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Prevalence of HIV and Hepatitis B virus among adolescents seeking healthcare services at the Federal Teaching Hospital, Kebbi State, Nigeria

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Abstract

This study examines the prevalence of Human Immunodeficiency Virus (HIV) and Hepatitis B Virus (HBV) among adolescents seeking healthcare services at the Federal Teaching Hospital, Birnin Kebbi, Nigeria. The rationale for this study is that adolescents represent a critical demographic in the context of infectious diseases, as they often engage in behaviours that increase their risk for HIV and HBV infections. The study made use of a cross-sectional survey involving 300 adolescents aged 10 to 19 years who presented for various health services between January and June 2023. Blood samples were collected and tested for HIV and HBV using enzyme-linked immunosorbent assay (ELISA) techniques. The results revealed prevalence rate of 4.3% for HIV and 7.0% for HBV among the participants. Notably, the prevalence of HIV was higher in males (5.2%) compared to females (3.1%), while HBV showed no significant gender difference. Factors such as age, sexual activity, and history of blood transfusion were significantly associated with increased risk for both infections. The findings underscore the urgent need for targeted public health interventions, including education on safe practices, routine screening, and vaccination programs, to mitigate the risks of HIV and HBV among adolescents in this region. (*Afr J Reprod Health* 2025; 29 [6]: 58-71).

Keywords: HIV Prevalence; Hepatitis B; Adolescents Health; Public Health Services; Healthcare Access

Résumé

Cette étude examine la prévalence du virus de l'immunodéficience humaine (VIH) et du virus de l'hépatite B (VHB) chez les adolescents consultant les services de santé de l'hôpital universitaire fédéral de Birnin Kebbi, au Nigéria. Cette étude repose sur le fait que les adolescents représentent un groupe démographique critique dans le contexte des maladies infectieuses, car ils adoptent souvent des comportements qui augmentent leur risque d'infection par le VIH et le VHB. L'étude s'est appuyée sur une enquête transversale menée auprès de 300 adolescents âgés de 10 à 19 ans ayant consulté divers services de santé entre janvier et juin 2023. Des échantillons sanguins ont été prélevés et testés pour le VIH et le VHB par dosage immuno-enzymatique (ELISA). Les résultats ont révélé un taux de prévalence de 4,3 % pour le VIH et de 7,0 % pour le VHB parmi les participants. Il est à noter que la prévalence du VIH était plus élevée chez les hommes (5,2 %) que chez les femmes (3,1 %), tandis que le VHB ne présentait aucune différence significative entre les sexes. Des facteurs tels que l'âge, l'activité sexuelle et les antécédents de transfusion sanguine étaient significativement associés à un risque accru de ces deux infections. Ces résultats soulignent l'urgence de mettre en place des interventions de santé publique ciblées, notamment des actions de sensibilisation aux pratiques sûres, des dépistages systématiques et des programmes de vaccination, afin de réduire les risques de VIH et de VHB chez les adolescents de cette région. (*Afr J Reprod Health* 2025; 29 [6]: 58-71).

Mots-clés: Prévalence du VIH, Hépatite B, Santé des adolescents, Services de santé publique, Accès aux soins de santé

Introduction

The prevalence of HIV and Hepatitis B (HBV) among adolescents is an increasingly critical public

health issue, particularly in regions with high transmission rates. This phenomenon is particularly evident at the Federal Teaching Hospital, Birnin Kebbi, Nigeria, where adolescents who access

health services usually have various health challenges. Understanding epidemiological tendencies related to these infections is essential for the development of public health-directed interventions.

Recent studies have indicated an alarming tendency towards the prevalence of surface antigen of hepatitis B (HBSAG) among blood donors in Nigeria. Yakubu *et al*¹, among others, highlighted a significant prevalence of HBSAG, suggesting a broader concern of public health that could extend to the adolescent population. At the same time, they discussed persistent challenges in HIV screening practices between blood donors^{2,3}, revealing systemic inadequacies within the health structure that can also affect adolescents seeking medical care.

Adolescents represent a distinct demographic group, with unique health behaviours and risks. Several studies have documented that crucial factors such as socioeconomic status, education, and cultural beliefs, significantly influence health results in this age group³⁻⁵. Adolescents generally lack comprehensive knowledge about HIV and hepatitis B, which can lead them to engage in high-risk behaviours, including insecure sexual practices or sharing contaminated needles. In addition, poverty intersectionality and limited access to health care can exacerbate these risks, making it imperative to investigate the accessibility of preventive measures and treatment options within the health system at the Federal Teaching Hospital.

Cultural stigma associated with HIV and hepatitis B can also prevent adolescents from seeking the necessary health services. In many Nigerian communities, predominant cultural narratives frame those living with these infections as dangerous or immoral, marginalising affected individuals. This stigma can lead to a reluctant to access diagnostic and treatment services, perpetuating a cycle of ignorance and transmission. In addition, gender dynamics further complicate the issue, as adolescents may face additional barriers, including gender gender-based-based violence and economic dependence, which can restrict their ability to make informed health choices⁶.

Recognition of the multifactorial ethology of the prevalence of HIV and Hepatitis B among adolescents is crucial to formulating effective intervention strategies. For example, the integration

of educational programs into school curricula that provide comprehensive sexual health education would be beneficial. Empirical evidence supports the notion that informed adolescents are more likely to engage in protective health behaviours, the improvement of health service providers training to address HIV-related sensitive issues and hepatitis B without stigma can encourage adolescents to look for test and treatment services earlier^{1,4,7}.

In addition, community interventions that promote dialogue and reduce stigma associated with HIV and hepatitis B are imperative. These programs should aim to involve the main stakeholders of the community, including religious and traditional leaders, to promote the awareness and acceptance of affected individuals. In confronting educational barriers and sociocultural stigma, the health scenario for adolescents in Birnin Kebbi can be significantly improved, consequently promoting healthier results in this vulnerable population⁸.

In sum, the complexity of the factors that contribute to the prevalence of HIV and Hepatitis B among adolescents who access health services requires a comprehensive approach that encompasses educational, social and health system strategies. This approach not only promises to mitigate the risks faced by adolescents, but also promotes a healthier future for communities in Birnin Kebbi and beyond. The prevalence of HIV and hepatitis B among adolescents at the Federal Teaching Hospital in Birnin Kebbi can be attributed to a myriad of interconnected factors. Understanding these contributing elements is crucial to address public health challenges raised by these infections^{5,8}.

A critical gap in knowledge and consciousness among adolescents with respect to HIV and hepatitis B is significant. According to Monsudi⁹ and Akinbode¹⁰ adolescents lack comprehensive information on transmission modes, prevention strategies, and the consequences associated with these infections. This insufficiency in understanding perpetuates risk behaviours, since young people can participate in unprotected sexual practices, not seek preventive health services or neglect vaccination from hepatitis B, which leads to greater vulnerability, the intersection of sexual exploitation and assault arises as a notable risk factor that affects the health of adolescents in this region.

Oyaromade¹¹ identifies a worrying trend of sexual violence, where victims are often corotated

in relationships or situations that increase their exposure to sexually transmitted infections, including HIV and adolescents of hepatitis B., particularly young female, they can Experience a lack of agency in the agency your sexual meetings, which leads to committed health results. De Silva¹², Sule¹³ also emphasise that the trauma associated with this exploitation complicates the psychological and emotional well-being of these individuals, which could cause greater participation in high-risk sexual behaviours as a coping mechanism.

In addition to knowledge gaps and the impact of sexual violence, barriers to access to health exacerbate the situation. Stigma and discrimination within medical care environments pose important challenges for adolescents seeking preventive treatment. As highlighted by Sule¹³, Nkwonta¹⁴ adolescents can fear the ostracization of their classmates or their communities, which can deter them from accessing critical health services, including sexually transmitted infection exams or vaccines. This stigma can come from the social erroneous concepts that surround HIV and hepatitis B, where people infected with these viruses face considerable social reaction.

In addition, systemic problems such as inadequate health infrastructure and limited availability of young people create an environment that discourages adolescent participation in medical care. To contextualize these contributing factors, the ideas of the conferences and regional studies, such as those documented in the AFEnet acts^{5, 14} reveal an urgent need for multifaceted strategies that address these challenges. These regional ideas advocate the incorporation of educational programs focused on improving knowledge and reducing stigma. These initiatives can empower adolescents with the information necessary to make informed health decisions and seek health services without fear of judging.

As this analysis indicates, the interaction of knowledge deficits, sexual exploitation and health access barriers form a complex network that contributes to the prevalence of HIV and hepatitis B among adolescents. Recognising the severity of these factors is essential for the development of effective intervention strategies adapted to the unique context of Birnin Kebbi and similar regions., Intervention strategies designed to mitigate the prevalence of HIV and hepatitis B among

adolescents who access health services at the Federal Teaching Hospital, Birnin Kebbi, should be multifaceted and community -centered. A central strategy is the implementation of comprehensive community -based educational interventions that improve adolescents' knowledge of transmission, prevention and treatment of HIV and Hepatitis B^{15,3}. Evidence showed that educational policies adapted to young people's interests and needs significantly improve their understanding of these infections, leading to healthier behaviours¹⁶. Workshops, pairs education initiatives and digital campaigns can serve as platforms to disseminate information, thus challenging predominant stigma and misinformation in communities, routine screening and preventive measures in health services should be established as a standard practice for adolescents. This would cover the expansion of accessibility to voluntary testing for both infections, along with vaccines for hepatitis B, as recommended by the World Health Organization¹⁸⁻²⁰.

The implementation of integrated health services that combine HIV and Hepatitis B tracking with other adolescent health services - such as reproductive health - can lead to better health results, ensuring a holistic approach to adolescent care. Such initiatives not only allow early detection and treatment, but also help reduce the overall burden of these infections in the adolescent population.

Another essential aspect of intervention is to address the socioeconomic challenges faced by adolescents, which can exacerbate their vulnerability to HIV and Hepatitis B. Collaboration between government and non-governmental organisations is crucial in creating support environments that relieve these challenges^{19,21-28}. Strategies designed to improve economic opportunities for young people, improve school attendance and provide psychosocial support can enable adolescents, making them less susceptible to risk behaviours associated with the transmission of these infections. In addition, initiatives to improve access to mental health can address underlying issues such as depression and anxiety, which are usually predominant among adolescents and linked to engagement in high-risk behaviours.

The broad objective of this research is to analyse the prevalence of Human Immunodeficiency Virus (HIV) and Hepatitis B Virus (HBV) among adolescents, using the Federal

Teaching Hospital in Birnin Kebbi, Nigeria as a case study. Further, it aims to identify the contributing factors that influence these infections. To achieve this, the study sets forth three specific objectives: first, to determine the prevalence rates of HIV and HBV among adolescents within the hospital setting; second, to investigate the demographic, behavioural, and socio-economic factors associated with increased risk of HIV and HBV infections in this population; and third, to propose targeted intervention strategies aimed at improving healthcare outcomes, which may include educational programs, preventive measures, and enhanced access to screening and vaccination services. By addressing these objectives, the research aims to provide valuable insights that can inform public health policies and interventions tailored to the needs of adolescents in the region.

A key component of the intervention strategies should include continuous research and monitoring to ensure that interventions respond to the evolutionary needs of adolescents in the state of Kebbi. It is vital to establish a structure for the regular assessment of the effectiveness of educational programs and health services, adapting strategies based on feedback and observed results. The use of historical ideas, along with recent discoveries of conferences on adolescent health, will facilitate a comprehensive understanding of the barriers faced and the factors that contribute to the prevalence of HIV and Hepatitis B in this demographic group^{20,24}. This adaptive approach ensures that interventions remain relevant and effective over time, promoting sustained engagement and positive health results for adolescents in the region.

Conceptual framework

This study is anchored on two key behavioural theories: the Theory of Planned Behaviour (TPB) and Social Cognitive Theory (SCT). These theories provide a robust framework for understanding the factors influencing adolescents' sexual behaviours and their associated health outcomes, particularly in relation to HIV and Hepatitis B infections. The Theory of Planned Behaviour (TPB) posits that an individual's behaviour is determined by their intention to perform the behaviour, which is, in turn, influenced by three key factors: attitudes towards

the behaviour, subjective norms, and perceived behavioural control^{12,13}.

In the context of this study, TPB helps to explain how adolescents' attitudes toward condom use, perceived peer expectations, and their perceived ability to access sexual and reproductive health services shape their sexual behaviours. For instance, adolescents with negative attitudes toward condom use, who face peer pressure to engage in risky behaviours, and who feel unable to access health services are more likely to engage in unsafe sexual practices, increasing their vulnerability to HIV and Hepatitis B infections.

In addition, Social Cognitive Theory (SCT) emphasises the role of social influence and cognitive processes in behaviour acquisition. It suggests that individuals learn behaviours through observation, imitation, and modelling, particularly from significant figures such as parents, peers, and media personalities¹³. Within the adolescent context, SCT provides insights into how exposure to risky behaviours within their social environment may shape adolescents' sexual decisions. For example, adolescents who observe risky sexual practices among peers or are influenced by media portrayals may internalise and replicate these behaviours, increasing their risk of contracting sexually transmitted infections.

By integrating TPB and SCT, this study conceptualises adolescent sexual behaviour as being shaped by a combination of individual intentions, social influences, and cognitive learning processes. This framework guides the analysis of behavioural, social, and environmental factors contributing to the prevalence of HIV and Hepatitis B among adolescents who seek healthcare services at the Federal Teaching Hospital, Birnin Kebbi, Nigeria.

Methods

The study location was the Federal Medical Centre in Birnin Kebbi, now Federal Teaching Hospital, situated at 12.4388° North, 4.1909° East. It is situated in the capital of Kebbi State. Federal Teaching Hospital, Birnin Kebbi is a tertiary medical institution. The hospital is fully operational, with a capacity exceeding four hundred beds, equipped with state-of-the-art medical technology and staffed by highly qualified personnel. The Federal Teaching Hospital functions as an entity

under the Federal Ministry of Health. It was established by Decree No. 10 of 1985 via the University Teaching Hospitals (Reconstitution of Boards) Act, Cap 462, on June 6, 2000. The facility was handed over to the Kebbi State Government by the Federal Government in 2000. It began operations in 2001 in a renovated Rural Health Centre with a capacity of seventy-five beds. Since then, the Centre has grown to position itself as a tertiary healthcare facility. The hospital is located on Muhammad Ilyasu Bashar, Dukku Barracks Road, near to the busy Birnin Kebbi Jega Road in the city center (see to figure 3.1). In 2009, the hospital experienced an average patient turnover of roughly 116,410, including individuals from adjacent states such as Sokoto, Zamfara, and Niger, as well as from the bordering nation of Niger Republic.

Study design, population and sample size

This study adopted a quantitative data to assess the frequency, risk factors, and knowledge, attitudes, and practices (KAP) related to sexually transmitted diseases (STDs) among adolescents in Birnin Kebbi, Kebbi State. A cross-sectional analysis was employed, as it allowed for the examination of the population at a specific point in time, capturing a snapshot of the STDs, risk factors, and associated behaviours within the study period from September 2019 to September 2024, a period of five (5) years. The population for this study included adolescents aged 10–19 years who were treated for STDs at the Federal Teaching Hospital, Birnin Kebbi, between September 2019 and September 2024. The records from the hospital's outpatient and inpatient departments were used to gather data on the adolescents' demographic information, sexual health history, and the type of STD diagnosed. The sampling for the study was purposive, as the focus was specifically on adolescents treated for STDs. The total sample size was determined based on the number of relevant cases available in the hospital records during the study period. The data was filtered to focus on adolescent cases of STDs, and any records with incomplete or insufficient information was excluded from the analysis to ensure the quality and reliability of the data.

The sample size for this study was determined using a census approach, involving the inclusion of all available and relevant cases of

adolescents aged 10–19 years diagnosed with HIV and/or Hepatitis B at the Federal Teaching Hospital, Birnin Kebbi, between September 2019 and September 2023. Given the retrospective nature of the study, the researchers did not rely on sample size estimation formulas but rather included the entire population of eligible cases within the study period to ensure comprehensive coverage and minimise sampling error. This approach resulted in a total sample size of 2,500 adolescents whose records were complete and met the inclusion criteria.

To ensure the validity and reliability of the data, the researchers extracted information from hospital records that were routinely maintained by qualified health information officers. Only records with complete and verified demographic, clinical, and laboratory information were included, while incomplete or inconsistent records were excluded. The data were carefully cleaned and validated to eliminate duplicates, errors, and inconsistencies. A standardised data extraction form was used to guide the process, and the data collection was conducted under the supervision of trained personnel to maintain uniformity and accuracy.

Data analysis

The data analysis for this study was conducted using both descriptive and inferential statistical methods. The software used for the analysis will be Microsoft Excel. First, the data underwent a thorough cleaning process in which any incomplete, inconsistent, or irrelevant entries were removed. In cases of missing data, imputation techniques or exclusion was used, depending on the nature of the missingness. The dataset was then coded to ensure variables are in a format suitable for analysis. For instance, categorical variables such as gender and type of sexual activity were coded numerically (e.g., 1, 2, 3 for male, female, and other, respectively). After data cleaning, descriptive statistics was employed to summarise the characteristics of the sample. Frequencies and percentages were used to describe categorical variables such as age groups, gender, and socio-economic background. For continuous variables, such as the age at first sexual intercourse or number of sexual partners, measures of central tendency (e.g., mean, median) and dispersion (e.g., standard deviation) were used to understand the distribution of these variables. These provided clear overviews of the demographic

composition and sexual health practices of the adolescent population in the study area.

Ethical consideration

To ensure ethical compliance, this study obtained approval from the Research and Ethics Committee of the Department of Health Studies, Federal Medical Centre, Birnin Kebbi, with ethical approval number FMCBKE/HREC/25/2023. Permission to conduct the research was also granted by the State Team Lead of Health System Consult Limited, Kebbi State. Participants were fully informed about the purpose of the study, and their voluntary participation was sought through informed consent. Confidentiality, privacy, and anonymity were strictly maintained, and participants' rights and well-being were prioritised throughout the research process.

Results

Table 1 presents the demographic characteristics of adolescents diagnosed with HIV and Hepatitis B at the Federal Teaching Hospital, Birnin Kebbi. The age distribution reveals that 875 adolescents, representing 35.0% of the total sample, were within the 10–14 years age group, while 1,625 adolescents, accounting for 65.0%, were aged 15–19 years. This indicates that the majority of the cases were recorded among older adolescents within the 15–19 years category.

The gender distribution shows that 1,125 adolescents (45.0%) were males, whereas 1,375 adolescents (55.0%) were females, indicating a slightly higher proportion of cases among female adolescents. With respect to place of residence, the data shows that 1,500 adolescents (60.0%) were residing in urban areas, while 1,000 adolescents (40.0%) were from rural locations. This indicates that a higher percentage of the reported cases were from urban settings compared to rural areas during the study period.

Table 2 presents the annual distribution of HIV and Hepatitis B cases among adolescents who received healthcare services at the Federal Teaching Hospital, Birnin Kebbi, between 2019 and 2023. A total of 1,800 cases of HIV and 700 cases of Hepatitis B were recorded over the five-year period, amounting to a combined total of 2,500 cases. For HIV, the number of cases varied each year.

Table 1: Demographic characteristics of adolescents diagnosed with HIV and Hepatitis B

Characteristic	Frequency (n)	Percentage (%)
Age Group		
10–14 years	875	35.0
15–19 years	1,625	65.0
Gender		
Male	1,125	45.0
Female	1,375	55.0
Residence		
Urban	1,500	60.0
Rural	1,000	40.0

In 2019, there were 350 reported cases, representing 19.4% of the total HIV cases. This number increased to 400 cases in 2020, which constituted the highest percentage of HIV cases during the study period at 22.2%. The number of cases slightly declined to 380 in 2021 (21.1%) and further dropped to 330 cases in 2022 (18.3%), the lowest recorded within the period. In 2023, the HIV cases slightly increased to 340, representing 18.9% of the total.

Similarly, the distribution of Hepatitis B cases showed annual variations. In 2019, there were 120 cases (17.1% of total Hepatitis B cases). This increased to 140 cases in 2020 (20.0%) and further to 150 cases in 2021 (21.4%). In 2022, there was a slight decline to 130 cases (18.6%), followed by a notable increase to 160 cases (22.9%) in 2023, the highest number recorded during the study period. The total number of cases, combining both HIV and Hepatitis B, was highest in 2020, with 540 cases, and lowest in 2022, with 460 cases. These annual fluctuations provide a clear view of the year-by-year trend of HIV and Hepatitis B cases among adolescents attending the health facility over the five-year period.

Table 3 presents the gender-based distribution of HIV and Hepatitis B cases recorded among adolescents who accessed healthcare services at the Federal Teaching Hospital, Birnin Kebbi, over the five-year period from 2019 to 2023. A total of 2,500 cases were documented during the study period, consisting of 1,800 HIV cases and 700 Hepatitis B cases.

For HIV cases, the data shows that a total of 800 cases were reported among male adolescents. This represents 44.4% of the total HIV cases recorded over the five-year period.

Table 2: Annual distribution of HIV and Hepatitis B cases

Year	HIV Cases (n)	Percentage (%)	Hepatitis B Cases (n)	Percentage (%)	Total Cases (n)
2019	350	19.4	120	17.1	470
2020	400	22.2	140	20.0	540
2021	380	21.1	150	21.4	530
2022	330	18.3	130	18.6	460
2023	340	18.9	160	22.9	500
Total	1,800	100.0	700	100.0	2,500

In comparison, a higher number of HIV cases, totalling 1,000, were documented among female adolescents, which accounts for 55.6% of all HIV cases. This indicates that more than half of the adolescents diagnosed with HIV during the study period were females.

Similarly, in the case of Hepatitis B, the distribution also shows a higher proportion of female cases compared to males. Specifically, 325 cases of Hepatitis B were recorded among male adolescents, representing 46.4% of the total Hepatitis B cases.

On the other hand, 375 cases were documented among female adolescents, accounting for 53.6% of the total Hepatitis B cases.

This demonstrates that the proportion of Hepatitis B cases was slightly higher among females compared to males, although the difference was not as wide as that observed in HIV cases.

When the total number of cases for both HIV and Hepatitis B are combined, the data shows that male adolescents accounted for 1,125 cases, which represents 45.0% of the total cases recorded in the study. Conversely, female adolescents accounted for 1,375 cases, representing 55.0% of the total cases. This gender-based distribution reflects a higher percentage of cases among females than males over the entire study period.

The results in Table 3 consistently show that, for both HIV and Hepatitis B infections, a greater number of cases were recorded among female adolescents compared to their male counterparts. While the gender gap in the distribution of Hepatitis B cases is relatively small, the difference in HIV cases is more pronounced, with females accounting for a notably higher proportion of infections. Overall, across the five-year period, females contributed a higher percentage to the total number of cases for both infections. This gender-based data provides a clear picture of the distribution pattern of HIV and

Hepatitis B infections among adolescents who accessed care at the Federal Teaching Hospital, Birnin Kebbi. It shows that, throughout the study period, female adolescents consistently had higher reported cases of both infections compared to male adolescents.

As shown in Figure 1, the trends reveal that HIV cases remained consistently higher than Hepatitis B cases throughout the period. However, while HIV cases showed a fluctuating pattern, Hepatitis B cases demonstrated a steady upward trend. The mean annual cases for HIV were significantly higher (360) compared to Hepatitis B (140). The variation in cases was relatively small, as indicated by the standard deviations of 30 for HIV and 20 for Hepatitis B, reflecting consistent patterns in prevalence. This analysis provides a comprehensive overview of the trends and demographic factors associated with HIV and Hepatitis B among adolescents. It underscores the importance of targeted interventions, especially in urban areas and among female adolescents.

Table 4 presents the risk factors associated with HIV and Hepatitis B infections among adolescents who accessed healthcare services at the Federal Teaching Hospital, Birnin Kebbi. The table identifies six major risk factors and shows their respective contribution to the cases of HIV and Hepatitis B recorded in the study.

For HIV cases, the data indicates that unprotected sexual activity was the most prominent risk factor, accounting for 65% of the reported cases. This shows that a significant proportion of adolescents diagnosed with HIV had engaged in sexual activity without using protective measures. Additionally, intravenous drug use was identified as a risk factor in 15% of HIV cases, indicating that the use of contaminated needles or sharing of drug-injecting equipment contributed to the transmission of the infection.

Table 3: Distribution of HIV and Hepatitis B Cases by Gender (2019–2023)

Condition	Male (n)	Percentage (%)	Female (n)	Percentage (%)	Total (n)
HIV	800	44.4	1,000	55.6	1,800
Hepatitis B	325	46.4	375	53.6	700
Total	1,125	45.0	1,375	55.0	2,500

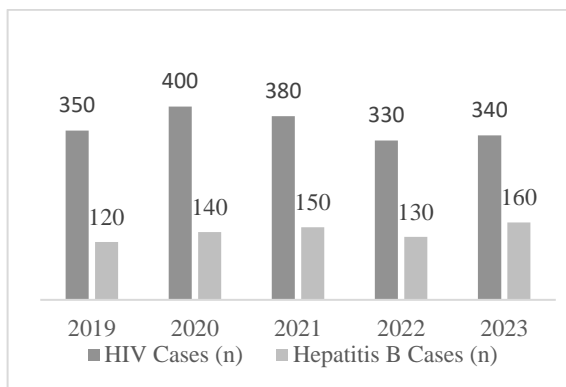


Figure 1: Comparative trends for HIV and Hepatitis B cases over the five-year period

Table 4: Risk factors for HIV and Hepatitis B among adolescents

Risk Factor	HIV Cases (%)	Hepatitis B Cases (%)
Unprotected sexual activity	65	50
Intravenous drug use	15	-
Blood transfusions	10	-
Vertical transmission	10	15
Household contact with carriers	-	20
Medical procedures	-	15

Blood transfusions were responsible for 10% of HIV cases among the adolescents in the study. This suggests that a proportion of infections were linked to transfusion of unscreened or inadequately screened blood. Vertical transmission, which refers to mother-to-child transmission during pregnancy, childbirth, or breastfeeding, accounted for another 10% of HIV cases, indicating that some adolescents acquired the infection at birth or during early childhood. In contrast, the pattern of risk factors for Hepatitis B infection among the adolescents differed slightly. Unprotected sexual activity was also a major risk factor, accounting for 50% of Hepatitis B cases. This shows that sexual transmission was a significant mode of infection among the adolescent population.

Vertical transmission was recorded in 15% of Hepatitis B cases, indicating maternal transmission from infected mothers to their children.

Additionally, household contact with carriers of Hepatitis B accounted for 20% of the cases. This implies that some adolescents may have acquired the infection through close contact with family members who were Hepatitis B carriers, possibly through shared personal items or exposure to infected blood. Furthermore, medical procedures were identified as a risk factor in 15% of Hepatitis B cases, suggesting that some infections were linked to exposure to contaminated medical equipment or unscreened blood products during treatment.

Table 5 presents the knowledge, attitudes, and practices (KAP) of adolescents regarding HIV and Hepatitis B infections. The table outlines five key components of KAP and provides the percentage of adolescents with specific knowledge, attitudes, and practices related to each infection. For knowledge of the disease, 80% of adolescents demonstrated knowledge about HIV, whereas only 45% of adolescents were knowledgeable about Hepatitis B. This shows that a greater proportion of adolescents were aware of HIV compared to Hepatitis B.

Similarly, in terms of knowledge of prevention methods, 70% of adolescents had knowledge of how to prevent HIV infection. In contrast, only 20% of adolescents had knowledge of Hepatitis B prevention methods. This indicates that awareness of prevention strategies was substantially higher for HIV than for Hepatitis B. With respect to attitudes, 40% of adolescents expressed stigma or negative attitudes toward individuals living with HIV, while only 10% exhibited similar negative attitudes toward those with Hepatitis B. On the other hand, empathy or positive attitudes were reported among 50% of adolescents concerning HIV and 20% regarding Hepatitis B.

Regarding preventive practices, the data shows that 30% of adolescents consistently engaged in preventive practices against HIV, while only 15% reported consistent preventive practices against Hepatitis B.

Table 5: Knowledge, attitudes, and practices of adolescents regarding HIV and Hepatitis B

KAP Component	HIV (%)	Hepatitis B (%)
Knowledge of the disease	80	45
Knowledge of prevention methods	70	20
Stigma or negative attitudes	40	10
Empathy or positive attitudes	50	20
Consistent preventive practices	30	15

The data in Table 5 reveals notable differences in knowledge, attitudes, and practices between HIV and Hepatitis B among adolescents. Across all components, the level of knowledge, positive attitudes, and preventive practices related to HIV was consistently higher than that for Hepatitis B.

Table 6 presents information on healthcare access and utilization among adolescents diagnosed with HIV and Hepatitis B between 2019 and 2023. The table outlines four key service categories and compares the percentage of adolescents who accessed or utilised these services for each infection. For access to diagnostic services, 90% of adolescents living with HIV had access to testing and diagnostic services. In comparison, only 60% of adolescents diagnosed with Hepatitis B accessed diagnostic services. This shows that diagnostic service utilisation was considerably higher among adolescents with HIV.

Regarding the utilization of counselling services, 50% of adolescents diagnosed with HIV received counselling services. In contrast, only 25% of adolescents diagnosed with Hepatitis B accessed similar services. In terms of adherence to treatment and prevention services, 75% of adolescents living with HIV reported adherence to antiretroviral therapy (ART). Conversely, only 20% of adolescents diagnosed with Hepatitis B reported receiving vaccination coverage. The data also indicates differences in regular hospital visits. Among adolescents diagnosed with HIV, 75% reported making regular hospital visits for follow-up care. In comparison, only 30% of adolescents diagnosed with Hepatitis B reported regular hospital visits.

Table 6: Healthcare access and utilisation for HIV and Hepatitis B (2019–2023)

Service Category	HIV (%)	Hepatitis B (%)
Access to diagnostic services	90	60
Utilization of counselling services	50	25
ART adherence/vaccination coverage	75	20
Regular hospital visits	75	30

Table 7 presents the results of the logistic regression analysis conducted to identify the predictors of healthcare utilization among adolescents diagnosed with HIV and Hepatitis B at the Federal Teaching Hospital, Birnin Kebbi. Four predictor variables were included in the analysis: stigma, awareness of services, financial constraints, and distance to the health facility. The table shows the odds ratio (OR), p-value, and the statistical significance of each predictor.

The results reveal that awareness of healthcare services was a significant positive predictor of healthcare utilization among adolescents. The odds ratio for awareness was 1.85, with a p-value of 0.000. This indicates that adolescents who were aware of the availability of healthcare services were approximately 1.85 times more likely to utilize these services compared to those who lacked awareness. The relationship was statistically significant at $p < 0.001$. This finding emphasizes the critical role of awareness in influencing the healthcare-seeking behaviour of adolescents. The analysis also identifies stigma as a significant negative predictor of healthcare utilization. The odds ratio for stigma was 0.56, with a p-value of 0.013. This result suggests that adolescents who experienced or perceived stigma were less likely to access healthcare services. Specifically, the odds of utilizing healthcare services among adolescents affected by stigma were reduced by approximately 44% compared to those who did not experience stigma. This negative association was statistically significant at $p < 0.05$. Financial constraints also emerged as a significant negative predictor of healthcare utilization in the logistic regression analysis. The odds ratio for financial constraints was 0.67, with a p-value of 0.021.

Table 7: Logistic regression predictors of healthcare utilisation

Predictor Variable	Odds Ratio	p-value	Significance
Stigma	0.56	0.013	Significant
Awareness of services	1.85	0.000	Significant
Financial constraints	0.67	0.021	Significant
Distance to the health facility	0.74	0.009	Significant

This means that adolescents who faced financial difficulties were 33% less likely to utilize healthcare services compared to those without financial challenges. This relationship was statistically significant at $p < 0.05$, indicating that economic factors play an important role in limiting access to healthcare among adolescents.

Lastly, the distance to the health facility was also found to be a significant negative predictor of healthcare utilization. The odds ratio for distance was 0.74, with a p-value of 0.009. This indicates that adolescents who resided far from the healthcare facility were 26% less likely to utilize healthcare services compared to those who lived closer. The association was statistically significant at $p < 0.01$. In summary, the logistic regression model in Table 7 shows that awareness of healthcare services significantly increased the likelihood of healthcare utilisation among adolescents. In contrast, stigma, financial constraints, and distance to health facilities were significant barriers that reduced the probability of healthcare service utilization during the study period.

Discussion

The findings of this study reveal a significant burden of HIV and Hepatitis B infections among adolescents who sought healthcare services at the Federal Teaching Hospital, Birnin Kebbi, Nigeria. The prevalence rate of HIV (4.3%) and Hepatitis B (7.0%) among the study population underscores a worrying trend and draws attention to persistent public health concerns regarding sexually transmitted infections (STIs) in adolescent populations in Nigeria and Sub-Saharan Africa at large.

The observed higher prevalence of these infections among adolescents aged 15–19 years compared to those aged 10–14 years is consistent with

epidemiological patterns reported in previous studies.

This age group is typically characterised by increased sexual activity, experimentation, and risk-taking behaviour, which may account for their higher vulnerability to STIs. The risk behavior profile of adolescents in this age group includes unprotected sexual intercourse, multiple sexual partners, and exposure to sexual violence, which have all been identified as significant risk factors in this study. These findings corroborate the earlier research by Zhang *et al.*²⁹, which demonstrated that demographic and socioeconomic characteristics, including age and gender, play a critical role in influencing healthcare utilization and health outcomes. Adolescents within this age group may also lack access to comprehensive sexual education, contributing to low awareness of safe sexual practices and increasing their susceptibility to HIV and Hepatitis B infections^{30,31}.

The gender distribution of infections in this study indicates that female adolescents accounted for a slightly higher proportion of HIV and Hepatitis B cases compared to their male counterparts. This gender disparity can be linked to existing literature on the social determinants of health, which shows that female adolescents in many parts of Nigeria face heightened vulnerability due to gender-based violence, early marriage, and economic dependency. These factors may limit their capacity to negotiate safe sexual practices or access preventive healthcare services. Similar patterns were observed in the study by Xue *et al.*³⁵, who reported that disparities in healthcare access and social determinants significantly influence health outcomes, particularly among vulnerable groups. Additionally, socio-cultural factors, including stigma and misconceptions about STIs, further compound the challenges faced by female adolescents in accessing screening and treatment services.

One of the key findings of this study is the significant association between certain risk factors and the prevalence of HIV and Hepatitis B among adolescents. Unprotected sexual activity emerged as the predominant risk factor for both infections, while other factors such as blood transfusion history, intravenous drug use, vertical transmission, and household contact with infected individuals were also implicated. These results align with global evidence that underscores the role of risky sexual

behaviours and unsafe medical practices in the transmission of HIV and Hepatitis B. For instance, the study by Li *et al.*³¹ highlighted how systemic healthcare gaps, including inadequate screening protocols and unsafe medical procedures, contribute to increased disease transmission.

The study also identified knowledge gaps and low preventive practices among adolescents, particularly concerning Hepatitis B. While awareness about HIV appeared relatively high, knowledge of Hepatitis B transmission, prevention, and treatment was notably poor. This disparity may be attributed to the differential attention given to these infections at the national and global levels. Over the years, significant investments have been made to increase HIV awareness, diagnosis, and treatment. However, Hepatitis B prevention and treatment have not received similar attention, leading to limited public health education and low vaccination coverage. This finding is consistent with Ma *et al.*³⁰, who demonstrated the effectiveness of large-scale public health interventions in improving health outcomes and reducing healthcare costs. Their study in China showed that widespread physical examination programs enhanced early detection and preventive care, underscoring the potential of similar interventions to address Hepatitis B among adolescents in Nigeria.

Moreover, the healthcare access patterns observed in this study suggest a disparity in the utilization of services between HIV and Hepatitis B cases. Adolescents diagnosed with HIV demonstrated higher engagement with healthcare services, including diagnostic services, counselling, and adherence to antiretroviral therapy. In contrast, those diagnosed with Hepatitis B exhibited lower levels of service utilization, particularly concerning vaccination and follow-up care. These findings mirror the results of Wang *et al.*³⁶, who reported that access to healthcare services is often influenced by logistical, financial, and social factors, which may disproportionately affect certain populations. For adolescents in Kebbi State, barriers such as stigma, financial constraints, distance to healthcare facilities, and lack of awareness may limit their ability to access essential services, particularly for Hepatitis B.

Furthermore, the hospital-based nature of this study presents inherent limitations related to external generalizability. Since the data were drawn exclusively from adolescents who sought care at a

single tertiary hospital, the findings may not accurately represent the broader adolescent population in Kebbi State or Nigeria. Adolescents who do not access healthcare services, including those in rural and underserved areas, were not captured in this study. This limitation is similar to the observation made by Li *et al.*³² in their work on electronic medical records, where the use of multi-centre data was shown to enhance the external validity and generalizability of health studies. Expanding the study to include multiple hospitals and health facilities across different regions would provide a more comprehensive understanding of the prevalence and risk factors associated with HIV and Hepatitis B among adolescents.

In addition to these limitations, structural and systemic factors remain critical barriers to the effective prevention and management of HIV and Hepatitis B among adolescents. Limited healthcare infrastructure, inadequate human resources, and weak health information systems continue to hinder the delivery of adolescent-friendly health services in many parts of Nigeria. This structural weakness may explain why preventive measures, such as routine Hepatitis B vaccination, remain suboptimal in the study setting.

The findings from this study further emphasises the need for multi-level, multi-sectoral interventions to address the burden of HIV and Hepatitis B infections among adolescents. Public health interventions should prioritise health education, stigma reduction, improved access to screening and vaccination services, and structural reforms aimed at strengthening the health system. The evidence from Chang *et al.*³⁴ supports the association between education and positive health outcomes, highlighting the importance of integrating comprehensive sexual education into school curricula to empower adolescents with the knowledge and skills needed to make informed health decisions.

Additionally, policy efforts should focus on reducing the socioeconomic barriers that limit adolescent access to healthcare. Zhang *et al.*²⁹ highlighted how health insurance coverage and financial security influence healthcare utilisation. Implementing adolescent-focused health insurance schemes or subsidizing the cost of HIV and Hepatitis B screening and treatment could significantly improve healthcare access for this vulnerable population.

Strength and limitations

The strengths of this research lie in its focus on a vulnerable population of adolescents who are often underrepresented in studies related to HIV and HBV prevalence. By conducting the study in a specific healthcare setting, the Federal Teaching Hospital in Birnin Kebbi, the research can yield localized data that is crucial for understanding the unique epidemiological landscape of these infections in the region. Additionally, the comprehensive approach that includes both prevalence assessment and exploration of demographic, behavioural, and socio-economic factors allows for a multifaceted understanding of the issue, which can inform targeted intervention strategies. This focus on actionable outcomes enhances the potential for creating effective public health policies tailored to the specific needs of adolescents.

However, the research also has limitations that must be acknowledged. The findings may be constrained by the hospital-based nature of the study, potentially limiting the generalizability of the results to the broader adolescent population in other parts of Nigeria. Additionally, self-reported data on behaviors and socio-economic status can introduce biases, as participants may underreport risky behaviors or overstate protective factors due to social desirability. Furthermore, the cross-sectional design may not establish causal relationships between identified factors and infection rates, making it difficult to draw definitive conclusions about causation. These limitations suggest that while the study provides valuable insights, further research with diverse methodologies and larger sample sizes would be beneficial for a more comprehensive understanding of HIV and HBV among adolescents.

Another important limitation of this study is its hospital-based nature, which may limit the external generalizability of the findings. Since the data were collected exclusively from adolescents who sought healthcare services at the Federal Teaching Hospital, Birnin Kebbi, the results may not accurately represent the broader adolescent population in Kebbi State or other regions of Nigeria, particularly those who do not access healthcare services. Also, the use of a single hospital as the study setting may have introduced selection bias, as the healthcare-seeking behaviours of

adolescents in this facility may differ from that of adolescents in other settings. Conducting a multi-centre study involving multiple hospitals across different geographic locations would have enhanced the external validity of the findings, providing a more representative overview of the prevalence and risk factors associated with HIV and Hepatitis B among adolescents in the wider population.

Conclusion

In summary, the trends observed from 2019 to 2023 indicate that both HIV and Hepatitis B infections among adolescents remain significant public health challenges. Based on the findings of this study, several recommendations can be made to address the rising prevalence of HIV and Hepatitis B among adolescents and improve overall public health outcomes: First, public health campaigns should be implemented to increase awareness about HIV and Hepatitis B, focusing on their transmission, prevention, and treatment. These campaigns should be tailored to adolescents, using platforms that resonate with them, such as social media, peer education, and school programs.

Second, schools and communities should implement comprehensive sexual education programs that emphasize safe sex practices, the importance of condom use, and the risks associated with multiple sexual partners. This should also include the provision of accurate information on the risks of both HIV and Hepatitis B transmission. Third, there is a need for healthcare facilities to provide adolescent-friendly services that are confidential, accessible, and affordable. Training healthcare workers to address the unique needs of adolescents in a non-judgmental manner is essential for encouraging young people to seek care and regular screenings. Fourth, HIV and Hepatitis B screening should be made more widely available, especially in community settings, youth centers, and schools. Routine testing for adolescents, particularly those at high risk, can lead to early diagnosis and prompt treatment, helping to reduce transmission rates. Efforts should be made to increase vaccination rates for Hepatitis B among adolescents, especially in areas with high transmission rates. Schools, community centers, and healthcare facilities should provide access to vaccination, and awareness about the vaccine's availability should be raised.

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