility was significant with p values of 0.5.3 with an odd ratio of OD (0. 64) signifying a protective mechanism in the population health. Congestion and mode of HBV infection was also discussed during the KII discussion; *"Overcrowding actually is main cause Hepatitis increase hepatitis in this camp and we are looking resources from the government in collaborations with the well-wisher, to expand female accommodation facilities since are most affected*"), KII discussion 23/09/2024.*"They say that when they are about to give birth, vertical transmission of Hepatitis B from infected to their infants within the camp may occur since they are the highest population with infection") FGDs 17/9/2024 in Nyabiheke Camp*

*"(We believe that overcrowding within living quarters will lead to the spread of hepatitis B)." FGD discussion 16/9/2024, in Nyabiheke Refugee camps.*Study results demonstrated the role of certain environmental factors like accessibility to hand washing facilities and improved sanitation in

reducing hepatitis B among people living in Nyabiheke Refugee camp. Ensuring access to these facilities and promoting proper hygiene practices could be crucial strategies in preventing Hepatitis B in the community.

4.3 Socio-Cultural Factors Associated to Spread of Hepatitis B infections

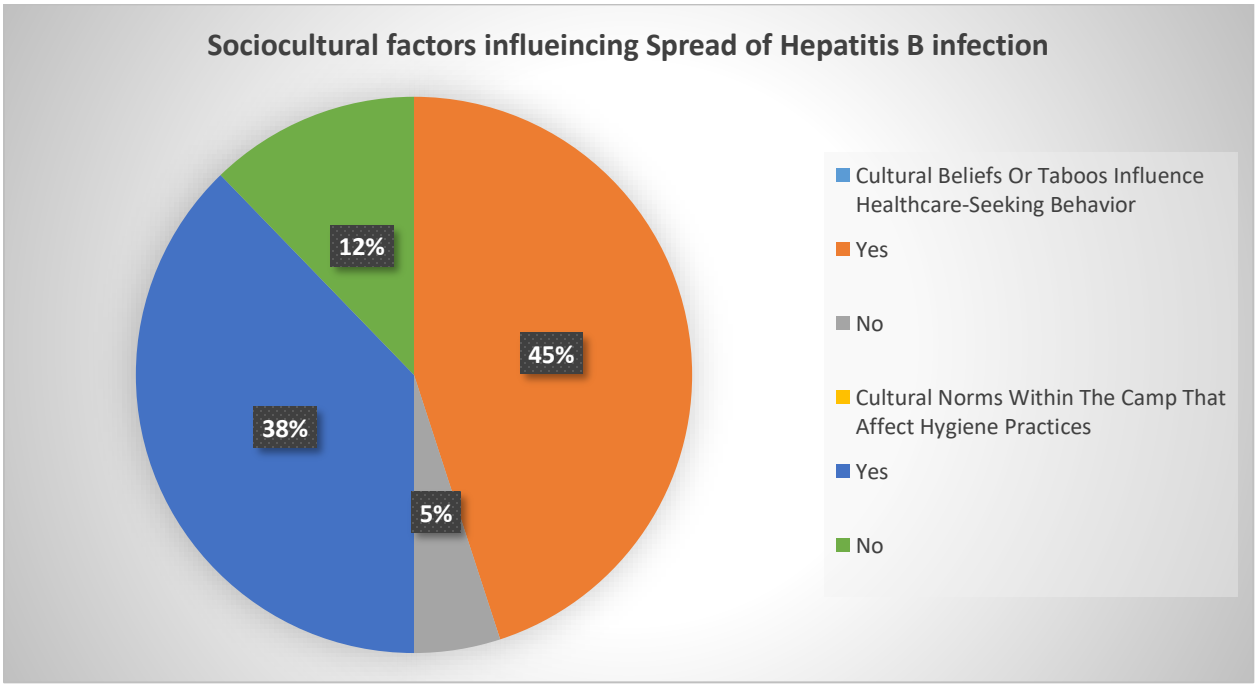

Figure 3: Demonstrate Main Socio-Cultural Risk Factors Associated to the Spread of Hepatitis B in the Nyabiheke Refugee Camp

The results showed that 38% of participants cultural beliefs or taboos influence healthcare-seeking behavior, 45% of participants said agreed cultural norms with the camp influence the spread of Hepatitis B infection among people living in Nyabiheke camp. Cultural beliefs or taboos influence healthcare-seeking behavior; most behaviors examined did not exhibit significant associations with Hepatitis B prevalence. *"(Hein, the other issue may be or taboos influence healthcare-seeking behavior regarding hepatitis infection within the camp. This situation pushes persons at specific cultural norms within the camp that affect hygiene practices and may contribute to the spread of hepatitis)"* KII informant o15/9/24 Nyabiheke camp

4.4 Effect of Knowledge Attitude and Practice (KAP), of the Health Population Influence the Prevalence of Hepatitis B and apply Mitigation

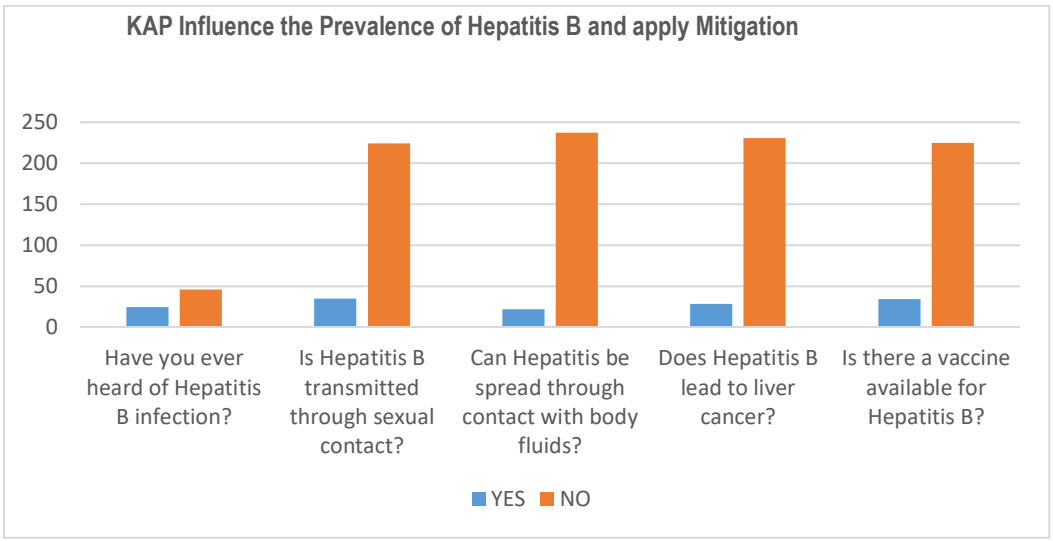

Figure 4: Population Influence Spread of Hepatitis B and Mitigation to use in Control

Majority of the respondents opined the KAP influence of spread of Hepatitis B infection in the camp remain limited and thus need to have health education in the camp to promote hepatitis B infection prevention and control:

("*Actually Hepatitis B as a serious public health problem, health education awareness is low, insignificant majority still recognizes the severity of the disease. We believed that Hepatitis B is a curable disease, pointing to supply of free drugs given in the camp to prevent and control infection."),* FGD held in the Camps on 23 0f September 2024. *"(There is an established custom of needle-sharing or unsafe injection practices. People who failed to get needles by sharing them and this may lead to the risk of hepatitis B infection to other persons.)"* (KII, Nyabiheke District, on 25/9/24). *"(I did not have any information about hepatitis and this poor awareness of hepatitis B transmission routes and prevention method complicated refugees to effectively overcome this public health issue),* KII informant in Nyabiheke Camp 15/9/2024).

4.5 Discussion of the Findings

The present study revealed a Hepatitis B prevalence of 3.4% among people residing in Nyabiheke Refugee Camp in Gatsibo District, Rwanda. This rate is notably lower than the national prevalence and aligns with the findings of Tosun (2022), underscoring the importance of addressing environmental risk factors to mitigate Hepatitis B transmission. Implementing control measures, such as enhancing sanitation infrastructure, providing access to clean water, promoting hygiene education, establishing effective waste management systems, and improving healthcare services, is critical in reducing environmental risks within the camp. Furthermore, alleviating overcrowding and raising awareness about Hepatitis B transmission modes are essential for preventing the spread of the virus. This study contributes to existing literature by examining these environmental risk factors in a refugee setting. Its findings are consistent with studies conducted across various countries, reinforcing the need for targeted interventions in similar environments.

However, the findings are higher than those of studies conducted in other settings, such as Arba Minch Hospital in southern Ethiopia (4.3%) (Health, 2015), Gandhi Hospital in Addis Ababa (2.3%), and Dawuro Hospital in southern Ethiopia (3.5%) (Madhava et al., 2022). Variations in prevalence may result from differences in participants' socio-demographic characteristics, geographical regions, health policies related to Hepatitis B prevention, community cultural practices, and behavioral factors, as well as differences in sampling methods, sample sizes, and laboratory testing methods for detecting HBsAg. Additionally, traditional medical practices, such as tonsillectomy using non-sterile instruments, may contribute to increased HBV transmission in certain communities. Given that Hepatitis B is also a sexually transmitted infection, its transmission risk rises with the number of sexual partners and the duration of sexual activity. In this study, pregnant mothers with a history of multiple partners showed a higher likelihood of HBV infection, aligning with findings from other studies (World Bank, 2017).

Globally, HBV determinants remain a significant public health challenge, affecting millions annually. Knowledge, Attitude, and Practice (KAP) surveys play a crucial role in understanding community perspectives on health issues. This study specifically evaluated KAP toward Hepatitis B within a camp setting to assess the effectiveness of current mitigation strategies. The sample included 420 male participants with an average age of 32.76 ± 9.40 years. Education levels varied, with 26.7% having intermediate education, while 45.4% were unemployed. Mean scores for knowledge, attitude, and practice were 8.74 ± 2.7, 3.72 ± 1.2, and 2.76 ± 1.1, respectively. Significant positive correlations were observed between knowledge-attitude ($r = 0.296$, $p < 0.01$), knowledge-practice ($r = 0.324$, $p < 0.01$), and attitude-practice ($r = 0.331$, $p < 0.01$). Notably, the only variable significantly associated with the mean KAP scores was the specific area within the camp (Siddig, 2018).

5.0 Conclusion

The study concludes that the prevalence of Hepatitis B among refugees in the Nyabiheke refugee camp stands at 3.4%, which is notably lower than the national prevalence of 3.9%, reflecting a relative control over HBV spread within the camp setting. In addition, it is concluded that overcrowding, inadequate sanitation, poor waste management practices, unsafe injection use, and vertical transmission from infected mothers are significant environmental and health-related risk factors driving HBV spread within the camp. Besides, the study concludes that socio-cultural factors, including taboos and cultural norms, play a role in influencing healthcare-seeking behaviors, potentially impacting the spread of Hepatitis B; however, the findings indicate that these behaviors did not present significant direct associations with HBV prevalence. Moreover, it is concluded that limited knowledge, attitudes, and practices (KAP) regarding HBV among the camp population are a critical barrier to effective infection control and prevention efforts. Thus, there is a need to prioritize health education initiatives to improve understanding and adherence to prevention and control measures among the camp residents. Among other conclusions, the study identifies the need for an integrated approach in addressing environmental, socio-cultural, and knowledge gaps to strengthen the mitigation efforts in controlling HBV spread.

6.0 Recommendations

The study recommends that the Ministry of Health should increase Hepatitis B vaccination coverage, particularly targeting newborns with immediate vaccination post-birth, to prevent vertical transmission and enhance immunity among the most vulnerable. In addition, it is recommended that

camp authorities implement educational campaigns tailored to raise awareness of HBV transmission routes, prevention measures, and the importance of safe practices to reduce HBV incidence. Besides, the study recommends that expanded access to voluntary testing and treatment options be established within the camp, helping to identify and manage cases early and reducing the potential for undetected transmission. Moreover, it is recommended that camp sanitation infrastructure and hygiene facilities be enhanced, including provisions for safe injection practices, improved waste management, and access to clean water to mitigate environmental risks associated with HBV spread. Among other recommendations, the study suggests additional research focused on vertical transmission rates and regional HBV prevalence disparities in other Rwandan refugee camps. This research could help direct more targeted health interventions and enable a systematic response to HBV control in refugee settings.

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