IMMUNISATION AT THE MARGINS: BEHAVIOURAL, NORMATIVE AND STRUCTURAL DETERMINANTS OF HEPATITIS B VACCINE UPTAKE AND SCHEDULE COMPLETION IN A HIGH-BURDEN NORTHERN NIGERIAN FRONTIER

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ABSTRACT

Hepatitis B virus (HBV) infection remains endemic in Nigeria despite the availability of a safe and effective vaccine, with northern regions bearing a disproportionate burden. In contexts characterised by persistent socio-cultural barriers and low immunisation coverage, understanding the behavioural and structural drivers of vaccine uptake and schedule completion is critical. This study examined the behavioural, normative and contextual determinants of Hepatitis B immunisation uptake and completion in Bauchi Local Government Area (LGA), a high-burden setting in northern Nigeria. A community-based descriptive cross-sectional survey was conducted among 227 adults selected through a multistage sampling technique. Data were collected using a structured questionnaire adapted from validated immunisation tools, capturing indicators of knowledge, perceptions, vaccine confidence, normative influence and structural barriers. Data were analysed using descriptive statistics in IBM SPSS version 26 and interpreted using the WHO Behavioural and Social Drivers (BeSD) Framework and the Theory of Normative Social Behaviour (TNSB). Findings revealed moderate awareness of Hepatitis B (55.5%), but limited detailed knowledge of transmission and vaccination schedules. While perceptions of disease severity were positive, vaccine confidence and peer mobilisation were weak. Normative factors, including male household authority and community influence, significantly shaped decisions, while structural barriers such as limited access and economic constraints hindered completion. The study concludes that vaccination behaviour is driven by the interaction of knowledge gaps, social norms and access barriers. It recommends strengthening health education, engaging community decision-makers and improving service accessibility.

Keywords: Hepatitis B vaccination, immunisation uptake, behavioural drivers, normative influence, structural barriers, northern Nigeria, vaccine confidence.

1. Introduction

Hepatitis B Virus (HBV) infection continues to pose a serious public health concern worldwide. The disease is responsible for a significant share of chronic liver disease, cirrhosis and hepatocellular carcinoma, contributing to considerable illness and death across many regions of the world (World Health Organization [WHO], 2023). Although an effective vaccine has been available for more than four decades, HBV remains widespread. Recent global estimates indicate that about 296 million people are living with chronic infection, with the highest burden occurring in sub-Saharan Africa (WHO, 2022). In many high-prevalence settings, transmission often occurs from mother to child at birth or during early childhood. For this reason, timely administration of

the birth dose and completion of the recommended vaccination schedule remain essential components of prevention (Nelson, Easterbrook, & McMahon, 2016).

Nigeria is among the countries most affected by HBV infection. National studies estimate that between 8% and 12% of the population may be living with the virus (Owolabi, Akinyemi, & Adebayo, 2021). The Hepatitis B vaccine was introduced into Nigeria's routine childhood immunisation programme in 2004, yet coverage remains uneven across the country. In particular, northern states have consistently recorded lower rates of vaccination completion than many parts of southern Nigeria (Williams, Akande, & Abbas, 2024). Several factors contribute to this disparity, including limitations within primary healthcare systems, socioeconomic challenges, rural settlement patterns and deeply rooted socio-cultural norms that influence health-seeking behaviour (Mohammed et al., 2024).

Bauchi State in northeastern Nigeria illustrates many of these challenges. Evidence from recent studies suggests that HBV transmission remains a concern in the state, including notable prevalence among pregnant women, which may perpetuate transmission across generations (Jibril, Maigari, & Sule, 2025). Although routine immunisation services are provided through primary healthcare facilities, completion of the recommended Hepatitis B vaccination schedule is not always consistent. A range of contextual factors—such as home deliveries, gendered patterns of household decision-making, economic hardship and the circulation of misinformation within community networks—may affect confidence in vaccines and adherence to immunisation schedules.

Existing research in Nigeria has largely concentrated on estimating the prevalence of HBV infection or assessing levels of knowledge among particular groups, including healthcare workers, students and pregnant women (Shah et al., 2020; Agbesanwa et al., 2023). While such studies have generated valuable insights, relatively little attention has been given to how behavioural attitudes, social expectations and structural constraints interact within communities to shape vaccination behaviour. Emerging evidence suggests that awareness of a disease does not necessarily translate into consistent preventive action, particularly where social norms and access barriers intersect (Akabuike et al., 2024).

In many under-immunised communities, vaccination decisions are rarely made by individuals in isolation. Rather, they are influenced by household dynamics, community expectations and the practical realities of accessing healthcare services. Understanding these interconnected influences is therefore essential for designing interventions that respond effectively to the lived experiences of communities. Such insights are particularly important as Nigeria seeks to strengthen its response to viral hepatitis and advance toward the global goal of eliminating the disease as a public health threat by 2030.

Against this background, the present study examines the behavioural, normative and structural determinants of Hepatitis B vaccine uptake and schedule completion among community members in Bauchi Local Government Area.

2. Conceptual Clarifications

This study is anchored on three core concepts: immunisation uptake, vaccination schedule completion, and the behavioural, normative and structural determinants of vaccination.

Immunisation uptake refers to the initiation of vaccination by individuals or caregivers, particularly the decision to receive at least one dose of a vaccine. Vaccination schedule completion, on the other hand, denotes adherence to the full recommended series of doses required to achieve optimal and sustained protection against infection. In the case of Hepatitis B, this includes the

timely administration of the birth dose followed by subsequent doses according to the recommended immunisation schedule (World Health Organization [WHO], 2022).

Behavioural determinants encompass individual-level factors such as knowledge, risk perception, attitudes and confidence in vaccine safety and effectiveness. These factors influence how individuals interpret health information and make decisions regarding vaccination. Normative determinants refer to socially embedded influences, including perceived expectations, household authority structures and community-level behavioural norms that shape individual choices. In many settings, particularly in northern Nigeria, such norms are closely linked to gender roles, family hierarchies and collective decision-making processes.

Structural determinants relate to the broader contextual and institutional conditions that enable or constrain vaccination behaviour. These include physical access to healthcare services, availability of vaccines, affordability, transportation challenges and the quality-of-service delivery within primary healthcare systems. Structural barriers often interact with behavioural and normative factors, reinforcing patterns of delayed uptake or incomplete vaccination.

Taken together, these concepts provide a multidimensional lens for understanding vaccination behaviour. They highlight that immunisation decisions are not solely driven by individual awareness but are shaped by the interplay of personal beliefs, social expectations and systemic conditions within which individuals and households operate.

3. Theoretical Framework

3.1 WHO Behavioural and Social Drivers (BeSD) Framework

The study draws on the WHO Behavioural and Social Drivers (BeSD) framework, which conceptualises vaccine uptake as the outcome of interacting psychological, social and structural determinants (WHO, 2019; Brewer et al., 2017). The framework identifies four domains influencing vaccination behaviour: thinking and feeling, social processes, motivation and practical issues. The "thinking and feeling" domain includes perceived risk, vaccine confidence and emotional responses to vaccination. The "social processes" domain captures interpersonal influence, normative expectations and provider recommendations. "Motivation" reflects intention and willingness to vaccinate, while "practical issues" encompass access, affordability and service delivery constraints.

Unlike earlier cognitive models of health behaviour, the BeSD framework integrates both individual and systemic drivers of vaccination decisions. In contexts such as Bauchi where social norms and structural barriers intersect, this multidimensional approach provides an appropriate analytical lens for interpreting immunisation behaviour.

3.2 Theory of Normative Social Behaviour (TNSB)

To further interrogate the role of social norms in shaping vaccination behaviour, this study incorporates the **Theory of Normative Social Behaviour (TNSB)**. The theory, developed by Rimal and Real (2005), extends traditional normative frameworks by distinguishing between **descriptive norms**—individuals' perceptions of what others are doing—and **injunctive norms**—perceptions of what important others approve or disapprove. TNSB further posits that the influence of norms on behaviour is moderated by factors such as outcome expectations, group identity and perceived benefits of compliance.

In collectivist contexts such as northern Nigeria, vaccination decisions often occur within household and community hierarchies rather than at the individual level. Descriptive norms may encourage vaccine uptake when immunisation is perceived as a common or socially accepted practice within the community. Conversely, injunctive norms—particularly approval or disapproval from influential actors such as male household heads, elders or religious leaders—can

significantly facilitate or constrain vaccination behaviour (Rimal & Real, 2005; Lapinski & Rimal, 2005).

Empirical studies in similar settings have demonstrated that social norms play a critical role in shaping health behaviours, including vaccination uptake, especially where community conformity and social approval are highly valued (Cialdini, Reno, & Kallgren, 1990; Bicchieri, 2017). In such contexts, individuals are more likely to align their behaviour with perceived social expectations, even when they possess adequate knowledge about health risks.

By integrating the WHO Behavioural and Social Drivers (BeSD) framework with TNSB, this study captures both the structural and normative dimensions of vaccination behaviour. While BeSD explains how access, motivation and perceptions influence uptake, TNSB provides deeper insight into how social expectations and authority structures shape decision-making processes in high-burden frontier communities.

4. Methods

Study Design and Setting

A community-based descriptive cross-sectional study was conducted in Bauchi Local Government Area of Bauchi State, northeastern Nigeria. The area comprises mixed urban and semi-urban settlements with substantial rural peripheries and persistent immunisation gaps relative to national targets.

Study Population

The study population comprised adult community members aged 18 years and above residing in selected wards of Bauchi LGA. Adults were selected due to their role in household health decision-making and childhood immunisation practices.

Sample Size and Sampling Procedure

A final sample of 227 respondents was obtained using a multistage sampling technique. Wards were first selected through simple random sampling, followed by systematic selection of households. One eligible adult respondent was then randomly selected from each household.

Data Collection

Data were collected using a structured interviewer-administered questionnaire adapted from validated immunisation behavioural instruments including WHO knowledge-attitude-practice modules and vaccine hesitancy measurement tools (WHO, 2014; Betsch et al., 2018). Interviews were conducted by trained research assistants to accommodate varying literacy levels.

Data Analysis

Data were analysed using IBM SPSS version 26. Descriptive statistics including frequencies, percentages, means and standard deviations were generated. Knowledge indicators were summarised as proportions of correct responses, while perception and socio-cultural variables were interpreted using mean score thresholds.

Ethical Considerations

Ethical approval was obtained from the Department of Sociology, Sa'adu Zungur University, Bauchi. Participants provided informed consent and were assured of confidentiality and anonymity throughout the study.

4. Results

Socio-Demographic Characteristics

A total of 227 respondents participated in the study. Females constituted 51.5% while males accounted for 48.5%. Age distribution was relatively balanced across adult categories, with the largest proportion (24.2%) aged 45–54 years.

Islam was the predominant religion (56.4%), followed by Christianity (40.6%). Educational attainment varied, with 30.0% reporting primary education and 26.9% having tertiary education.

Awareness and Knowledge of Hepatitis B

General awareness of Hepatitis B was reported by 55.5% of respondents, while 53.7% reported receiving information regarding Hepatitis B vaccination. However, detailed knowledge regarding transmission pathways and vaccination requirements was limited.

Recognition of Hepatitis B as a viral infection affecting the liver was reported by 33.0% of respondents. Awareness of sexual transmission was reported by 34.4%, while only 29.5% identified sharing sharp objects as a transmission pathway. Knowledge of mother-to-child transmission during birth was reported by 33.9%.

Regarding prevention, 36.6% correctly identified vaccination as a preventive measure. Knowledge of the multi-dose vaccine schedule was reported by 33.9%, while only 29.5% recognised that the first vaccine dose should be administered at birth.

Perceptions Toward Hepatitis B Immunisation

Perceptions of Hepatitis B severity and the importance of vaccination were moderately positive. Respondents generally agreed that Hepatitis B immunisation protects individuals and families (mean = 3.10) and recognised the disease as a serious health threat (mean = 3.12).

However, vaccine confidence was comparatively weaker. Trust in vaccine safety and effectiveness recorded a mean score of 2.91, while motivation to encourage others to complete vaccination recorded a mean of 2.85.

Socio-Cultural and Structural Determinants

Socio-cultural and structural determinants revealed significant normative and practical influences. Male household authority was identified as an important factor shaping immunisation decisions (mean = 3.06). Family encouragement and community behavioural conformity also influenced vaccination behaviour.

Structural barriers were prominent. Limited vaccine access recorded a mean score of 3.18, while economic constraints recorded a mean of 3.07. Traditional beliefs discouraging vaccination recorded the highest mean score (3.34), indicating the continuing influence of cultural narratives.

5. Discussion

This study explored the behavioural, social and structural factors shaping Hepatitis B immunisation uptake and schedule completion in Bauchi Local Government Area, a setting that continues to experience a high burden of infection alongside relatively low immunisation coverage. The findings suggest that vaccination behaviour in this context is influenced by a combination of limited biomedical understanding, moderate recognition of disease severity, uneven confidence in vaccines, household decision hierarchies and practical barriers related to access and affordability. Viewed through the lens of the WHO Behavioural and Social Drivers (BeSD) framework and the Theory of Normative Social Behaviour (TNSB), these patterns highlight that vaccination decisions in frontier settings are embedded in everyday social relationships and institutional realities rather than being driven solely by individual awareness.

A notable finding from this study is the gap between general awareness of Hepatitis B and detailed knowledge about how the infection is transmitted or prevented. Although a fair proportion of respondents had heard of the disease, many were uncertain about specific transmission routes, the timing of the birth dose or the need to complete the full vaccination schedule. Similar patterns have been reported in earlier studies conducted in Nigeria and other parts of sub-Saharan Africa, where awareness of Hepatitis B tends to be relatively widespread but accurate understanding of prevention practices remains limited (Eni et al., 2019; Agbesanwa et al., 2023). Abban et al. (2024)

reported comparable findings among university students in Ghana, noting that familiarity with the disease did not always correspond with accurate biomedical knowledge. Within the BeSD framework, such gaps fall within the "thinking and feeling" domain, which emphasises the role of knowledge, perceptions and emotional responses in shaping health behaviour. The findings therefore suggest that while awareness campaigns may have succeeded in increasing recognition of Hepatitis B as a health issue, they may not have sufficiently translated into the kind of practical understanding needed to sustain consistent vaccination behaviour.

The study also found that many respondents recognised the seriousness of Hepatitis B and acknowledged the protective value of vaccination. However, confidence in the safety and effectiveness of the vaccine appeared more tentative. This difference between recognising disease risk and trusting the vaccine itself has been observed in several other studies on immunisation behaviour. For example, Ayamolowo et al. (2023) found that individuals could simultaneously acknowledge the dangers associated with Hepatitis B while remaining uneasy about potential vaccine side effects. The BeSD framework emphasises that vaccine confidence plays a central role in bridging the gap between recognising a health risk and taking preventive action. Where confidence in vaccines is uncertain, individuals may hesitate or delay vaccination even when they recognise the potential consequences of infection.

Social and household dynamics also emerged as important influences on vaccination decisions. In particular, the findings point to the role of male heads of household in shaping whether immunisation is pursued or delayed. This observation aligns with previous research documenting how gendered decision-making structures influence health-seeking behaviour in northern Nigeria (Williams et al., 2024). Within the perspective of the Theory of Normative Social Behaviour, this reflects the influence of **injunctive norms**—that is, expectations or approval from influential social actors. In many households, health decisions are not made individually but are negotiated within family structures where authority and responsibility are unevenly distributed. Where male household heads support vaccination, the chances of children receiving vaccines may increase; where doubts exist, immunisation may be postponed or avoided.

Beyond the household, broader community dynamics also appear to shape vaccination behaviour. Respondents indicated that they were more likely to vaccinate when they believed that others in the community were doing the same. This reflects the influence of **descriptive norms**, which refer to perceptions about what people around us commonly do. According to TNSB, individuals often take cues from the behaviour of their peers when deciding how to act in situations involving uncertainty or perceived risk. Similar patterns have been reported in vaccination campaigns in Ghana and Ethiopia, where visible community participation helped reinforce vaccine acceptance (Kusi et al., 2023; Bayissa et al., 2024). In Bauchi LGA, seeing neighbours, relatives or respected community members participate in immunisation programmes may help strengthen confidence and encourage wider uptake.

Alongside behavioural and normative influences, the study also highlights the continuing importance of structural barriers. Respondents frequently mentioned limited access to vaccination services and economic constraints as factors that make completing the vaccination schedule difficult. These findings echo earlier research showing that practical challenges—such as long distances to health facilities, transportation costs or inconsistent vaccine availability—can disrupt immunisation even when people are willing to participate (Olakunde et al., 2021; Mohammed et al., 2024). Within the BeSD framework, such issues fall under the category of "practical barriers," reminding us that willingness to vaccinate does not automatically translate into action when services are difficult to reach or sustain.

Cultural narratives and misconceptions also remain part of the social landscape surrounding vaccination. While the study did not find strong evidence of direct religious opposition, broader beliefs about health, illness and medical interventions continue to influence how vaccines are perceived. Other studies conducted in African settings have similarly shown that traditional beliefs, informal advice networks and circulating misinformation can shape community attitudes toward vaccination (Mugisha et al., 2019; Osarenkhoe et al., 2023). These beliefs do not necessarily lead to outright rejection of vaccines, but they can create uncertainty or hesitation, particularly in communities where access to reliable health information is limited.

Taken together, the findings suggest that Hepatitis B immunisation behaviour in Bauchi LGA is shaped by a combination of behavioural understanding, social influence and structural conditions. The BeSD framework helps illuminate how knowledge, perceptions and practical barriers interact to influence vaccination decisions, while the Theory of Normative Social Behaviour sheds light on the role of household authority and community expectations. Considered together, these perspectives underline the need for vaccination strategies that do more than provide information. Improving immunisation coverage in high-burden frontier settings will likely require approaches that simultaneously strengthen knowledge, engage community norms and address the practical barriers that continue to limit access to vaccination services.

6. Policy and Programmatic Implications

The findings of this study carry important implications for public health policy and immunisation programming in high-burden northern Nigerian settings. First, vaccination interventions must move beyond traditional information-based awareness campaigns. Although awareness of Hepatitis B exists among community members, the findings indicate that knowledge alone does not automatically translate into sustained vaccine uptake or completion. Behavioural change strategies must therefore incorporate social and normative dimensions that shape health decision-making within households and communities.

Second, immunisation programmes should adopt norm-sensitive engagement strategies that recognise the influence of household authority structures and community leadership. In many northern Nigerian contexts, male heads of households and respected community figures play critical roles in determining healthcare decisions. Integrating these actors into vaccination advocacy efforts can strengthen injunctive norms that support immunisation behaviour.

Third, strengthening vaccine confidence and trust in healthcare providers is essential. Community-based health education initiatives should address misconceptions surrounding vaccine safety and potential side effects while emphasising the benefits of completing the full vaccination schedule. Trusted health workers, religious leaders and community health volunteers can play important roles in reinforcing accurate information and promoting positive vaccination norms.

Finally, addressing structural barriers to vaccination remains critical. Limited access to immunisation services, transportation challenges and indirect economic costs may discourage vaccine uptake even when individuals recognise its benefits. Expanding outreach vaccination services, improving supply chain reliability and ensuring convenient service delivery schedules may reduce these practical barriers and improve vaccination completion rates.

Collectively, integrating behavioural insights, normative engagement and structural service improvements can strengthen immunisation outcomes in under-immunised frontier settings.

7. Limitations of the Study

While this study provides valuable insights into the determinants of Hepatitis B immunisation behaviour in Bauchi LGA, several limitations should be acknowledged. First, the cross-sectional design of the study limits the ability to establish causal relationships between behavioural,

normative and structural factors and vaccination outcomes. The findings therefore reflect associations rather than causal effects.

Second, the study relied on self-reported responses from participants, which may be subject to recall bias or social desirability bias. Respondents may have overreported socially desirable behaviours or attitudes toward vaccination. Third, the study was conducted within a single Local Government Area, which may limit the generalisability of the findings to other regions with different socio-cultural or health system contexts.

Despite these limitations, the study offers important context-specific insights into the social and structural dynamics shaping vaccination behaviour in high-burden northern Nigerian settings. Future research employing mixed-method approaches or longitudinal designs could further deepen understanding of how behavioural and normative factors influence vaccination decisions over time.

8. Conclusion

This study demonstrates that Hepatitis B immunisation behaviour in Bauchi LGA is shaped by the interaction of behavioural perceptions, normative structures and structural access conditions. Although moderate awareness of Hepatitis B exists within the community, detailed biomedical knowledge regarding transmission pathways and vaccination schedules remains limited. At the same time, fragile vaccine confidence, gendered household authority structures and community conformity pressures influence vaccination decisions, while economic constraints and limited service access further undermine schedule completion.

These findings suggest that improving immunisation coverage in high-burden northern settings requires strategies that extend beyond conventional awareness campaigns. Effective interventions must incorporate norm-sensitive engagement with household decision-makers, particularly male heads of households, while strengthening trust in vaccination services and improving the accessibility of routine immunisation delivery. Addressing structural barriers, enhancing community-level health communication and reinforcing positive vaccination norms are therefore critical for increasing vaccine uptake and adherence.

By highlighting the interconnected behavioural, normative and structural determinants of Hepatitis B vaccination, this study contributes to a more comprehensive understanding of immunisation dynamics in under-immunised frontier settings. Such insights are essential for designing contextually responsive interventions capable of supporting Nigeria's broader goal of reducing viral hepatitis transmission and improving population health outcomes.

9. Recommendations (Aligned with Study Findings)

Based on the empirical findings of this study, the following recommendations are proposed:

1. **Strengthen community-based health education**
   The study found moderate awareness of Hepatitis B but low detailed biomedical knowledge regarding transmission pathways, birth-dose timing and vaccine schedule completion. Public health interventions should therefore prioritise targeted health education that emphasises practical and actionable knowledge to improve informed vaccination decisions.
2. **Enhance vaccine confidence through trust-building strategies**
   Findings revealed comparatively low trust in vaccine safety and effectiveness, as well as weak motivation to encourage others to vaccinate. Health communication strategies should focus on addressing misconceptions, improving risk communication and strengthening trust in vaccines through credible sources such as healthcare providers and trained community health workers.

3. **Engage household decision-makers**
   The study identified male household authority as a significant determinant of immunisation decisions. Immunisation programmes should therefore incorporate targeted engagement of male heads of households and key family decision-makers through culturally sensitive advocacy and dialogue-based interventions.
4. **Leverage social and community norms**
   Evidence from the study indicates that community behavioural conformity influences vaccination decisions. Interventions should utilise peer influence, community role models and respected local leaders to reinforce descriptive and injunctive norms that support vaccination uptake and completion.
5. **Improve access to vaccination services**
   Limited access to vaccination services emerged as a major barrier to immunisation. Health authorities should expand outreach services, mobile vaccination units and community-based delivery strategies to improve physical accessibility, particularly in underserved and peripheral areas.
6. **Address economic constraints**
   Economic barriers were identified as a significant constraint affecting vaccination uptake and schedule completion. Policies should aim to reduce indirect costs associated with vaccination, including transportation and opportunity costs, through subsidised services or integrated community delivery approaches.
7. **Strengthen health system reliability**
   Structural findings highlight the importance of consistent vaccine availability and efficient service delivery. Strengthening primary healthcare systems through improved supply chains, staffing and service quality will enhance public confidence and support sustained immunisation behaviour.

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