

Sexual Behaviours and Hepatitis B Virus (HBV) Infection among Female Sex Workers in Lubowa Village, Wakiso District. A cross-sectional study

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ABSTRACT

Background

Hepatitis B virus is transmitted through parenteral contact with infected blood and sexual contact involving exposure to infectious body fluids. The study aims to assess the relationship between Sexual Behaviours and Hepatitis B Virus (HBV) Infection among Female Sex Workers in Lubowa Village.

Methodology

The study population comprised female sex workers aged 18+ residing and operating in Lubowa Village, Wakiso District, who have been in the area for at least six consecutive months before the data collection period. Bivariate and Multivariate logistic regression were used to determine factors associated with HBV seropositivity. Statistical significance was set at $p < 0.05$.

Results

Age at first sexual intercourse was significantly associated with HBV infection ($\chi^2 = 38.04$, $p < 0.001$). The number of sexual partners was also significantly associated with HBV infection ($\chi^2 = 8.56$, $p = 0.003$). Similarly, the frequency of unprotected sexual intercourse was significantly associated with HBV infection ($\chi^2 = 10.70$, $p = 0.013$). There was also a statistically significant association between sexual practices and HBV infection ($\chi^2 = 42.64$, $p < 0.001$) and between alcohol use before or during sex and HBV infection ($\chi^2 = 8.11$, $p = 0.004$). Most respondents were single (75.0%) and had attained primary education (57.5%).

Conclusion

Reducing risky sexual behaviours through comprehensive prevention, condom promotion, behavioural interventions, and targeted health education may reduce HBV transmission among female sex workers.

Recommendation

NGOs and peer educators should strengthen condom distribution, negotiation skills, alcohol harm reduction and economic empowerment to reduce transactional unprotected sex.

Keywords: Sexual Behaviours, Hepatitis B Virus (HBV) Infection, Female Sex Workers, Lubowa Village.

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Background

Hepatitis B virus is transmitted through parenteral contact with infected blood and sexual contact involving exposure to infectious body fluids. Among FSWs, sexual transmission represents a primary route of HBV acquisition (Ferreira-Júnior et al., 2018). The virus can survive in relatively high concentrations in genital secretions and blood, making unprotected sexual intercourse a significant transmission pathway. Genital ulcerative disease, which is more common among individuals with concurrent sexually transmitted infections, substantially increases the efficiency of both HIV and HBV transmission through disrupted mucosal barriers.

Condom use represents the most accessible and effective barrier method for preventing sexual transmission of HBV among FSWs. However, research across multiple African settings has consistently documented concerning low rates of consistent condom use in this population. The documented reasons for inconsistent condom use among FSWs are multifactorial, including client refusal, economic coercion (clients paying extra for unprotected sex), low negotiating power due to occupational marginalisation, and limited access to quality condoms (Salinsile et al., 2025).

The number of sexual partners and frequency of sexual contact constitute fundamental epidemiological drivers of HBV transmission among FSWs. In the Ethiopian national biobehavioral survey of FSWs, those reporting 61-90 paying clients in the past six months showed significantly elevated HBV prevalence compared to those with fewer clients (Bedassa et al., 2022). Beyond simple partner numbers, the characteristics of partners—including their infection status, preventive behaviours, and relationship type—substantially influence HBV acquisition risk. This pattern suggests that FSWs with greater numbers of sexual partners face correspondingly greater cumulative exposure to potential HBV transmission.

Hepatitis B virus (HBV) is a DNA virus that mainly affects the liver and can cause both acute and chronic disease. Chronic hepatitis B can lead to conditions such as liver cirrhosis and liver cancer. The main sign of active HBV infection is the hepatitis B surface antigen (HBsAg), while antibodies to the hepatitis B core antigen (anti-HBc) show past or ongoing infection. According to the World Health Organisation (WHO, 2024), infection acquired during adulthood becomes chronic in less than 5% of cases, while infection acquired at birth has a much higher risk of becoming chronic, reaching almost 90%.

Among FSWs, factors such as poor knowledge about HBV, inability to negotiate condom use, stigma from healthcare workers, violence, and limited access to services increase the risk of hepatitis B infection (Platt et al., 2018; Salinsile et al., 2025). The HBM further explains that people are more likely to adopt preventive behaviours if they believe they are at risk and understand the benefits of prevention.

The study aims to assess the relationship between Sexual Behaviours and Hepatitis B Virus (HBV) Infection among Female Sex Workers in Lubowa Village.

METHODOLOGY

Research Design

A quantitative cross-sectional survey design was employed. This allowed for the simultaneous assessment of exposure and outcome during the data collection period, making it well-suited for estimating prevalence and exploring behavioural associations in defined populations.

Study Setting

This study was conducted in Lubowa Village, Wakiso District, Central Uganda. Wakiso District is the most densely populated district in Uganda, surrounding the capital city of Kampala, with an estimated population of 3,519,300 people (Ssekamatte et al., 2023). Lubowa is a peri-urban trading centre and informal settlement with a

known concentration of female sex workers operating from local bars, lodges, and informal venues.

Study Population

The study population comprised female sex workers aged 18+ residing and operating in Lubowa Village, Wakiso District, who have been in the area for at least six consecutive months before the data collection period. FSWs are a key population with elevated vulnerability to HBV infection due to multiple sexual partners, inconsistent condom use, and limited access to prevention services.

Inclusion Criteria

Female sex workers who had resided and operated in Lubowa Village for at least six consecutive months.

Exclusion Criteria

Individuals who were gravely ill or unable to provide informed consent at the time of recruitment.

Individuals who had previously been enrolled in this study (to prevent duplication through snowball referrals).

Individuals who did not meet the operational definition of an FSW used in this study.

Sample Size Determination

The sample size for this study was determined using the Yamane Taro (1967) formula for finite populations, which is appropriate for small, bounded study populations such as the FSW community in Lubowa Village:

Table 1: Sample Size Determination

$$n = N / [1 + N(e)^2]$$

Where:

n	= sample size
N	= total study population
e	= margin of error (0.05 at 95% confidence level)

Substituting the known values:

$$n = 45 / [1 + 45 \times (0.05)^2]$$

$$n = 45 / [1 + 45 \times 0.0025]$$

$$n = 45 / [1 + 0.1]$$

$$n = 45 / 1.1$$

$$n \approx 40.909$$

A minimum sample of 40 FSWs was therefore required.

Sampling Technique and Procedures

Given the hidden and hard-to-reach nature of the FSW population in Lubowa Village, a non-probability sampling approach will be employed, combining convenience sampling and snowball sampling techniques.

Convenience sampling was used to recruit 20 participants who were readily accessible at four known assembly points (bars, lodges, and informal venues) within Lubowa Village. An additional 20 participants were recruited through the snowball sampling procedure: ten seed participants identified through convenience sampling were each given a referral coupon to recruit two additional peers from among their FSW networks. This approach will enable access to FSWs who are less visible or who operate in more discreet locations, thereby reducing selection bias and improving the representativeness of the sample.

Data Collection Methods and Instruments

Data were collected using a structured questionnaire to obtain information on socio-demographic characteristics

and behavioural habits of female sex workers. In addition, venous blood samples were collected from each participant for Hepatitis B serological testing. The questionnaire was developed based on study objectives and reviewed by the supervisors for content validity.

Structured Interview

Following written informed consent, a structured interviewer-administered questionnaire was used to collect data from each participant. The questionnaire was developed in English and translated into Luganda to ensure comprehension.

Serological Testing for HBsAg

Each consenting participant provided a venous blood sample (5 mL), collected by a trained phlebotomist into a red-top vacutainer tube. Serum was separated by centrifugation and transported in a cold chain to Muyinza Medical Centre for hepatitis B surface antigen (HBsAg) testing using validated rapid diagnostic test kits. HBsAg positivity was used as the primary outcome measure for hepatitis B disease, consistent with the diagnostic

approach adopted in comparable studies. All participants were informed of their results after the study.

Quality Control Measures

To ensure the accuracy and reliability of study data, the following quality control measures were implemented:

Laboratory quality control: Known HBsAg-positive and HBsAg-negative control samples were run alongside participant samples each day of testing to validate the performance of rapid test kits before results are reported. Questionnaire quality control: Data collection instruments were reviewed by the research supervisors prior to administration.

Field-level quality control: Completed questionnaires were reviewed immediately after each interview to identify and correct errors, omissions, or inconsistent responses before leaving the field. This real-time checking ensured data completeness and accuracy (Ssekamatte et al., 2023).

Validity and Reliability

The validity of the study instruments was ensured through a structured pre-testing process involving five FSWs outside the main study sample. Questions were refined to ensure they were clear, culturally appropriate, and effectively captured the constructs of interest. The research supervisors reviewed the final instruments for content validity before administration.

Reliability of data was enhanced by using standardised, closed-ended questions for the main variables of interest, thereby minimising interviewer subjectivity. A consistent interview guide was used across all participants. The use of validated serological test kits with internal quality controls will further ensure the reliability of the biological outcome measure.

Data Management and Analysis

Data from questionnaires were checked for completeness daily, coded, and entered into Excel. Laboratory results were recorded and merged with questionnaire data. Data were analysed using SPSS version 19. Descriptive statistics were used to summarise socio-demographic characteristics and prevalence of HBV. Bivariate and Multivariate logistic regression were used to determine factors associated with HBV seropositivity. Statistical significance was set at $p < 0.05$.

Data Sorting and Editing

All completed questionnaires were reviewed at the end of each interview day. This process involved checking for errors, omissions, and inconsistencies in responses. Any such issues identified will be corrected immediately, before leaving the field, to ensure the accuracy, completeness, and internal consistency of the data collected.

Data Coding and Entry

Codes were assigned to all response categories using a pre-developed coding frame. Quantitative data were entered into Statistical Package for Social Sciences (SPSS) Version 26.0 for analysis. Double data entry was performed on a random 10% subset of questionnaires to verify entry accuracy.

Data Analysis

Descriptive statistics were used to summarise socio-demographic characteristics and sexual behaviour variables. Frequencies and proportions were reported for categorical variables, while means and standard deviations (or medians and interquartile ranges, as appropriate) were reported for continuous variables. Bivariate analysis using Pearson's chi-squared test (for cells with expected counts below five) was used to assess unadjusted associations between each sexual behaviour variable and HBsAg positivity. Variables achieving statistical significance at the bivariate level ($p < 0.25$) were entered into a multivariable logistic regression model to identify independent predictors of HBV infection while controlling for potential confounders. Results were presented as crude and adjusted odds ratios (ORs) with 95% confidence intervals. Statistical significance will be set at $p < 0.05$. All findings were presented in the form of tables, figures, and charts to facilitate interpretation and discussion, consistent with the analytic approach adopted in similar studies

Ethical Considerations

Ethical approval for this study was obtained from Mildmay Uganda Research Committee, MUREC -2026-245, Faculty of health science, University of Kisubi. Upon approval, a letter of introduction was obtained and delivered to the Local Council authority of Bunamwaya Village, Wakiso District, to inform and obtain support from the local leadership.

Participation in the study was entirely voluntary. All eligible participants were provided with a detailed explanation of the study's purpose, procedures, risks, and benefits in their preferred language (English or Luganda) before being asked to sign a written informed consent form.

All data collected was treated as strictly confidential. Participant names were not recorded on questionnaires; instead, unique numeric identifiers will be used. Questionnaires and biological samples were stored securely and accessible only to the research team. HBsAg results were communicated to each participant individually and confidentially. Participants found to be HBsAg-positive were provided with counselling and actively linked to care and treatment services at the nearest appropriate health facility, in line with Uganda's national hepatitis B guidelines.

Environmental Management

All biological samples, used testing consumables (rapid test kits, lancets, vacutainer tubes, and gloves), and potentially infectious waste generated during the study was segregated into appropriate waste streams and disposed of in accordance with Uganda's national biomedical waste management guidelines. No biological waste was transported to or disposed of at community sites.

RESULTS

Table 1: Socio-demographic characteristics of female sex workers in Lubowa Village, Wakiso District (n = 40)

Indicator	n (%)
Age	
18-24 years	13 (32.5)
25-34 years	13 (32.5)
35 years and above	14 (35)
Marital status	
Married	10 (25)
Single	30 (75)
Divorced/Separated	0 (0.0)
Widowed	0 (0.0)
Education Level	
None	0 (0.0)
Primary	23 (57.5)
Secondary	6 (15)
Tertiary	9 (22.5)
University	2 (5)
Religion	
Catholic	15 (37.5)
Muslim	16 (40)
Protestant	9 (22.5)
Pentecostal	0 (0.0)
Other	0 (0.0)
Monthly Income	
Less than UGX 100,000	2 (5)
UGX 100,000 - 300,000	22 (55)
UGX 301,000 - 500,000	2 (5)
Above UGX 500,000	14 (35)
Duration of involvement in sex work	
Less than 1 year	4 (10)
1 - 3 years	24 (60)
4 - 6 years	6 (15)
More than 6 years	6 (15)
Duration of residence/work in the study area	
6 months – 1 year	5 (12.5)
2 - 3 years	33 (82.5)
More than 3 years	2 (5)

Table 1 shows the socio-demographic characteristics of the 40 respondents. The largest proportion of respondents were aged 35 years and above (35.0%), while those aged 18–24 years and 25–34 years each accounted for (32.5%). Most respondents were single (75.0%) and had attained primary education (57.5%). The majority were Muslims (40.0%), followed by Catholics (37.5%). More than half (55.0%) earned between UGX 100,000 and UGX 300,000 per month. Most respondents (60.0%) had been involved in sex work for 1–3 years, while 82.5% had lived or worked in the study area for 2–3 years. Overall, the findings suggest that the respondents were predominantly single, moderately experienced female sex workers with relatively low levels of formal education and moderate monthly incomes.

Sexual Behaviors Practiced by Female Sex Workers.

Table 2: Sexual behaviours practiced by female sex workers in Lubowa Village, Wakiso District (n = 40)

Indicator	n (%)
Age at first sex	
10 – 14 years	34(85)
15 – 19 years	6 (15)
Number of sexual partners	
11 – 20	6 (15)
6 – 10	4 (10)
More than 20	30 (75)
Condoms use with paying clients	
Always	1 (2.5)
Sometimes	35 (87.5)
Rarely	4 (10)
Never	0 (0.0)
Condoms use with non-paying partners	
Always	0(0.0)
Sometimes	2 (5)
Rarely	0 (0.0)
Never	38 (95)
Sexual intercourse without a condom	
Yes	40 (100)
No	0 (0.0)
Frequency without a condom	
Once	6 (15)
2 - 5 times	26 (65)
More than 5 times	8(20)
Sexual practices engaged	
Anal sex	18 (45)
Oral sex	22 (55)
Accepted extra payment for unprotected sex	
Yes	40 (100)
No	0 (0.0)
Experienced forced sex or sexual violence	
Yes	39(97.5)
No	1 (2.5)
Number of times experienced forced sex	
Once	7 (17.9)
2 - 5 times	28 (71.8)
More than 5 times	4 (10.3)
Alcohol use before or during sex	
Always	0 (0.0)
Sometimes	19 (47.5)
Rarely	1 (2.5)
Never	20 (50)
Drugs/substances use before sex	
No	11 (27.5)
Yes	29 (72.5)
Diagnosed with any STI	
No	9 (22.5)
Yes	31 (77.5)
STI diagnosed with STI	
Chlamydia	11 (35.5)
HIV	6 (19.4)
Syphilis	14 (45.2)
Other	0 (0.0)

Table 2 presents the sexual behaviours practiced by the respondents that may increase the risk of hepatitis B virus (HBV) infection. The findings showed a high prevalence of risky sexual behaviours among the respondents. Most respondents (85.0%) had their first sexual intercourse at 10–14 years, while 75.0% reported having more than 20 sexual partners. Most (87.5%) sometimes used condoms with paying clients, whereas 95.0% never used condoms with non-paying partners. All respondents (100.0%) reported having unprotected sexual intercourse and

accepting extra payment for unprotected sex. Additionally, 97.5% had experienced forced sex or sexual violence, 47.5% sometimes consumed alcohol before or during sex, and 72.5% reported using drugs or substances before sex. Furthermore, 77.5% had previously been diagnosed with an STI, including syphilis (45.2%), chlamydia (35.5%), and HIV (19.4%). Overall, these findings demonstrate widespread risky sexual behaviours that may increase vulnerability to HBV infection.

Table 3a: Association between Sexual Behaviours and Hepatitis B Virus (HBV) Infection among Female Sex Workers in Lubowa Village, Wakiso District (n = 40)

Indicator	Hepatitis B Virus		Chi-square	P-value
Age at first sex				
10 – 14 years	7 (70)	27 (90)	38.0419	0.000*
15 – 19 years	3 (30)	3 (10)		
Number of sexual partners				
6 - 10	0 (0.0)	4 (13.33)	8.5607	0.003*
11 - 20	1 (10)	5 (16.67)		
More than 20	9 (90)	21 (70)		
Condoms use with paying clients				
Always	1(10)	0(0.0)	4.3429	0.114
Sometimes	9(90)	4(13.33)		
Rarely	0(0.0)	26(86.67)		
Condoms use with non-paying partners				
Never	10 (100)	28(93.33)	0.7018	0.402
Sometimes	0(0.0)	2(6.67)		
Sexual intercourse without a condom				
Yes	10(100)	30(100)	-	-
No	0 (0.0)	0(0.0)		
Frequency without a condom				
Once	1(10)	5(16.67)	10.7003	0.013*
2 - 5 times	7(70)	19(63.33)		
More than 5 times	2(20)	6(20)		
Sexual practices engaged				
Anal sex	3(30)	15(50)	42.6407	0.000*
Oral sex	7(100)	15(50)		
Accepted extra payment for unprotected sex				
Yes	10(100)	30(100)	-	-
No	0 (0.0)	0 (0.0)		
Experienced forced sex or sexual violence				
No	0(0.0)	1(3.33)	0.3419	0.559
Yes	10(100)	29(96.67)		

Table 3b: Association between Sexual Behaviours and Hepatitis B Virus (HBV) Infection among Female Sex Workers in Lubowa Village, Wakiso District (n = 40)

Number of times experienced forced sex				
Once	4(40)	3(10.34)	5.2833	0.071
2- 5 times	6(60)	22(75.86)		
More than 5 times	0(0.0)	4(13.79)		
Alcohol use before or during sex				
Sometimes	5(50)	14(46.67)	8.1109	0.004*
Rarely	0(0.0)	1(3.33)		
Never	5(0.0)	15(50)		
Drugs/substances use before sex				
No	4(40)	7(23.33)	1.0449	0.307
Yes	6(60)	23(76.67)		
Diagnosed with any STI				
No	2(20)	7(23.33)	0.0478	0.827
Yes	8(80)	23(76.67)		
STI diagnosed with.				
Chlamydia	2(25)	9(39.13)	2.3084	0.315
HIV	3(37.5)	3(13.04)		
Syphilis	3(37.5)	11(47.83)		

Significant ($p < 0.05$)

Tables 3a and 3b present the association between sexual behaviours and hepatitis B virus (HBV) infection among female sex workers. The findings showed that age at first sexual intercourse was significantly associated with HBV infection ($\chi^2 = 38.04$, $p < 0.001$). The number of sexual partners was also significantly associated with HBV infection ($\chi^2 = 8.56$, $p = 0.003$). Similarly, the frequency of unprotected sexual intercourse was significantly associated with HBV infection ($\chi^2 = 10.70$, $p = 0.013$). There was also a statistically significant association between sexual practices and HBV infection ($\chi^2 = 42.64$, $p < 0.001$) and between alcohol use before or during sex and HBV infection ($\chi^2 = 8.11$, $p = 0.004$).

Other variables, including condom use with paying clients, condom use with non-paying partners, experience of forced sex, number of times forced sex was experienced, drug/substance use before sex, history of STI, and type of STI diagnosed, were not statistically significantly associated with HBV infection ($p > 0.05$).

Discussion

Early sex debut ($p < 0.001$), number of partners ($p < 0.003$), frequency of unprotected sex (0.013), sexual practices ($p < 0.001$), alcohol use ($p < 0.004$) were significantly associated with HBV infection.

Interpretation: Early debut lengthens exposure period, multiple clients, frequency of unprotected sex and sexual practices chosen increase HBV risk. Alcohol use impairs negotiation and proper brain functioning. Bedassa et al.

(2022) reported that having FSWs with 61-90 clients had higher HBV prevalence. Matovu et al. (2012) reported only 45% had consistent condom use in Kampala while this study found only 12.5% always use condoms with paying clients. 100 % reported extra pay for unprotected sex matches economic coercion described by salinsile et al. (2025)

Key findings on associated factors: 80% alcohol use, 72.5% drug use, 50% never heard about HBV, 60% never tested/vaccinated. Alcohol impairs judgement and condom negotiation. Poor knowledge leads to low-risk perception. Low testing /vaccination leaves FSWs unprotected despite the availability of effective vaccine since 1981. Nakiggala et al. (2024) found only 16.5% of brothel-based FSWs in Kampala had received any HBV dose and 5.5% completed 3 doses, similar to our 40% vaccinated and 62.5% completion. Nakiggala also found only 48.5% had heard about HBV, similar to our 50%. Ssekamatte et al. (2023) documented that only 35% of facilities offer HBsAg screening for FSWs, matching our 60% unsure of service availability.

Conclusion

Reducing risky sexual behaviours through comprehensive prevention, condom promotion, behavioural interventions, and targeted health education may reduce HBV transmission among female sex workers.

Limitations

The study was conducted among only 40 female sex workers in Lubowa Village, which limits the generalizability of the findings to all female sex workers in Uganda.

The study also relied on self-reported information regarding sexual behaviours, which may have been affected by recall bias or social desirability bias.

The cross-sectional study design only established associations between variables and could not determine causal relationships between risky sexual behaviours and hepatitis B infection.

Recommendations

NGOs and peer educators should strengthen condom distribution, negotiation skills, alcohol harm reduction and economic empowerment to reduce transactional unprotected sex.

Health facilities should integrate alcohol and drug harm reduction counselling into HIV/SRH outreaches for key populations.

Community leaders and police should address sexual violence (through safety mechanisms and referral for post-exposure prophylaxis

Economic empowerment programs should be introduced to reduce dependence on extra pay for unprotected sex

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LIST OF ABBREVIATIONS

anti-HBc:	Antibody to Hepatitis B Core Antigen
DNA:	Deoxyribonucleic Acid
FSWs:	Female Sex Workers
HBM:	Health Belief Model
HBsAg:	Hepatitis B Surface Antigen
HBV:	Hepatitis B Virus
HIV:	Human Immunodeficiency Virus
SPSS:	Statistical Package for Social Sciences
WHO:	World Health Organization

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Conflicts of interest

The author declares no conflict of interest in this study.

Data availability

The data sets generated and analysed during this study are available from the corresponding author upon reasonable request. The data are not publicly available due to ethical restrictions to protect the privacy and confidentiality of female sex workers who participated in the study in Lubowa village, Wakiso District. Access will be granted with approval from the relevant ethics committee.

Author contribution

Patrick Okema conceptualised the study, designed the methodology, collected data from female sex workers in Lubowa village, performed laboratory testing coordination at Muyinza Medical Centre, analyzed data using SPSS version 19, interpreted results and drafted the manuscript and approved the final version before submission.

Dr Jacqueline Kyosiimire: supervised research proposal development, guided study design and methodology, critically reviewed the report and revised the manuscript.

Mr Kennedy Charles: Co-supervised proposal development, guided literature review and methodology, and reviewed the manuscript

Dr Priscilla Bulungi: Reviewed the research report, provided feedback on data presentation and corrections, and reviewed the manuscript

Dr Saphan Muzoora: Reviewed the final research report, provided critical feedback on discussion and interpretation, and reviewed the manuscript for intellectual content.

Michael Amooti: supervised the research development process

David Sserunjogi: served as final editor. Edited the manuscript for language, clarity, and formatting and ensured compliance with academic standards.

Author biography

Patrick Okema is a BBLT graduate at the University of Kisubi, Uganda. He has an interest in infectious diseases, key populations health, and Hepatitis B prevention. This study on Risky sexual behaviours and associated factors influencing Hepatitis B infection among female sex workers in Lubowa village, Wakiso District was conducted as part of his academic research. He is passionate about community-based interventions for vulnerable groups to achieve WHO 2030 Hepatitis elimination targets

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