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Editor-in-Chief

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Sokoto Journal of Geographical Studies
Department of Geography
Faculty of Social and Management Sciences
Sokoto State University, Sokoto
P.M.B 2134, Along Birnin Kebbi Road, SokotoState-Nigeria

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EXPLORING SOCIO-DEMOGRAPHIC AND ECONOMIC FACTORS INFLUENCING HEPATITIS B PREVALENCE IN GOMBE STATE, NIGERIA

Abdulrazaq, A. A.[1], Dardau, H.[2], Kazaure, I. Y. A.[2], Bappah, L.[3], Suraj, A.[4], John, S.[5] & Umar, N.[6]

[1]Department of Geography, Federal College of Education, Katsina State, Nigeria
[2]Department of Geography, Umaru Musa Yar'adua University
[3]Federal College of Education, Technical, Gombe
[4]Sufabel Community Development Initiative, Gombe State, Nigeria
[5]Janna Health Foundation, Adamawa State, Nigeria
[6]Department of Mathematics, Umaru Musa Yar'adua University

Corresponding Author's Email: hafizd200@gmail.com or hafiz.dardau@umyu.edu.ng

Abstract *https://doi.org/10.65760/sjgs.v3.i1.3*

Hepatitis B Virus (HBV) remains a major public health concern in Nigeria, with its prevalence driven by a complex interplay of socio-demographic and economic factors. Understanding these determinants is crucial for targeted intervention strategies. This study investigated the influence of socio-economic and behavioral factors on HBV transmission and prevalence in Gombe State. A cross-sectional survey was conducted among 384 respondents across six Local Government Areas, employing structured questionnaires and laboratory testing. Descriptive statistics and logistic regression analysis revealed an HBV prevalence of 11.5%, with notably higher rates in rural areas such as Nafada (14.8%) and Balanga (13.2%) compared to urban Gombe LGA (8.7%). Significant predictors of HBV infection included low literacy levels, low income, and lack of vaccination, occupational exposure, and age (particularly 26–45 years). These findings underscore the impact of social inequality, educational deficits, and economic marginalization on HBV vulnerability. The study emphasizes the need for integrated public health interventions, including health education campaigns, economic empowerment programs, and expanded access to free or subsidized vaccination, especially in underserved communities. Addressing these determinants is vital for reducing HBV transmission and improving health outcomes in the region.

Keywords: *Hepatitis B, Socio-Demographic Determinants, Economic Status, Gombe State, Nigeria, Health Disparities and Viral Hepatitis.*

Introduction

Hepatitis B Virus (HBV) infection remains one of the most important global public health issues, affecting an estimated 296 million individuals globally in 2019 (World Health Organization [WHO], 2021a). Despite the availability of safe and effective vaccines, HBV continues to cause significant morbidity and mortality around the world, with over 1.5 million new cases recorded each year. Chronic HBV infection can cause serious liver problems such as cirrhosis and hepatocellular cancer, accounting for around 820,000 deaths worldwide each year (WHO, 2021a).

The prevalence of HBV is notably higher in low- and middle-income countries, especially in sub-Saharan Africa and Southeast Asia, where rates frequently surpass 8%. These regions encounter distinct challenges, including inadequate healthcare infrastructure, low vaccination rates, cultural practices that promote transmission, and socioeconomic inequalities that obstruct effective prevention and treatment initiatives (WHO, 2021a). Nigeria, being the most populous nation in Africa, carries a substantial portion of this responsibility. Estimates indicate a national

HBV prevalence of approximately 9.5%, placing Nigeria among the countries most significantly impacted by the virus (Federal Ministry of Health, 2016). Hepatitis B is mainly transmitted via contact with infected blood, semen, and other bodily fluids. Transmission occurs primarily through perinatal exposure from mother to child, unsafe medical procedures, and horizontal contact via cuts, wounds, or intimate personal interactions. Despite the implementation of national immunisation programs, the transmission of HBV continues in Nigeria, attributed to factors including insufficient public awareness, restricted screening and diagnostic resources, cultural practices, and unequal access to healthcare services (Aliyu *et al*., 2021; Ajuwon *et al*., 2021). The barriers facilitate ongoing transmission, particularly in rural and underserved regions with inadequate health infrastructure.

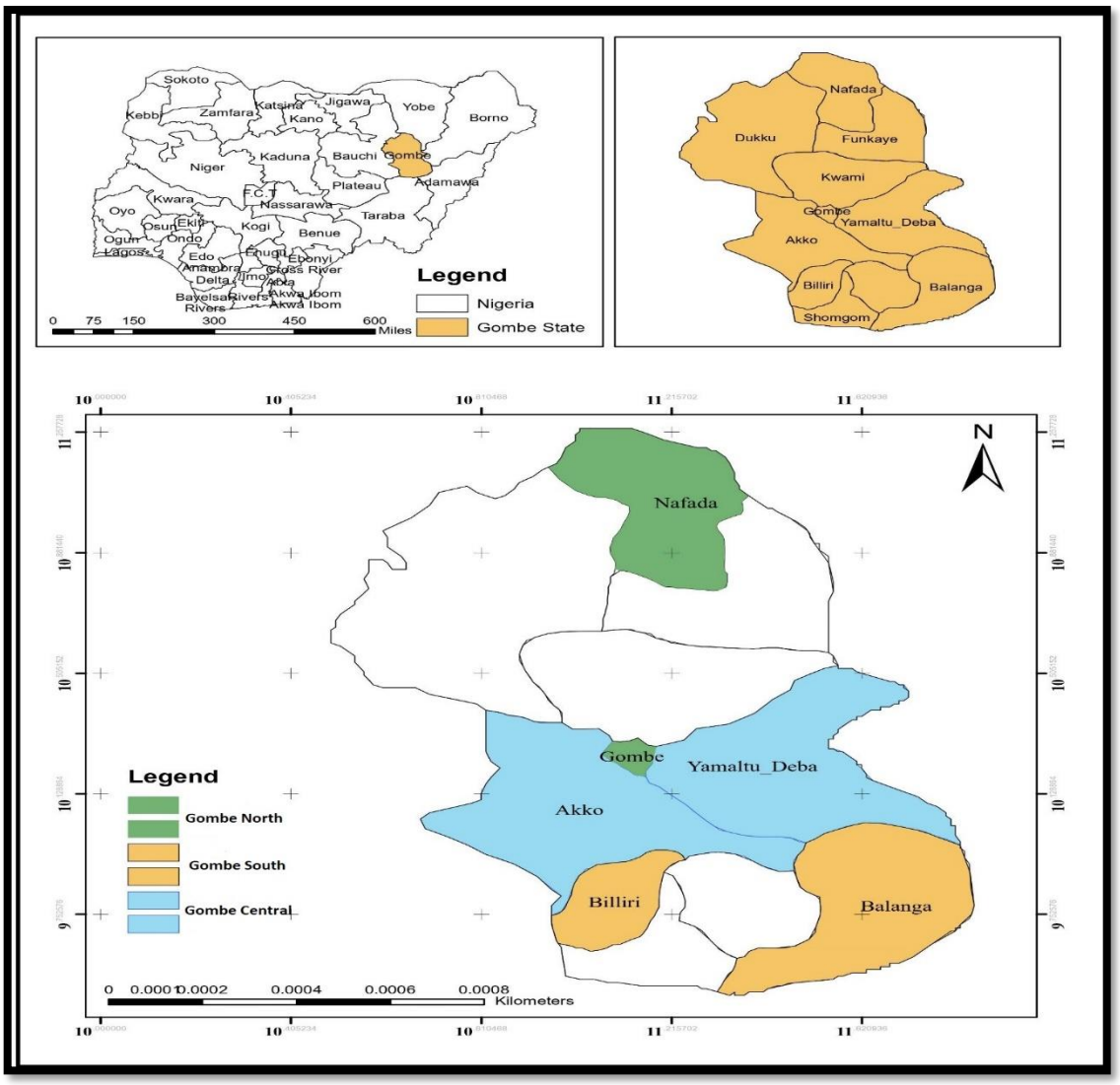
In Nigeria, the epidemiology of HBV necessitates an analysis of the intricate interactions among socio-demographic, economic, and behavioural factors that affect the risk of infection. Factors including age, gender, educational attainment, occupation, and income level have been identified as influencing the patterns of HBV prevalence (ref). Populations with restricted access to healthcare resources, typically marked by low literacy, poverty, and participation in informal sectors, exhibit increased vulnerability to infections resulting from insufficient vaccination, screening, and treatment. Cultural practices, traditional medical procedures, and employment in sectors with inadequate health protections increase exposure risks (adapted from Ajuwon *et al*., 2021; Aliyu *et al*., 2021).

Despite these insights, a significant gap exists in region-specific data that examines the variation of socio-economic and demographic determinants across different areas of Nigeria. The absence of localised evidence impedes the development of targeted interventions. Gombe State, situated in Northeastern Nigeria, experiences these challenges. While certain studies indicate significantly high prevalence rates in this region, there is a lack of comprehensive research investigating the socio-demographic and economic factors influencing HBV (Ajuwon *et al*., 2021). Existing data primarily originate from hospital-based samples, including blood donors and antenatal clinic attendees, which frequently fail to represent the broader community prevalence accurately. Moreover, spatial disparities in healthcare access and socio-economic inequalities hinder the implementation of effective prevention strategies. Understanding the specific factors influencing HBV transmission in Gombe State is essential due to these complexities. Factors including age, gender, education level, occupation, income, and access to healthcare are significant in influencing infection risk. Identifying these key determinants will allow policymakers and health practitioners to develop culturally appropriate, targeted interventions that are aligned with local needs. These efforts are crucial for decreasing HBV prevalence in Gombe and for advancing Nigeria's overarching objective of eradicating viral hepatitis as a public health concern by 2030, consistent with the WHO's global strategy. This research examines the socio-demographic and economic factors linked to HBV prevalence in Gombe State, using data gathered from six Local Government Areas. The identification of key predictors of infection will yield essential insights to guide public health policies, improve screening and vaccination initiatives, and ultimately mitigate the burden of HBV in this underserved area.

Study Area

Gombe State is situated in the northeastern region of Nigeria, positioned at a latitude of 10.29° N and a longitude of 11.17° E, with an elevation of 449 meters above sea level. It is one of the 36 states in the country, with Gombe serving as its capital. The state is located in the vast savannah and shares borders with five other states: Borno to the east, Yobe to the north, Taraba and Adamawa to the south, and Bauchi to the west. The state encompasses an area of 20,265 km² and has a population of approximately 4,021,000 individuals in 2024, based on the 2006 census (NPC, 2006). The state is comprised of 11 Local Government Areas (LGAs), but this research focused on six selected LGAs: Akko, Balanga, Billiri, Deba, Gombe, and Nafada. These LGAs

were purposively selected to capture both urban and rural settings, thereby providing a comprehensive geographical and socio-economic representation of the state. The state features a tropical continental climate, a predominantly agrarian economy, and varying levels of access to healthcare services, making it a relevant context for studying infectious diseases like Hepatitis B.



Source: Field Survey (2024)
Figure 1: The Study Area

Study Design

A cross-sectional survey design was employed using a quantitative method. The target population comprised residents aged 18 years and above in the selected LGAs. A multistage sampling technique (which involves selecting samples in multiple steps or stages). The initial stage utilized cluster sampling, followed by stratified sampling in the second stage. The third stage involved systematic sampling of households, while simple random sampling was employed for respondents in the fourth stage was used to select a total of 384 respondents, ensuring adequate representation from both rural and urban communities. The inclusion criteria included permanent residency in the area for at least one year, being 18 years of age or above, and providing informed consent to participate in the study.

The sample size for this study was determined using the Krejcie and Morgan (1970) sample size determination table, also known as the Advisory Table, which provides statistically appropriate sample sizes for given population sizes at a 95% confidence level and a 5% margin of error. Based on the estimated population size of the study area, a minimum sample size of 384 respondents was deemed appropriate. To ensure fair representation, a multistage sampling technique was adopted. First, three Local Government Areas (LGAs) were randomly selected from each of the three senatorial zones, totaling nine LGAs. Within each selected LGA, two communities (one rural and one urban) were purposively chosen. From these communities, households were selected using systematic random sampling, and one respondent was chosen per household using simple random selection. This procedure ensured broad geographical coverage and balanced rural-urban representation.

Data Collection Instruments

The primary tool adapted for data collection in this study was a structured questionnaire, developed based on an extensive review of relevant literature and existing instruments used in similar studies on hepatitis B. The questionnaire was designed to capture both quantitative and qualitative data, including respondents' socio-demographic details, awareness, perception, knowledge levels, risk factors, and experiences related to hepatitis B. To ensure clarity, relevance, and cultural appropriateness, the tool was pilot-tested in a non-sampled community with similar characteristics to the study areas. Feedback from the pilot test was used to refine ambiguous questions, improve language simplicity, and adjust the structure for better flow. The instrument's content validity was ensured through expert review by public health professionals and researchers familiar with infectious disease surveys. Additionally, face validity was confirmed through the pilot test, where participants indicated that the questions were understandable and aligned with the study objectives. The reliability of the questionnaire was established using Cronbach Alpha values of .75, .79, 80, 83, and .77 for awareness, perception, knowledge levels, risk factors, and experiences sections, respectively, indicating good internal consistency of the questionnaire. In addition to questionnaire administration, on-the-spot laboratory testing for Hepatitis B Surface Antigen (HBsAg) was performed immediately after each interview for all 384 respondents. Testing was conducted within the respective communities by qualified health professionals using Swecare Rapid One-Step test strips (Nantong Egens Diagnosis Biotechnology Co. Ltd., Rugao Jiangsu Province, China) in accordance with standard medical procedures. Each participant's index finger was sterilized with alcohol, pricked using a sterile disposable lancet, and two drops of blood were applied to the test strip, followed by buffer solution. Test results were observed after 15 minutes, and strict infection control as well as biosafety protocols were maintained throughout the process to ensure reliability and participant safety

Data Analysis

Quantitative data were analyzed using SPSS Version 22. Descriptive statistics (frequencies, means, and standard deviations) were used to summarize the socio-demographic and economic characteristics of respondents. Inferential statistics, including chi-square tests and logistic regression analysis, were used to examine the association between socio-demographic/economic variables and HBV prevalence. Statistical significance was set at $p < 0.05$.

Ethical Considerations

Ethical approval was obtained from the Gombe State Ministry of Health. Participation in the study was voluntary, and informed consent was obtained from all respondents. Anonymity and confidentiality of participants' responses were strictly maintained.

Results and Discussions

Prevalence of Hepatitis B by Socio-Demographic Characteristics

Table 1: Prevalence of Hepatitis B by Socio-Demographic Characteristics

Variable	Category	No. Tested	No. Positive	Prevalence (%)
Gender	Male	217	27	12.4
	Female	167	17	10.2
Age Group	15–25	112	8	7.1
	26–45	149	20	13.4
	46 and above	123	16	13.0
Marital Status	Single	153	12	7.8
	Married	231	32	13.8

Source: Field Survey (2024)

The results show that males had a slightly higher prevalence (12.4%) compared to females (10.2%), though the difference is not statistically significant. The highest infection rates were observed among respondents aged 26–45 years (13.4%), indicating that this is a high-risk age group likely due to active social, occupational, and reproductive exposure. Married individuals also recorded a higher prevalence (13.8%) compared to singles (7.8%), suggesting a possible link between prolonged close-contact relationships and HBV transmission risk. These patterns highlight the need for targeted public health messaging and testing campaigns among sexually active and working-age adults.

Association between Education, Income, and HBV Prevalence

Table 2: Prevalence of Hepatitis B by Education and Monthly Income

Variable	Category	No. Tested	No. Positive	Prevalence (%)
Education Level	None	133	24	17.9
	Primary	108	13	12.0
	Secondary	74	5	6.8
	Tertiary	69	3	4.3
Monthly Income	< ₦30,000	148	22	14.9
	₦30,000–₦50,000	153	16	10.5
	> ₦50,000	83	6	7.2

Source: Field Survey (2024)

There is a clear inverse relationship between education level and HBV prevalence. Individuals with no formal education had a 17.9% prevalence rate, more than four times higher than those with tertiary education (4.3%). This finding suggests that education likely improves awareness, health-seeking behavior, and uptake of preventive services like vaccination. Similarly, lower income levels were associated with higher HBV prevalence. Those earning below ₦30,000 monthly had a prevalence of 14.9%, while those earning above ₦50,000 had just 7.2%. The economic burden likely limits access to healthcare and safe practices, exposing low-income individuals to greater infection risks. These results support targeted outreach for low-income, low-literacy populations in HBV control programs.

This study investigated the socio-demographic and economic determinants of Hepatitis B prevalence in Gombe State, Nigeria. The findings revealed that HBV prevalence was significantly associated with factors such as education, income level, occupation type, vaccination status, and place of residence. These results corroborate earlier findings that HBV is disproportionately prevalent among populations with limited access to health education, preventive services, and economic resources (Ajuwon *et al*., 2021).

The overall prevalence rate of 11.5% in the study population confirms that Gombe State continues to experience a high HBV burden. This aligns with previous hospital-based findings, which reported prevalence rates as high as 18.9% in certain facilities within the state (Aliyu *et al.,* 2021). The higher rates observed among rural populations (e.g., Nafada and Balanga LGAs) suggest disparities in health awareness, screening opportunities, and access to immunization services, a trend that has also been documented in other Nigerian studies (Federal Ministry of Health, 2016; Nwangwu *et al*., 2016).

Education level was found to be a strong determinant of HBV infection. Respondents with no formal education were significantly more likely to be infected, consistent with literature indicating that poor literacy hampers health-seeking behavior and understanding of transmission routes (Adebowale, 2021). In communities where health information is not accessible in local languages or where traditional beliefs dominate health practices, the risk of HBV transmission increases, especially through unsafe medical or cultural procedures such as traditional circumcision and scarification (Balegha *et al*., 2021).

Similarly, monthly income was shown to be inversely related to infection rates. Those earning less than ₦30,000 per month were nearly three times more likely to test positive. This supports the theory that economic status is both a barrier and a protective factor in health outcomes (Barbosa *et al*., 2021). Lower-income groups are more likely to live in crowded conditions, rely on informal healthcare providers, and lack resources for preventive care such as HBV vaccination, which was confirmed in this study as a strong protective factor.

Occupation also played a significant role in HBV risk. Informal workers (e.g., farmers, traders, artisans) had significantly higher infection rates than civil servants, likely due to occupational exposure and reduced access to formal health services. These findings mirror the observations of Ajuwon *et al.* (2021), who noted that people in the informal sector often lack coverage in national vaccination or health intervention programs.

Vaccination status emerged as the most significant predictor of HBV infection. Respondents who had not received any dose of the HBV vaccine were more than four times likely to be infected, underscoring the critical importance of expanding immunization campaigns. This aligns with WHO's global strategy for hepatitis elimination, which emphasizes increased vaccination coverage as a cornerstone for reducing new infections (World Health Organization, 2021a).

The results reveal a strong inverse association between education level and Hepatitis B Virus (HBV) prevalence, indicating that individuals with no formal education are substantially more vulnerable to infection compared to their more educated counterparts. This pattern underscores the critical role of education in shaping health literacy, awareness of transmission routes, and the adoption of preventive measures such as vaccination and safe medical practices. Similar findings have been documented in previous studies, which emphasize that limited education often correlates with misconceptions about HBV transmission, reliance on traditional health practices, and reduced participation in preventive healthcare programs (Adebowale, 2021; Ajuwon et al., 2021).

Furthermore, the observed relationship between income and HBV prevalence highlights the broader impact of socioeconomic inequality on public health outcomes. Respondents with lower income levels exhibited significantly higher infection rates, likely due to restricted access to quality healthcare services, vaccination, and early diagnosis. Economic hardship may also increase dependence on informal or unsafe medical services, thereby heightening exposure risks. This relationship reflects a cycle in which poverty exacerbates vulnerability to infectious diseases, and ill health in turn perpetuates economic instability. Consequently, these findings reinforce the need for HBV control strategies that prioritize economically disadvantaged and

low-literacy populations through subsidized vaccination programs, community-based screening, and health education initiatives tailored to local contexts.

Logistic Regression Analysis of Predictors of Hepatitis B Infection

Table 3: Logistic Regression of Socio-Demographic and Economic Predictors of HBV

Predictor Variable	Odds Ratio (OR)	95% Confidence Interval (CI)	*p*-value
No Formal Education	3.42	1.45 – 8.10	**0.006**
Monthly Income < ₦30,000	2.89	1.18 – 7.05	**0.021**
Informal Occupation	2.33	1.02 – 5.29	**0.044**
Rural Residency	1.96	1.01 – 3.81	**0.048**
Unvaccinated Against HBV	4.12	2.10 – 8.05	**<0.001**

Source: Field Survey (2024)

The logistic regression analysis confirms that no formal education, low income, informal employment, rural residency, and lack of vaccination are statistically significant predictors of HBV infection. Respondents with no education were over 3 times more likely to be infected than those with formal education. Similarly, being unvaccinated increased the odds of infection by more than 4 times. These findings highlight the multidimensional vulnerability of individuals with limited access to health education, economic security, and preventive healthcare. It underscores the urgent need for policies that integrate HBV prevention with education, rural health outreach, and economic development.

Finally, the observed associations between rural residency and increased HBV prevalence suggest that geographic location remains a key structural determinant of health. Rural dwellers are more likely to face barriers such as distance to health facilities, inadequate manpower, and insufficient health education programs (Aliyu *et al*., 2021; Nwangwu *et al*., 2016). This geographical gap reinforces the need for decentralizing hepatitis prevention efforts, particularly in northern Nigeria, where healthcare disparities are more pronounced.

Collectively, these findings support the hypotheses that socio-demographic and economic variables are significantly associated with HBV prevalence and must be addressed through multi-sectoral health planning. They also confirm that behavioral interventions alone may be insufficient without addressing structural inequalities in education, income, and healthcare access.

The logistic regression analysis provides strong evidence that socio-demographic and economic variables significantly influence the likelihood of Hepatitis B Virus (HBV) infection in Gombe State. Individuals with no formal education were over three times more likely to be infected compared to those with formal education, indicating that educational attainment plays a crucial protective role. This finding aligns with prior research in Nigeria and other sub-Saharan contexts, where limited education has been consistently linked to poor health literacy, misconceptions about HBV transmission, and reduced engagement with preventive measures such as vaccination and screening (Adebowale, 2021; Ajuwon *et al*., 2021).

Income level also emerged as a strong determinant, as respondents earning less than ₦30,000 monthly were nearly three times more likely to contract HBV than those with higher incomes. This pattern reinforces the idea that poverty constrains access to healthcare, vaccination, and safe medical procedures, while also increasing dependence on informal and potentially unsafe practices. The association between informal employment and higher infection risk further supports this interpretation. Individuals engaged in informal occupations often lack workplace health protections, health insurance, or consistent access to public health services, making them more susceptible to infectious diseases.

Rural residency was also found to significantly predict HBV infection, with rural dwellers almost twice as likely to be infected as their urban counterparts. This disparity can be attributed to limited healthcare infrastructure, fewer vaccination opportunities, and lower awareness levels in rural areas, consistent with findings from other Nigerian studies (Aliyu et al., 2021; Nwangwu et al., 2016). The most significant predictor, however, was vaccination status unvaccinated individuals were over four times more likely to test positive for HBV. This underscores the critical importance of vaccination as the most effective preventive measure against HBV infection, as also emphasized by the World Health Organization (2021a).

Overall, these findings demonstrate that HBV infection in Gombe State is shaped by a combination of educational, economic, occupational, and geographical disadvantages, compounded by inadequate immunization coverage. Addressing these interrelated factors requires an integrated public health approach that combines community-based education, rural vaccination outreach, and socioeconomic empowerment initiatives. Such interventions would not only reduce HBV transmission but also help to narrow existing health inequities across socio-demographic groups.

These results have important implications for achieving both Nigeria's national hepatitis control objectives and the World Health Organization's (WHO) goal of eliminating viral hepatitis as a public health threat by 2030. The identified predictors low education, poverty, informal employment, rural residency, and lack of vaccination reflect the social and structural barriers that hinder progress toward these targets. Therefore, effective HBV control in Gombe State and across Nigeria requires a comprehensive strategy that integrates health education, equitable access to vaccination, rural healthcare strengthening, and poverty reduction initiatives. Aligning local interventions with the WHO Global Health Sector Strategy will be critical to reducing HBV transmission, improving early detection, and ultimately achieving hepatitis elimination in line with the 2030 agenda.

Conclusion and Recommendations

This study examined the socio-demographic and economic determinants of Hepatitis B prevalence in Gombe State, Nigeria, using a community-based cross-sectional approach. The findings clearly show that low educational attainment, low income, informal employment, rural residency, and lack of vaccination significantly increase the likelihood of HBV infection. The study confirms that Hepatitis B is not only a biomedical issue but also a socio-economic and geographical one. As such, reducing HBV prevalence requires an integrated approach that goes beyond clinical interventions to address underlying social determinants.

Based on these findings, the following recommendations are proposed**:**

1. **Health Education Campaigns**: Government and health agencies should intensify public enlightenment, especially in rural and low-literacy areas, using culturally relevant materials to improve awareness about HBV transmission and prevention.

2. **Free or Subsidized Vaccination Programs**: Expand access to HBV vaccination, particularly targeting economically disadvantaged groups and informal sector workers who are often excluded from formal healthcare interventions.

3. **Integration of HBV Screening into Primary Healthcare**: Routine screening should be incorporated into community health services to allow early detection and prompt management.

4. **Policy Support for Rural Healthcare**: Strengthen healthcare infrastructure and human resources in rural areas to close the urban-rural health gap that contributes to higher HBV transmission rates.

5. **Multi-sectoral Collaboration**: A coordinated effort among the education, health, and labor sectors is necessary to address the socio-economic conditions that facilitate the spread of HBV.

Finally, the asserts that tackling Hepatitis B in Gombe State and by extension Nigeria requires a comprehensive public health strategy that considers both medical and socio-structural dimensions of disease prevention.

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