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# PREVALENCE OF HEPATITIS B AND THEIR RISK FACTORS IN DISTRICT DERA ISMAIL KHAN KHYBER PAKHTUNKHWA PAKISTAN

**Mehmood Khan**
Lab Technologist at Cecos University. mehmood@cecos.edu.pk
**Muhammad Umar Nafees**
Lecturer at Department of Medical Laboratory Technology Agricultural University D.I Khan. nafees.khattak@uad.edu.pk
**Shafqat Ullah**
Lecturer at Department of Medical Laboratory Technology Agricultural University D.I Khan. shafqatullah49aqihs@gmail.com
**Muhammad Toseef**
Agricultural University DI Khan. hadikhan.kham@gmail.com
**Muhammad Muzammil Javed**
Agricultural University DI Khan. muzammil6252@gmail.com
**Touseef Khalid**
Agricultural University DI Khan. raotouseef536@gmail.com
**Asad Ullah**
Dental Technologist PAF Islamabad. abad595193@gmail.com
**Ali Haider**
alikhanw243@gmail.com
**Din Muhammad***
Assistant Professor cum Senior Demonstrator at FAHS MLT UAD. Corresponding Author Email: danishwazir11609@gmail.com

**Author Details**

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**Corresponding E-mails & Authors*:**
Din Muhammad
danishwazir11609@gmail.com

## Abstract

**Background:** Hepatitis B Virus (HBV) infection is a major public health concern worldwide and is associated with significant morbidity and mortality. Chronic HBV infection may lead to severe liver diseases, including cirrhosis and hepatocellular carcinoma. In Pakistan, HBV remains a significant health challenge, particularly in areas with limited healthcare resources and awareness. Methodology: A cross-sectional study was conducted among participants from District Dera Ismail Khan. Demographic data and information regarding potential

risk factors were collected using a structured questionnaire. Blood samples were obtained and screened for Hepatitis B Surface Antigen (HBsAg) using standard laboratory procedures. Data were analyzed using appropriate statistical methods to determine prevalence and associated risk factors. **Objectives**: To determine the prevalence of Hepatitis B Virus infection and identify its associated risk factors among the population of District Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan. **Results**: The prevalence of HBV infection was determined among the study population. Significant risk factors associated with HBV infection included history of blood transfusion, surgical procedures, dental treatment, use of contaminated needles, barber shaving practices, and family history of hepatitis infection. Statistical analysis was performed to assess the strength of association between these risk factors and HBV infection. **Conclusion**: Hepatitis B remains an important public health problem in District Dera Ismail Khan. The identification of major risk factors highlights the need for increased public awareness, vaccination programs, safe healthcare practices, and regular screening to reduce the burden of HBV infection in the region.

**Keywords**: Hepatitis B Virus, HBV, Prevalence, Risk Factors, HBsAg, Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan

**Background** The term hepatitis is derived from the Greek words hepatos (liver) and it is (inflammation) (Adabara et al., 2012). Hepatitis is primarily a viral liver disease and there are 5 major types that cause viral hepatitis (A–E) (Shepard et al., 2006). The most common of these are hepatitis b virus (HBV) and hepatitis c virus (HCV) infections (Eke et al., 2011). Hepatitis can also be caused by toxins, including some drugs, plants, and alcohol, other infectious agents, or autoimmune disorders (Ahmedin et al., 2004). These viruses are serious public health problems and the burden is especially high in developing countries and sub-Saharan Africa (Haider et al., 1994). Clinically speaking, hepatitis is called acute if the infection lasts less than six months, and chronic if it lasts longer. However, most infections are asymptomatic, while some have less specific symptoms like vomiting, jaundice, malaise, fatigue, anorexia and abdominal pain (Ryder & Beckingham, 2001). In hepatitis, the liver inflammation may have immune-mediated, toxic, metabolic and/or direct viral mechanisms. Chronic viral hepatitis is a major cause of mortality and morbidity worldwide, particularly with the viruses HBV and HCV (Jalil et al., 2020). Within Europe, prevalence rates for chronic HBV (hepatitis B surface antigen + for $\geqslant$ 6 months) and chronic HCV (HCV nucleic acid or core antigens + for > 6 months) among adult citizens vary between 0.1-6% (Mauss et al., 2017). HBV is an enveloped partially double-stranded DNA virus belonging to the Hepadnaviridae family (Alberti et al., 1999).

### Hepatitis B Virus:

Globally, an estimated 2 billion people are infected with HBV, and it continues to be responsible for chronic infections in 240 million people, over 10% of whom live in sub-Saharan Africa and East Asia (World Health Organization, 2015). The chronic form of HBV infection is associated with long-term complications including cirrhosis of the liver and hepatocellular carcinoma (World Health Organization, 2015). The main concern is vertical transmission: HBV positive children born to women with HBV infection (and especially with HBsAg positives and positive HBeAg) can become infected during pregnancy, labor and puerperium with the transmission risk being 10% 20% in case of positive HBsAg and 90% if they are HBsAg and HBeAg positive in the perinatal period (World Health Organization, 2015; Xu et al., 2009). Moreover, HBV is a high-infectivity pathogen (Alter et al., 2003).

### Global Epidemiology and Disease Burden:

Globally chronic HBV infection is highly heterogeneous. This is why, for example, in North America, Western Europe, Australia and New Zealand, the rates only drop to 0.1% to 2% in low-prevalence regions, while the highest, between 10 and 20%, are found in the sub-Saharan African regions, South East Asia and China. These are: (1) Some parts of Africa, where mainly vertical transmission takes place; (2) Areas of intermediate prevalence, including Asia, the Americas and southern Europe, where the major mode of transmission takes place horizontally in early childhood; and (3) Areas of lower prevalence. While the prevalence of HBsAg among pregnant women is known to differ by race and ethnicity in the United States, estimates in Africans provide prevalence rates that vary between 3% and 13% at minimum for instance in Ethiopia, 3.8%; in South Africa, 5.3%; and in Malawi, 13% Zambia No adequately trustworthy data are available from here so far however it has been reported from one center that the serum HBsAg positivity was 6.5% and in another study in pregnant women the serum HBsAg positivity was 9.3%. An earlier study revealed 9.9% active HBV infection prevalence in adults at University Teaching Hospital (Alter et al., 2003) and prompted researchers to recommend focused studies.

### Molecular Categorization and Structure:

HBV is an archetypal member of the Hepadnaviridae family, ahepatotropic DNA virus that mainly infects hepatocytes, but very low levels of hepadnaviral DNA can be also found in pancreas, kidney, and mononuclear cells (Hollinger et al., 2010). HBV virions are 40 to 42 nm double-layered particles composed of an outer lipoprotein envelope that encloses three highly homologous envelope glycoprotein.

The genome of the virus is a 3.2-kb, relaxed-circular, partially Double-stranded DNA (dsDNA), together with a polymerase fundamental to catalyzing viral DNA synthesis in infected cells, thus termed viral nucleocapsid (or core) (He et al., 2020; Zhang et al., 2020). HBV is obstinate as it has a viral genotypes which vary in terms of their distribution depending on the region (Jazayeri & Carman, 2009). Light and electron microscopy showed the presence of lipid-enveloped subviral particles, including 20 nm spheres and filaments, which were independently isolated from HBV-infected cells, as well as virions. Since HBsAg particles lack a viral genome and capsid, and are constituted of envelope glycoproteins and host derived lipids, these are produced with a 1000:1 to 10000:1 greater ratio than virions (Robinson & Lutwick, 1976).

## MATERIALS AND METHODS:

The current study was conducted in the District Headquarter Hospital Dera Ismail Khan, Khyber Pakhtunkhwa Pakistan. Samples were taken in the hospital and stored at −20°C and sent to University of Agriculture Dera Ismail Khan Faculty of Allied Health Sciences Department of Medical Lab Technology MLT Skill Lab for analysis This study was conducted from december 2026 to March 2026.

**Ethical Approval:** This study got approved by the institutional ethical committee. The study involved Male & Female aged between 18 and 50 years who were visiting DHQ Dera Ismail Khan for routine laboratory screening and examination.

**Objective**

1. To estimate the prevalence of Hepatitis B infection among different and genders in the study area. age groups

2. To identify major risk factors associated with Hepatitis B transmission, including: ➢ History of blood transfusion ➢ Unsafe injection practices ➢ Dental and surgical procedures ➢ Sharing of razors and personal items ➢ Intravenous drug use

3. To assess the level of awareness regarding Hepatitis B transmission and prevention among the general population.

4. To evaluate the vaccination status of participants against Hepatitis B.

5. To determine the association between identified risk factors and the occurrence of Hepatitis B infection.

6. To provide recommendations for effective prevention and control strategies based on study findings.

**Sample Technique:** For each individual, a 4 mL sample of venous blood was drawn into a 5 mL sterile hypodermic needle and dispensed into a red top tube with separator gel (BD Vacutainer, SST II Advance Semi-separator, gel BD, Believer Industrial Estate, Plymouth PL6 7BP, United Kingdom). Blood samples were allowed to stand at room

temperature for 10–15 min and then spun at 3500 p.m. for 5–10 min. The sera were stored in cryotubes and kept in the departmental laboratory of University of Agriculture at −20 °C.

**Sample selection:** Individuals of different age groups residing in Dera Ismail Khan will be eligible to participate. Participants must provide informed consent. Individuals with known 22 chronic liver diseases other than Hepatitis B or those unwilling to participate will be excluded.

**Inclusion criteria** 1. Individuals residing in Dera Ismail Khan
2. Both males and females
3. Individuals willing to provide informed consent

**Exclusion criteria** 1. Individuals not willing to participate
2. Patients with other chronic liver diseases
3. Individuals already diagnosed and under treatment for Hepatitis B

**Data collection procedure:** Individuals of different age groups residing in Dera Ismail Khan will be eligible to participate. Participants must provide informed consent. Individuals with known chronic liver diseases other than Hepatitis B or those unwilling to participate will be excluded.

**RESULTS AND DISCUSSION:**

There was a total of 150 participating in the study. From December 2026 to March 2026 with the help of oral interview by oral history and Sera of them was collection was necessitated from District Headquarter Hospital Dera Ismail, Khan (largest in the district) for search of M. tuberculosis and the sero prevalence. Hepatitis B virus infection. Mean age was 18 years and most of the enrolled (46.7%) were in the age group of 21-30 years. Thirty seven (37) had not gone to school (i.e. not formally educated) while 98 (72.6%) were at least educated to primary school level (table 4.1) most 97 (71.9%) were married, 18 (13.3%) were cohabiting and 20 (14.8%) were single. The predominant participant occupations were trader (49 [36.2%]), student (8 [5.9%]), other vocational type (26 [19.3%]), and civil servant (11 [8.1%]). 62 (46%) and 73 (54%) of our subjects were primigravida and multigravida, respectively. Results: 53 (39.2%) had 2 or more sexual partners before the current partner, 47 (34.8%) had 1 previous sexual partner, and 35 (25.9%) had no previous sexual partner. Most of subjects included 2nd trimester 75(55.5%) pregnancy stage, 1st trimester was 43(31.9%) and least common were 3rd trimester 17 (12.6%) which is indicated in table 4.1.

Table 4.1: *Socio-demographic characteristics*

| Variable | Category | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Age Group | < 20 | 19.00 | 14.1 |
| | 21–30 | 63.00 | 46.7 |
| | 31–40 | 52.00 | 38.5 |
| | 41–50 | 1.00 | 0.7 |
| | **Total** | **135** | **100** |
| Marital Status | Single | 20 | 14.8 |
| | Co-habiting | 18 | 13.3 |
| | Married | 97 | 71.9 |
| | **Total** | **135** | **100** |
| Education Background | None | 37 | 27.4 |
| | Basic | 71 | 52.6 |
| | Secondary | 12 | 8.9 |
| | Tertiary | 15 | 11.1 |
| | **Total** | **135** | **100** |
| Occupation | Unemployed | 19 | 14.1 |
| | Vocational | 22 | 16.3 |
| | Public Servants | 11 | 8.1 |
| | Students | 49 | 36.3 |
| | Trading | 35 | 25.9 |
| | *Sum of frequencies* | *136* | *(Data mismatch)* |
| | Nulliparity | 30 | 22.2 |

| | | | |
|---|---|---|---|
| **Parity** | Primiparity | 73 | 54.1 |
| | Multiparity | 32 | 23.7 |
| | **Total** | **135** | **100** |
| **Previous Sexual Partners** | None | 35 | 25.9 |
| | Single (1 partner) | 47 | 34.8 |
| | Multiple (2 or more) | 53 | 39.3 |
| | **Total** | **135** | **100** |

### 4.1 Overall Seroprevalence of HBV and HCV

In this study, out of 135 Individual, 49 (36.2%) were serologically positive for viral hepatitis. Of the 135 Individual, 37/135 (27.4%) were positive for HBV (with HBV) as shown in Fig. 4.1.

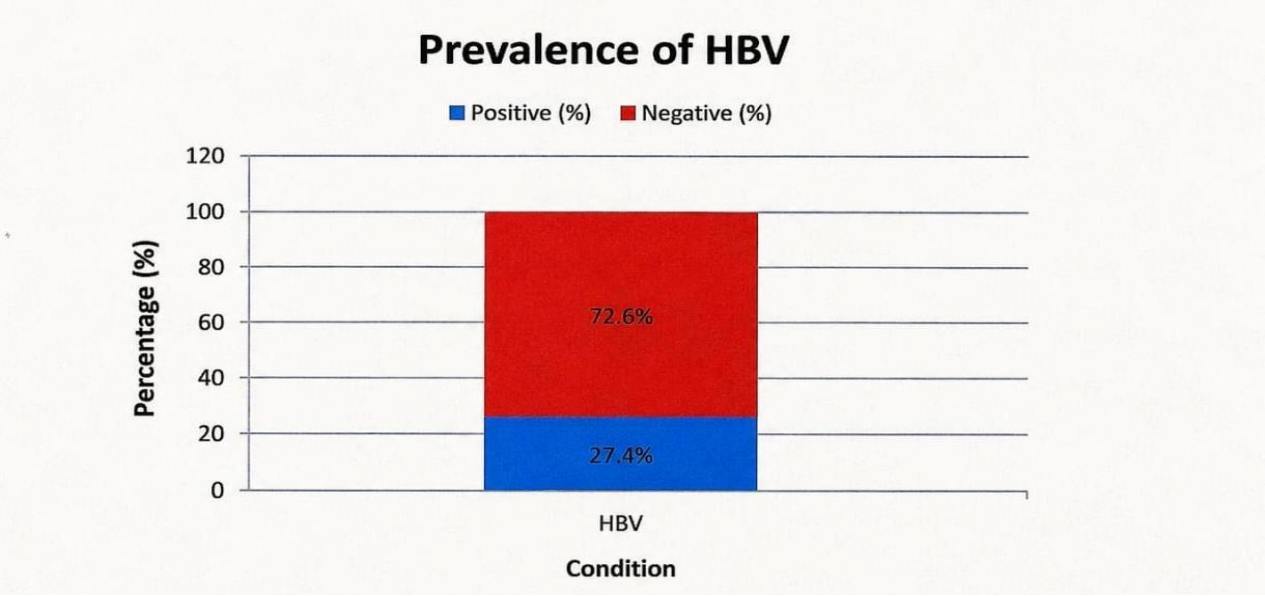


*Figure 4.1: Prevalence and age distribution of respondents*

Nevertheless, the prevalence of P-0 along with HBV infection confirmed that only few (5.4%) of the study subjects Individual were infected in the 41–50 years group. 4218 and 0.859 respectively. Respondents in the age group of 21–30 years had the highest prevalence (62.2%) of hepatitis B infection (P=0.015 for HBV, Table 4.2).

Table 4.2: *Multivariable analysis of hepatitis B. age groups of respondents (binary logistic regression)*

| Age Groups | HBV Infection Among Pregnant Women | | | |
|---|---|---|---|---|
| | POS(+) | Odds Ratio | CI 95% | P-Value |
| 18 – 20 | 5 (13.5%) | 0.982 | 0.785 - 1.253 | **0.183** |
| 21 – 30 | 24 (64.8%) | 1.012 | 0.981 - 1.325 | **0.015** |
| 31 – 40 | 7 (18.9%) | 1.240 | 0.841 - 1.532 | **0.215** |
| 41 – 45 | 1 (2.7%) | 2.154 | 1.560 - 3.152 | **0.361** |

### 4.2 Education Level Correlates with HBV Prevalence

However, in our study, none of those had secondary or tertiary educational level were HBV infected whereas tertiary educational have the lowest HBV infection (10.8%) but P value did not reach to a significant P value (P=0.08). The HBV infection rates were 48.7% and 66.7% in women of low educational level, but in these values were nonsignificant (P=0.687 and 0.824). Among patients who never went to school (21.6%) and P=0.896 and P=0.991 for HBV prevalence, respectively (Table 4.3).

Table 4.3: *Educational background against prevalence of hepatitis*

| Educational Background | HBV Positive (N=135) (n=37) | | | |
|---|---|---|---|---|
| | POS(+) | Odds Ratio | CI 95% | P-Value |
| None | 8 (21.6%) | 1.091 | 0.891 - 1.520 | **0.896** |
| Basic | 18(48.7%) | 1.418 | 0.851 - 2.251 | **0.687** |
| SHS | 7 (18.9%) | 2.750 | 1.425 - 3.152 | **0.170** |
| Tertiary | 4 (10.8%) | 1.254 | 0.984 - 2.542 | **0.08** |

### 4.3 The Respondents' Risk Factors for HBV Prevalence

Table 4.5 distribution of HBV according to some probable risk factors. In the table below 28 (75.5%) of individual who sexually partner was multiple positive for HBV and

was also significantly associated with (P=0.003). Other risk factors like marital status 24(64.9%), sexual protection 31(83.8%), blood transfusion 28(75.7%) tattoo 3(8.3%), alcohol consumption 6(16.6%) and parity 8(21.6%) also were not significantly related with the HBV infection.

Table 4.5: *Prevalence of HBV*

| Variable(s) | HBV Positive (N=135) (n=37) | | | |
|---|---|---|---|---|
| | POS(+) | Odds ratio | CI 95% | P-value |
| **1. Marital status** | | | | |
| a. Single | 7(18.9%) | | | 0.328 |
| b. Co-habiting | 6(16.2%) | 1.321 | 0.756-2.307 | |
| c. Married | 24(64.9%) | | | |
| **2. Sexual protection** | | | | |
| a. Yes | 6(16.2%) | 0.712 | 0.206-2.454 | 0.59 |
| b. No | 31(83.8%) | | | |
| **3. Blood transfusion** | | | | |
| a. Yes | 9(24.3%) | 1.293 | 0.453-3.680 | 0.631 |
| b. No | 28(75.7%) | | | |
| **4. No. of Sexual partner(s)** | | | | |
| a. One | 4(10.8%) | 0.251 | 0.129-0.490 | **0.003** |
| b. Two | 5(13.5%) | | | |
| c. Three or more | 28(75.7%) | | | |

| | | | | |
|---|---|---|---|---|
| **5. Parity** | | | | |
| a. Nulliparity | 9(24.3%) | 1.175 | 0.865-1.597 | 0.302 |
| b. Primiparity | 13(35.1%) | | | |
| c. Multiparity | 8(21.6%) | | | |
| d. Grand parity | 3(25%) | | | |
| **6. Tattoo** | | | | |
| a. Yes | 3(8.3%) | 1.124 | 0.954-2.152 | 0.570 |
| b. No | 34(91.7%) | | | |
| **7. Alcohol** | | | | |
| a. Yes | 6(16.6%) | 1.245 | 0.865-1.892 | 0.276 |
| b. No | 31(83.4%) | | | |

4.6 infection rate in the HBsAg-positive individual 5 (13.5%) were positive for HBeAg. HBeAb was positive in 9 (24.3%) and negative in both HBeAg and HBeAb in 23 (62.2%).

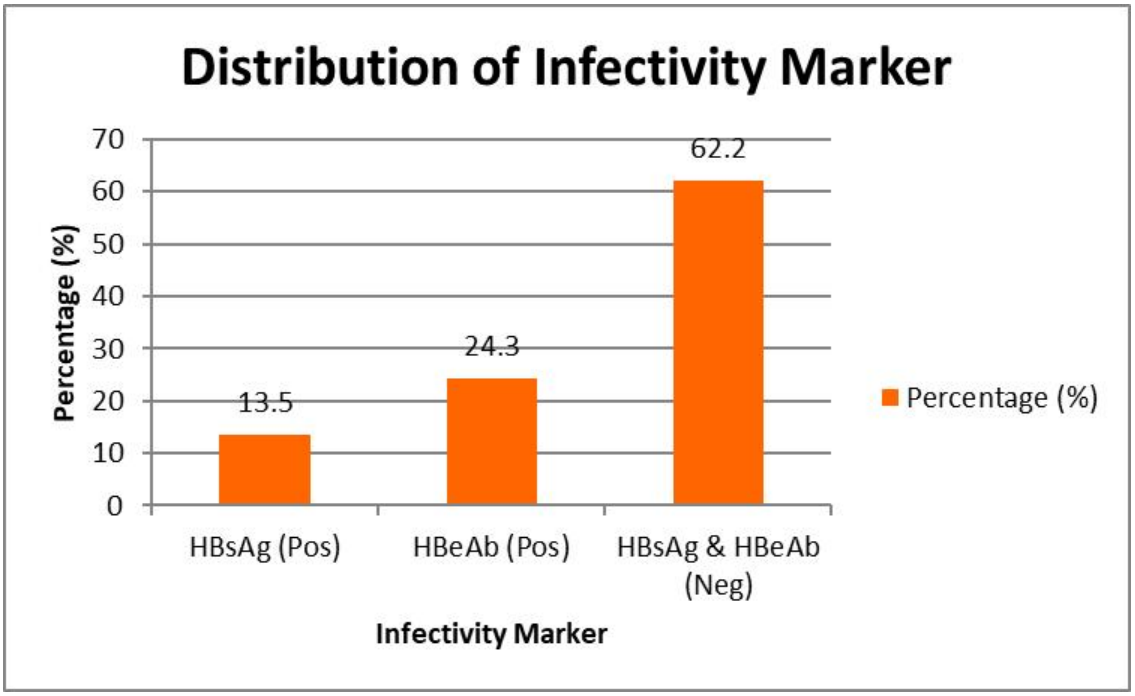


*Figure 4.2: Pattern of infectivity markers distribution*

## Discussion:

### Overall Prevalence of Hepatitis B Virus (HBV)

Hepatitis B Virus (HBV) infection is often asymptomatic during its early stages, making timely diagnosis difficult without proper screening programs. Since many infected individuals do not exhibit noticeable symptoms, early detection is essential to prevent disease progression and reduce transmission within the community. HBV can be transmitted through exposure to infected blood and body fluids, making it a significant public health concern worldwide.

The present study assessed the seroprevalence of HBV among individuals in the study population. HBsAg was detected in 37 out of 135 participants, giving a prevalence rate of 27.4%. This prevalence indicates a high burden of HBV infection within the study population and is consistent with the classification of certain regions as hyperendemic for HBV, where the prevalence exceeds 8%.

The prevalence observed in this study was higher than that reported in several previous studies conducted in different regions. Variations in prevalence rates may be attributed to differences in geographical location, socioeconomic conditions, cultural practices, and access to healthcare services. Rural communities may exhibit higher infection rates due to increased sharing of personal household items and lower awareness regarding disease transmission.

A high seropositivity rate for markers of previous HBV exposure was also observed, indicating that a considerable proportion of the population had been exposed to the virus at some point in their lives. Such findings suggest ongoing transmission and emphasize the need for effective prevention and control measures, including vaccination, public awareness campaigns, and routine screening programs.

## Conclusion

According to WHO criteria, our study demonstrated a high seroprevalence of hepatitis B surface antigen (HBsAg) (27.4%), suggesting very high endemicity of HBV in the study population. Among the HBsAg-positive individuals, 13.5% were also HBeAg positive, indicating higher infectivity and an increased risk of HBV transmission.

The high burden of HBV infection observed in this study highlights the need for targeted public health interventions. These should include regular screening programs, awareness campaigns, promotion of safe behavioral practices, and hepatitis B vaccination programs for at-risk and susceptible individuals. Such measures are essential for reducing the transmission and long-term burden of HBV infection.

The study identified a significant association between a history of multiple sexual partners and HBV infection ($p = 0.003$), emphasizing the importance of preventive strategies aimed at reducing exposure to known risk factors.

## Recommendations

In light of the study findings, the following recommendations are proposed:

1. Routine HBV screening should be implemented to facilitate early detection and management of infected individuals.
2. Hepatitis B vaccination should be provided to all HBV-negative individuals who are at risk of infection.
3. Public health education programs should be strengthened to increase awareness of HBV transmission routes, risk factors, and preventive measures.
4. Regular surveillance and monitoring of HBV infection should be conducted to support effective disease control strategies.

## Limitations

Quantification of HBV DNA would have allowed for a more precise assessment of HBV infectivity because it closely correlates with the replicative capacity of the virus and more accurately reflects disease progression and response to therapy. However, due to cost constraints, HBeAg testing was used in this study as a surrogate marker of infectivity.

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