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Hepatitis B Birth Dose Coverage among Infants in Plateau State, Nigeria

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ABSTRACT

Hepatitis B virus (HBV) infection remains a significant public health challenge in Nigeria, with vertical (mother-to-child) transmission being a major route of infection. The World Health Organization (WHO) recommends administering the hepatitis B birth dose (HepB-BD) within 24 hours of birth to prevent perinatal transmission. However, the level of HepB-BD coverage across different regions of Nigeria remains suboptimal and poorly documented. This study assesses the coverage of the hepatitis B birth dose among infants in Plateau State, Nigeria, and identifies the determinants influencing vaccine uptake. Using a cross-sectional study design, data were collected through structured interviews with caregivers and health workers, as well as reviews of immunization records from selected health facilities across urban and rural areas of the state. The study evaluated birth dose administration rates, timing, and associated factors such as maternal education, place of delivery, awareness of HBV, availability of vaccines, and health system challenges. Preliminary findings reveal a low overall coverage of HepB-BD, with significant disparities between urban and rural communities, and a high proportion of infants receiving the vaccine beyond the recommended 24-hour window. Key barriers identified include inadequate maternal awareness, high rates of home deliveries, poor vaccine logistics, and health worker shortages. The study underscores the need for targeted health education, improved delivery and immunization services, and policy interventions to enhance timely administration of the birth dose. Strengthening the integration of maternal and child health services with immunization programs is critical for reducing HBV transmission and achieving national and global hepatitis elimination targets.

Keywords: Hepatitis B, HBV transmission, infants, immunization, HepB-BD, vaccine, liver

INTRODUCTION

Hepatitis B is the most common liver infection in the world caused by the Hepatitis B virus. Each year more than 1 million people die from Hepatitis B worldwide even though it is preventable. Hepatitis is a 'silent epidemic' because symptoms may not appear for months after infection and the infected person can still transmit the infection to others [1]. Viral hepatitis is inflammation of the liver caused by one or more of the five main hepatic viruses: A, B, C, D, and E. These viruses show similar symptoms like weakness, fatigue or tiredness, jaundice (yellowing of the eye and body), joint pain, nausea, vomiting, abdominal pain, dark urine, loss of appetite, swollen abdomen among others., and have the potential to cause liver disease to varying degrees.

Viral hepatitis is a major global health problem with more than 400 million individuals chronically infected, causing over 1.4 million deaths per year [2]. The Hepatitis B virus contains an outer envelope and an inner core.

The outer envelope of the virus is composed of a surface protein called the Hepatitis B surface antigen or HBsAg. The surface antigen can be detected by a simple blood test and a positive test result indicates a person is infected with the Hepatitis B virus while the inner core of the virus is a protein shell referred to as the Hepatitis B core antigen or HBcAg which contains the Hepatitis B virus DNA and enzymes used in viral replication. [10]

The Hepatitis B virus is a small DNA virus that belongs to the 'Hepadnaviridae' family. Related viruses in this family are also found in woodchucks, ground squirrels, tree squirrels, pecking ducks and herons [2, 3].

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Conceptual Clarification

Lifecycle of the Hepatitis B Virus

The Hepatitis B virus has a complex life cycle. The virus enters the liver cell and is transported into the nucleus of the liver cell. Once inside the nucleus, the viral DNA is transformed into the covalently closed circular DNA (cccDNA) which serves as a template for viral replication (creation of new Hepatitis B virus). New HBV is packaged and leaves the liver cell, with the stable viral cccDNA remaining in the nucleus where it can integrate into the DNA of the host liver cell, as well as continue to create new Hepatitis B virus. Although the life cycle is not completely understood, parts of this replicative process are error prone, which accounts for different genotypes or genetic codes of the Hepatitis B virus (4).

Complications of Hepatitis B

Chronic hepatitis B can lead to cirrhosis, liver cancer, liver failure and premature death, and the most common route of hepatitis B transmission globally is perinatal transmission which occurs during the labor and delivery process. Unvaccinated infants can also become infected shortly after birth or through horizontal transmission in early childhood from infected blood. Such perinatal infections lead to a high rate of chronicity.{5} The risk of developing chronic hepatitis B increases to 90% of those infected as neonates and 30% to 50 % among children infected between one and five years old and 5% to 10% among those infected as adults. The prevalence of HBsAg among children aged five years is a proxy for new hepatitis B infections from vertical and/or early horizontal transmission {5, 6}.

WHO's global health sector strategy impact target for eliminating Viral hepatitis includes a HBsAg prevalence target for children of ≤ 1% by 2020 and ≥ 0.1 % by 2030. {6}. Considerable progress has been made towards eliminating the perinatal transmission of HBV and reducing new infections among children through universal infant HBV immunization, including a timely hepatitis B birth dose. Following birth dose, it is recommended that universal infant immunization with at least three of the hepatitis B vaccine (HepB3), each separated by least four weeks commonly referred to as the pentavalent vaccination series. {7}. The first dose of hepatitis B vaccine should be administered to all newborns as soon as possible after birth, preferably within 24 hours. .If the birth dose is administered as soon as possible following delivery (within 24 hours) in addition to the pentavalent vaccination, the infant has a greater than 90% chance of a hepatitis B free future. {8}

Nigeria is among the countries with a hepatitis B virus, prevalence of 11%. {8} Knowledge of viral hepatitis is relatively low among Nigerians despite being a leading infectious cause of much death each year. {8,9} It is estimated that over 20 million Nigerians living with viral hepatitis B are undiagnosed, increasing the likelihood of future transmission to others and placing them at greater risk for severe, even fatal health complications such as liver cirrhosis and liver cancer (hepatocellular carcinoma). {10}. Hepatitis B Vaccination at birth is critical to protecting all babies from hepatitis B and liver disease, as newborns exposed to hepatitis B virus are at a high risk of developing chronic hepatitis B, which can lead to serious liver disease in adulthood.

In Nigeria hepatitis B birth dose has been offered since 2004, however implementation and uptake has been variable with researchers identifying barriers to timely administration of birth dose including poor knowledge among health care workers or common misconceptions about administration. Hepatocellular carcinoma (HCC) is a disease of public health concern in Nigeria, with chronic hepatitis B infections contributing most to the disease burden. Despite the increasing incidence of HCC, surveillance practices for early diagnosis and possible cure are not deeply rooted in the country. (11)

According to FO Baba, in Nigeria, only 33% received timely birth dose which is key to preventing MTCT of HBV. The availability of daily child vaccination services seems to be an obvious requirement for improving access to the birth dose of HBV vaccine. {15,16} Where is not possible, there should be rapid linkage to the nearest facility where HBV vaccination is immediately available.

Key facilitators across multiple zones in Nigeria are health literacy, maternal education, and community leader influence. However, unique regional differences were existed in Nigeria, where North-West zone perceived vaccine benefits, fear of non-immunization consequences, urban residence, health literacy, and antenatal care

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visits were reported as crucial. Perceived benefits of vaccines and trust in healthcare providers were identified as predominant factors in the North-Central were Plateau State belong. Tailored approaches that consider the social-economic, cultural, and logistical challenges specific to the region essential to bridge the immunization gap, were HepB-BD is included. (12)

The HBV vaccination remains the cornerstone of public health policy to prevent chronic hepatitis B and its related complications. It serves as a crucial element in the global effort to eliminate HBV, as established by World Health Organization (WHO), with an ambitious 90% vaccination target by 2030. However, reports on global birth dose coverage reveal substantial variability, with an overall coverage rate of only 46 %.(13). This comprehensive review thoroughly examines global trends in HBV vaccination coverage. Additionally, the review addresses the essential formidable challenges and facilitating factors for achieving WHO's HBV vaccination coverage objectives and elimination strategies in the coming decade and beyond(3,14)

In Plateau State, most pregnant women confirmed having knowledge of hepatitis B birth-dose, but do not know the actual period HepB-BD supposed to have been given after birth, while some do not have idea what HepB-BD is all about, and further said that, their baby will be protected by God, as he/she is in the hands of God, during oral interview at one Local Government. It is against these backdrops that the study examine hepatitis B infection, mode of transmission, associated risks, control and prevention in Plateau State to serve as document for implementation all of the country.

MATERIALS AND METHODS

Study Population:

This study is a secondary data analysis from 1,236 Primary Healthcare Centers in 17 Local Government Area of Plateau State, Nigeria from 2020 to 2024 on vaccination at birth-does of Infants within 24 hours of birth.

Plateau State is located in the North-central zone out of the Six geopolitical zone of Nigeria, with an Area of 26,899 square kilometers (10,386 sqmi), the State is located between latitude $8^0$24'E and $10^0$30'N and longitude $8^0$32'E and $10^0$38'E. The population projection of Plateau State in 2025 is approximately 5.07 million people, while in 2022, the estimated population of 4.7 million. However, the growth rate is based on an annual increase of 2.4% which has been consistent over the years [Cirddoc.org Plateau State]

The seventeen (17) Local Government of the State comprises of Barkin Ladi, Bassa, Bokkos, Jos East, Jos North, Jos South, Kanam, Kanke, Langtang North, Langtang South, Mangu, Mikang, Pankshin, Qua'an Pan, Riyom, Shendam, and Wase. Each of the Local Government Area has their unique cultural, linguistic, and weather differences.

Study Design

This study employed a **cross-sectional descriptive design**, suitable for assessing the prevalence of hepatitis B birth dose (HepB-BD) administration and identifying associated factors within a defined population at a single point in time (Ghobadmoradi et al., 2021).

Study Population

- **Primary respondents**: Mothers or caregivers of infants aged **0–11 months**.
- **Secondary respondents**: Health care workers (HCWs) at primary health centers offering immunization services.

Sampling Technique and Questionnaire Administration

A **multistage sampling method** was adopted:

1. **First stage**: Stratified selection of 3 urban and 3 rural LGAs from the 17 LGAs in Plateau State.

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2. **Second stage**: Random selection of primary health care facilities offering immunization services within each LGA.

3. **Third stage**: Systematic sampling of eligible mother-infant pairs attending immunization clinics or located through health records and home visits.

Random and stratified sampling techniques were employed where the researcher selected and interviewed 152 people across the 17 Local Governments of the Plateau State which has One Thousand two hundred and thirty six (1236) Primary health care centers, and some Private Hospitals. These comprises 32 Health workers provider, 96 pregnant women and 24 nursing Mothers on the availability and accessibility of the vaccines in labor ward, giving vaccines on HepB-BD within 24 hours , and as well obtained data from the 1,236 Primary health Centers in the State. Furthermore, cell phone conversations were made to access the first hand information on the ground across the State Healthcare facilities, to ascertain perceptions and attitudes of parents and healthcare providers towards HepB-BD vaccination, barriers and facilitators to HepB-BD vaccination in different contexts. This was done to know if a cultural, social and environmental context has influence on HepB-BD vaccination.

All the secondary data was collected through the Plateau State Primary health Care Board, using documentary evidence, oral interview was done at the primary healthcare facilities (PHC) and some Private Hospital (HCWs), Pregnant Women and Nursing Mothers as well were interviewed in English.

Data Collection Tools

Data were collected using pre-tested, interviewer-administered structured questionnaires and health facility record checklists**.**

Key components:

- Demographic data (age, education, parity, income)
- Infant's birth details (place of delivery, birth attendant)
- Knowledge and awareness of HBV and HepB-BD
- Vaccination status (verified from vaccination cards or facility registers)
- Facility-level data (vaccine availability, cold chain status)

Data Collection Tools

- **Structured questionnaires** administered to caregivers/mothers to collect data on:
  - Socio-demographic characteristics
  - Birth history and vaccination status of the infant
  - Awareness and knowledge of HBV
  - Accessibility of health services
- **Health facility records** were reviewed to verify HepB-BD administration.
- **Key informant interviews** were conducted with health workers to gather qualitative insights.

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Data Analysis

Statistical analysis was done using SPSS or similar statistical software. Descriptive statistics (frequencies, proportions) described the coverage where results were presented the table and percentages, and the second method of the data analysis was the use of Bar Chart, and Pie Chart, for data visualization. The relative risks were estimated by fitting unvariate and multivariable log-binomial regression models. The adjusted model included all the independent variables regardless of their significance level in the univariate analysis.

A chi-square (χ^2) test was employed and examined associations between the environmental sustainability of healthcare facilities at government and private healthcare centres in Kaduna metropolis variables. It is to show weather there are variations between the responses the government and private health facilities. Eleven (11) independent variables were used for the comparative analysis of the HCF numbered a – k.

The formula for the Chi-Square:

$$x^2 = \sum (0_i - E_i)^2$$

E_i …… Equation (2.3)

Where x^2 = Chi-Square

0_i = Observed frequency (table of the Likert Scale responses),

E_i = Expected Count.

RESULT AND DISCUSSION

Hepatitis B Transmission, risk factors, symptoms and preventions

Hepatitis B is a viral infection that can be transmitted through blood or other bodily fluids, including semen and vaginal secretions. Common modes of transmission include having unprotected sex with an infected person, sharing personal items such as toothbrushes or sharp objects like razors, clippers, and nail cutters contaminated with infected blood, receiving tattoos or body piercings with unsterilized equipment, mother-to-child transmission during childbirth, transfusion of infected blood, and sharing of needles, syringes, or other unsterilized equipment. Certain factors increase the risk of contracting the virus, such as having multiple sexual partners, working in healthcare, being an infant born to an infected mother, being a man who has sex with men, injecting drugs, living with an infected person, having hepatitis C infection or a history of it, and being on immunosuppressive therapy. Many people with hepatitis B do not initially show symptoms; however, when symptoms occur, they may include fever, fatigue, muscle or joint pain, nausea, vomiting, abdominal discomfort, dark urine, weakness, loss of appetite, yellowing of the eyes and skin (jaundice), and a bloated or swollen abdomen. Hepatitis B is preventable through vaccination, which is safe, effective, and recommended for all infants within 12–24 hours of birth, as well as for children, adolescents, and unvaccinated adults. Additional preventive measures include avoiding contact with contaminated blood, not sharing sharp objects or using unsterilized equipment, limiting sexual partners, practicing safe sex, and ensuring that infected pregnant women are identified early and treated to prevent mother-to-child transmission.

Knowledge of Hepatitis B and its vaccines

The interviews with the local population, the nursing mothers, hospital workers showed that many of them confirmed that there are limited vaccines available in their area, while some said; they are not properly informed about the 24hrs HepB-BD vaccine. Few of them attributed the barrier as experience and perceptions of mothers, healthcare providers, and community members regarding HepB-BD vaccination. One woman told me about the stigma associated with HBV, and traditional practices that impact HepB-BD uptake. Could these be the factors influencing uptake of the HepB-BD.? This is a call for enhancing public awareness campaigns to educate communities about HepB-BD. Some Healthcare workers also complained about non availability of the vaccines to private hospitals as it is in the Primary Health Centers, owing to the fact that, they do not actually care more

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about the HepB-BD. This posture does not work in line with stipulated WHO guidelines 2024, and National guideline for the prevention, care and treatment of viral Hepatitis B and C in Nigeria.

The cell phone interview reported that some of the Matrons /Nurses said "vaccines are not kept in labor ward, and are not accessible at all time, because most of the Primary Health centers has a particular day in a week for immunization. If the birth of infant happened on the day that is not immunization, the HepB-BD vaccines will be difficult to be administered within 24hours of birth while face to face interview with the selected respondents reveled that most of the pregnant women confirmed having knowledge of hepatitis B birth-dose, but do not know the actual period HepB-BD supposed to have been given after birth, while some do not have idea what HepB-BD is all about, and further said that, their baby will be protected by God, as he/she is in the hands of God.

Table 1, 2, 3, 4 and 5 discuss the number of infants born, vaccinated, born at private hospital/ home delivery, completed second and third doses of the vaccines against HBV at PHC in Plateau State from 2020 – 2024 respectively.

Table 1: The number of infants born at PHC in Plateau State from 2020 to 2024:

LGA	**2020**	**2021**	**2022**	**2023**	**2024**
BARKIN LADI	2345	164	131	238	227
BASSA	1577	655	709	987	1028
BOKKOS	902	390	301	238	277
JOS EAST	1063	267	337	321	330
JOS NORTH	2638	861	2210	3935	3582
JOS SOUTH	2928	886	843	818	3040
KANAM	610	287	445	564	417
KANKE	939	373	447	69	143
LANGTANG NORTH	896	203	345	322	507
LANGTANG SOUTH	817	187	201	123	186
MANGU	6198	2016	2110	1402	1459
MIKANG	461	183	259	98	127
PANKSHIN	1329	363	1049	886	592
QUA'AN PAN	2349	512	645	515	633
RIYOM	938	639	650	492	752
SHENDAM	2435	736	820	465	410
WASE	502	76	28	37	23
TOTAL	**28927**	**8798**	**11532**	**11510**	**13733**

Source Field Survey (2025)

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Table 2: The number of infants vaccinated in Plateau State from 2020 t0 2024.

LGA	2020	2021	2022	2023	2024
BARKIN LADI	5328	5092	7595	6674	7130
BASSA	6638	5496	7030	7936	8657
BOKKOS	5082	4902	6016	4780	5245
JOS EAST	2181	2221	2124	1935	2589
JOS NORTH	18300	12789	17849	17518	18886
JOS SOUTH	9203	9651	12400	10056	12122
KANAM	3631	6294	8150	7147	8739
KANKE	2900	3042	3532	2882	3180
LANGTANG NORTH	4616	3686	4241	3905	6017
LANGTANG SOUTH	3513	3856	3953	3471	3640
MANGU	9053	8059	11165	8609	8644
MIKANG	2882	2390	2482	2069	2682
PANKSHIN	4023	4357	4083	4304	4406
QUA'AN PAN	6810	5788	7267	8306	7679
RIYOM	3350	3517	4075	3452	3538
SHENDAM	7362	6255	6788	9040	9016
WASE	3922	3730	5075	5703	7011
TOTAL	98794	91125	113825	107787	119181

Source Field Survey (2025)

Table 3: The number of Infants born at Private Hospital/ Home Delivery in Plateau State.

LGA	2020	2021	2022	2023	2024	**TOTAL**
BARKIN LADI	2983	4928	7464	6436	6903	**28714**
BASSA	5061	4841	6321	6949	7629	**30801**
BOKKOS	4180	4512	5715	4542	4968	**23917**
JOS EAST	1118	1954	1787	1614	2259	**8732**
JOS NORH	15662	11928	15639	13583	15304	**72116**

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JOS SOUTH	6275	8765	11557	9238	9082	**44917**
KANAM	3021	6007	7705	6583	8322	**31638**
KANKE	1961	2669	3083	2813	3037	**13563**
LANGTANG NORTH	3720	3483	3896	3583	5510	**20192**
LANGTANG SOUTH	2696	3669	3752	3348	3454	**16919**
MANGU	2855	6043	9055	7207	7185	**32345**
MIKANG	2421	2207	2223	1971	2555	**11377**
PANKSHIN	2694	3994	3034	3418	3814	**16954**
QUA'AN PAN	4461	5276	6622	7791	7046	**31196**
RIYOM	2412	2878	3425	2960	2786	**14461**
SHENDAM	4927	1111	5968	8575	8606	**29187**
WASE	3420	3654	5047	5666	6988	**24775**
TOTAL	**69,867**	**77,919**	**102,293**	**96,277**	**105,448**	**451,804**

Source Field Survey (2025)

Table 4: The Newborns that completed second dose vaccines against HBV

LGA	2020	2021	2022	2023	2024	TOTAL
BARKIN LADI	4	-	-	-	-	4
BASSA	38	-	-	-	-	38
BOKKOS	16	-	-	-	-	16
JOS EAST	6	-	-	-	-	6
JOS NORTH	120	-	-	-	-	120
JOS SOUTH	17	-	-	-	-	17
KANAM	19	-	-	-	-	19
KANKE	61	-	-	-	-	61
LANGTANG NORTH	126	-	-	-	-	126
LANGTANG SOUTH	-	-	-	-	-	-
MANGU	24	-	-	-	-	24
MIKANG	15	-	-	-	-	15

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PANKSHIN	6	-	-	-	-	6
QUA'AN PAN	23	-	-	-	-	23
RIYOM	-	-	-	-	-	-
SHEMDAM	-	-	-	-	-	-
WASE	173	-	-	-	-	173
TOTAL	648	0	0	0	0	648

Source Field Survey (2025)

Table 5: The Newborns that completed third dose vaccines against HBV

LGA	2020	2021	2022	2023	2024	**TOTAL**
BARKIN LADI	31	-	-	-	-	**31**
BASSA	36	-	-	-	-	**36**
BOKKOS	-	6	-	-	-	**6**
JOS EAST	12	-	-	-	-	**12**
JOIS NORTH	10	-	-	-	-	**10**
JOS SOUTH	108	17	-	-	-	**125**
KANAM	12	-	-	-	-	**12**
KANKE	-	-	-	-	-	**-**
LANGTANG NORTH	92	54	-	-	-	**146**
LANGTANG SOUTH	1	-	-	-	-	**1**
MANGU	68	-	-	-	-	**68**
MIKANG	53	-	-	-	-	**53**
PANKSHIN	32	-	-	-	-	**32**
QUA'AN PAN	22	-	-	-	-	**22**
RIYOM	-	-	-	-	-	**-**
SHENDAM	48	-	-	-	-	**48**
WASE	190	-	-	--	-	**190**
TOTAL	**715**	**77**	**0**	**0**	**0**	**792**

Source Field Survey (2025)

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Considering the facts that many families from the rural areas in Plateau State come from poor background, and most of them prefer having their babies at home without recourse to consequences of complications that may arise.

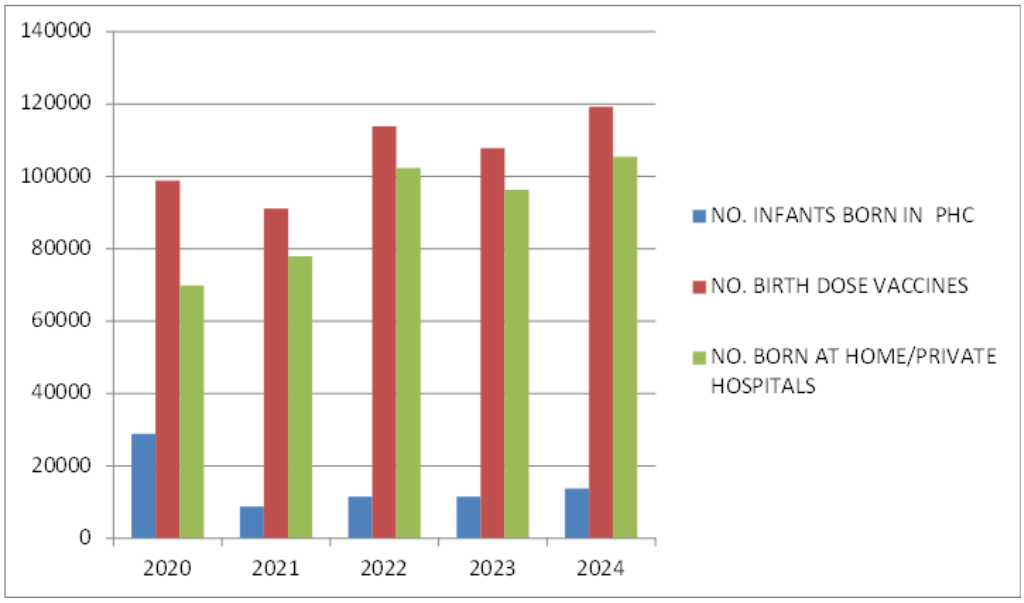
Comparing Table 1, 3, in 2020, 61.17% of newborns was delivered at Home delivery/private Hospitals while only 38.83% was delivered at Primary Health care centers in the State. 2021, 88.19% was delivered at Home delivery/Private Hospitals while only 11.81% was delivered at PHC in Plateau State. In 2022 too, 84.52% was also delivered at Home delivery/Private Hospitals while only 15.45% was at Primary Health care Centers. 2023, 84.55% was through Home delivery/ private hospitals, and 15.48% was through Primary healthcare centers. And 2024, 81.58% was Home delivery/Private Hospitals while 18.42% was Primary Healthcare Centers.

The number of Newborns that was delivered at Home delivery/Private Hospitals is far higher than the number of Newborns delivered at Primary Healthcare Centers in the State from the period under review. This is an indication that many Women preferred having their Babies born at Private Hospitals than the Primary Heath care Centers that is being managed by government.

Though, the Private Hospitals do refer the Newborns to Primary Healthcare Centers for HepB-BD vaccines, because non availability of vaccines at private hospitals, or because at PHC, it is less cost of total free as Government subsidized the cost. The problem with this arrangement from Private Clinics is that, in most cases, the 24hours stipulated for the vaccines to Newborns are not always maintained, therefore creating gap for HBV to infect the Newborns at will. This should be followed with proper orientation and training to Private Clinics Health workers, as well the Primary Healthcare workers to be on the same slate for preventing spread of the HBV.

The State Government should liaise with the Private Hospital on the need to supply these vaccines to them so that the life of the Newborn can be saved from HBV.

Using Bar Chart To Analyse The Table 1,2 And 3.



The percentage of HepB-BD from 2020 to 2024 shows a rise and fall of the activities which ought to have been on increased considering the facts that, the population in the State is increasing.

In 2020 = 18.62%

2021 = 17.17%

2022 = 21.45%

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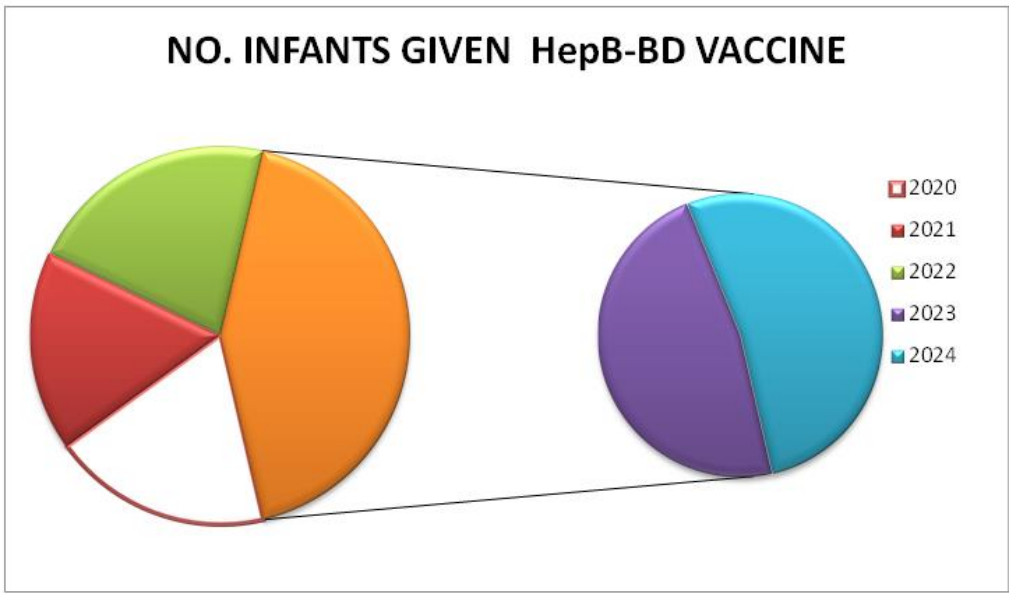
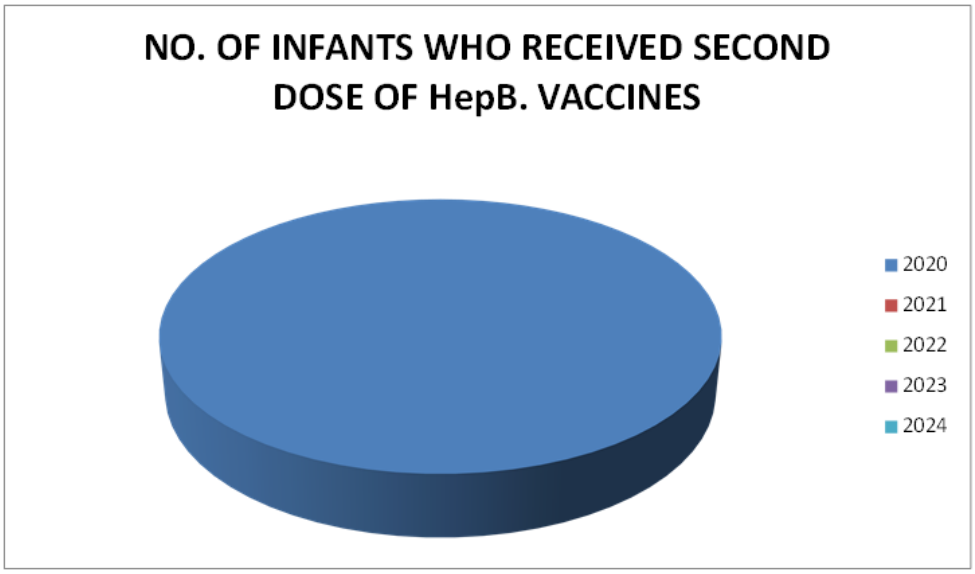
2923= 20.31 %

2024 = 22.45 %



The Jos North Local Government Area has the highest number of Women who delivered their Babies and was given HepB-BD vaccines, while Jos East Local Government Area has the lowest number of Infants given HepB-BD vaccines in the State. The Wase Local Government Area has the lowest number of delivery among women the State. Jos North Local Government seems to understand the policy on HepB-BD than other Local Government Areas.

Table 4, shows the second dose of HepB-second dose at 6 week after delivery, the researcher found out that in year 2020, the records for the activities on vaccines shown that only 648 infants received vaccines , and from 2021 to 2024, no records or proof of Infants reviewed the second dose vaccines. Questions were asked on why there are no records, and the answers from Primary Healthcare Workers were that, “many Women do not bring their Infants to Clinic for second dose vaccination after the first dose”. From the record, only 0.2% of Infants received second dose vaccines in 2020, and from 2021 to 2024 is 0%, which is too poor. This is also a proof that many Women need sensitization on the needs to get their Infants complete HepB vaccination.



The table 5, shown the level of vaccinations of Infants within 10 weeks after birth as third dose from 2020 t0o 2024 in Plateau State of Nigeria.

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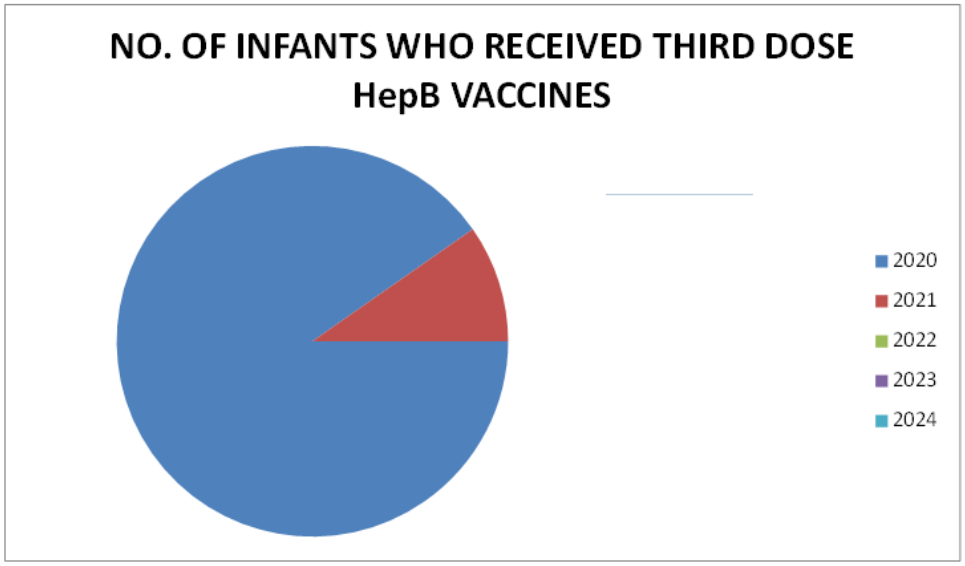
In 2020 and 2021 have 715 and 77 Infants which represent 0.13% and 0.014% respectively, while from 2022 to 2024 have 0%.

There are a lot of gap between the knowledge of second and third dose Hepatitis B vaccines among the Women in Plateau State that needs urgent attention. This could be attributed to access barriers limitation on vaccines broad use, not well informed about the second and third does, limited cold chain storage, lack of adequate trained community health workers, unearth attitude of some women towards vaccines and financial constraint



Chi-Square Test of Independence Variables of the PHC and Private/Home births across LGAs (2020 - 2024)

The study further subjected the data between PHC and Private/Home births across LGAs (2020 - 2024) to show relationship of the two variables. The combined results showed Chi-square statistic (χ^2) = 16,633.54, Degrees of freedom (df) = 16 and p-value = 0.000… (≈ 0). This was done on LGA bases as shown in Table …

This means that since the **p-value < 0.05**, there is a **highly significant difference** in the distribution of births between **PHC deliveries** and **Private/Home deliveries** across LGAs in Plateau State as well as the **uptake of PHC vs. Private/Home delivery is not uniform across LGAs**. It indicates that some LGAs rely much more on PHC, while others rely heavily on private/home births as shown the chi-sqaure **standardized residuals** which show where the biggest differences lie between PHC vs. Private/Home births across LGAs (see Table)

Table: Chi-square Test of Independence by LGA, Plateau State (2020–2024)

LGA	χ^2 Value	df	p-value	Interpretation
Barkin Ladi	8543.64	4	<0.0001	Significant
Bassa	687.90	4	<0.0001	Significant
Bokkos	831.79	4	<0.0001	Significant
Jos East	1283.25	4	<0.0001	Significant
Jos North	1721.44	4	<0.0001	Significant
Jos South	4047.11	4	<0.0001	Significant
Kanam	712.00	4	<0.0001	Significant

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Kanke	1483.77	4	<0.0001	Significant
Langtang North	576.81	4	<0.0001	Significant
Langtang South	1310.60	4	<0.0001	Significant
Mangu	8762.96	4	<0.0001	Significant
Mikang	288.61	4	<0.0001	Significant
Pankshin	1002.93	4	<0.0001	Significant
Qua'an Pan	3476.49	4	<0.0001	Significant
Riyom	259.57	4	<0.0001	Significant
Shendam	4449.53	4	<0.0001	Significant
Wase	1915.74	4	<0.0001	Significant

Source: Field Survey (2025)

Chi-Square Standardized Residuals Variables of the PHC and Private/Home births across LGAs (2020 - 2024)

LGA	PHC Residual	Private Residual	Interpretation
Barkin Ladi	-20.85	+8.46	Far fewer PHC births than expected; strong preference for private/home births.
Bassa	-1.48	+0.60	Small deviation, not significant.
Bokkos	-25.96	+10.54	Strong underuse of PHC, overuse of private/home.
Jos East	+19.06	-7.74	Much higher PHC reliance than expected.
Jos North	+10.43	-4.23	More PHC births than expected.
Jos South	+10.94	-4.44	More PHC births than expected.
Kanam	-35.83	+14.55	Heavy reliance on private/home deliveries.
Kanke	-4.86	+1.97	Mildly fewer PHC births.
Langtang North	-16.08	+6.53	Strong private/home preference.
Langtang South	-21.44	+8.71	Strong private/home preference.
Mangu	+83.96	-34.09	Extremely strong reliance on PHC (the biggest positive deviation).
Mikang	-15.26	+6.20	Private/home preference.
Pankshin	+22.32	-9.06	Strong PHC preference.

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Qua'an Pan	-5.90	+2.40	Slight private/home preference.
Riyom	+18.51	-7.52	Strong PHC reliance.
Shendam	+0.66	-0.27	No meaningful deviation.
Wase	-48.91	+19.86	Very strong private/home reliance.

Source: Field Survey, (20

The PHC and Private residuals show that Mangu is the biggest outlier with far more PHC births than expected**,** Wase and Kanam stand out for very strong reliance on private/home deliveries while Bokkos, Barkin Ladi, Langtang South, and Mikang also lean heavily toward private/home births. Jos East, Jos North, Jos South, Pankshin, and Riyom on the other hand show significantly higher PHC use.

Findings:

a. Many women do not know more about Hepatitis B, mode of transmission, preventive measures, and HepB-BD vaccines.

b. A lot of Health Workers (Matrons, Nurse) does not know the period to be given HepB-BD. Some said within 72hrs, some said within the same week, while others said for few days. Only few of them confirmed that is within 24hrs of birth, as some do not know the Nigerian guideline for viral Hepatitis B and C vaccination.

c. Those who give birth at Private Hospitals and at Home are 10 times more than those who give birth at Primary Health care facilities.

d. Many Primary Health care Centers do not have qualified personnel, and some who have needs more manpower to carter for the number of patients.

e. Many Private Hospitals do not give vaccines; rather they refer the Newborns to Government facilities for vaccination.

f. There was not adequate information or record concerning the second dose and third dose vaccines given to Infants within 6 weeks and 10 weeks after birth.

g. The HepB-BD vaccines are not available at the delivery ward rooms, in almost all the facilities, and many Private Hospitals where over 80% of women delivered do not have the HepB-BD vaccines.

h. Most Health workers lack basic knowledge on Hepatitis viruses.

RECOMMENDATIONS

a. There should be refreshers training among the Health workers at least 2 persons from each Primary Healthcare Centers (1236) across the State.

b. The Private Hospitals should also be sensitized and trained on HepB-BD vaccines within the State.

c. There should be aggressive awareness campaign within the Seventeen (17) Local Government of the State, so that those Women in the rural Areas will be acquainted with HepB-BD vaccines.

d. The HepB-BD vaccines should be placed in every delivery ward, so that the vaccines will always be at hands for vaccination.

e. The Private Hospital should be giving subsidies vaccines so that it will also be available at their facilities.

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