*Original Research Article*

# Barriers to Timely Administration of Hepatitis B Birth Dose Vaccine to Neonates of Mothers With Hepatitis B in Ghana: Midwives' Perspectives

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**Charles Ampong Adjei, PhD, MPH, RN[1], Damasus Suglo, MSC, RN[2], Alfred Yanful Ahenkorah, MPhil, RN[3], Shannon E. MacDonald, PhD, RN[4] and Solina Richter, PhD, RN[5]**

## Abstract

**Background:** The global health sector strategy on viral hepatitis aims to reduce new hepatitis B infections by 90% by 2030. Yet, hepatitis B birth dose (HepB-BD) vaccination, which is effective in preventing mother-to-child transmission of hepatitis B, remains low in sub-Saharan Africa. Given the essential role that midwives play in infants' birth dose immunisation, we explore their perspectives on the reasons for delays and non-administration of HepB-BD to eligible neonates in Ghana.

**Methods:** We conducted interviews with 18 midwives, stratified by region (Greater Accra and Northern regions). Participants were selected purposively. The data were transcribed, coded, and analysed following the Braun and Clarke data analysis procedure.

**Results:** The participants conveyed a broad range of barriers to HepB-BD vaccination in Ghana. These include the mother's denial of hepatitis B seropositivity; the mother's ignorance of the impact of hepatitis B on their newborn; partners' non-involvement in post-test counselling; and the high cost of hepatitis B immunoglobulin and hepatitis B monovalent vaccine. Other reasons included vaccine unavailability and midwives' oversight and documentation lapses.

**Conclusion:** We recommend educating expectant mothers on the importance and effectiveness of HepB-BD vaccination during antenatal care (ANC) visits, as well as educating midwives on HepB-BD vaccination procedures. In addition, ensuring sufficient supplies and administering hepatitis B vaccines in the delivery ward should be done to guarantee that babies receive the vaccines on time. Importantly, Ghana needs policies that require HepB-BD vaccination as part of the Expanded Programme on Immunisation (EPI) to ensure the investments and funding it needs.

## Keywords

hepatitis B birth dose vaccine, barriers, neonates, Ghana

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## Introduction

Nearly 296 million people are chronically infected with hepatitis B, with an annual mortality of 820,000 globally (World Health Organization [WHO], 2022). Comparatively, the burden of hepatitis B in Africa is higher than in areas such as the Americas (Spearman et al., 2017; WHO, 2022). In Africa alone, about 60 million people are estimated to have hepatitis B viral (HBV) infection (WHO, 2020), and a higher proportion of these people reside in Central and Western Africa (WHO, 2017b). As part of the global response toward the elimination of viral hepatitis by 2030, WHO has adopted a global strategy to reduce new HBV infection by 90% and death by 65% through immunisation, prevention of mother-to-child transmission (MTCT), blood

[1]Department of Public Health Nursing, University of Ghana, Legon, Ghana
[2]Tamale Teaching Hospital, Tamale, Ghana
[3]Shai Osudoku District Hospital, Accra, Ghana
[4]Faculty of Nursing, University of Alberta, Edmonton, Canada
[5]College of Nursing, University of Saskatchewan, Saskatoon, Canada

**Corresponding Author:**
Charles Ampong Adjei, Department of Community Health Nursing, University of Ghana, Legon, Ghana.
Email: chadjei@ug.edu.gh

and injection safety, harm reduction services, and increased testing and treatment.

MTCT is the predominant route of HBV transmission in Africa (Moturi et al., 2018; WHO, 2022). The high prevalence of HBV (i.e., >10%) among pregnant women in Ghana, a West African country, underscores the need to implement interventions capable of interrupting the transmission cycle. Given the high infectivity of HBV (Franco et al., 2012; Trépo et al., 2014; WHO, 2019), early detection of the virus through screening especially during pregnancy is recommended (Terrault et al., 2018). Detection of hepatitis B during pregnancy is considered critical because 80–90% of infants exposed to the virus early in life (i.e., first year) may develop chronic infection, and complications such as liver cirrhosis, liver cancer, and liver failure later in life (Cheung & Lao, 2020). Besides, the hepatitis B infected female child may serve as a reservoir for onward transmission of the infection to their future children (Cheung & Lao, 2020).

Effective vaccines against HBV exist and have been shown to prevent MTCT of HBV when administered to newborns of mothers with HBV within 12 hours after birth (Yi et al., 2016). Timely administration of hepatitis B birth dose (HepB-BD) followed by a three-dose infant-vaccination series is considered the most effective intervention (Chen et al., 2020), especially in sub-Saharan Africa (Dionne-Odom et al., 2018). About 75–90% of hepatitis B infections can be averted following neonatal immunisation with either hepatitis B vaccine alone or in combination with hepatitis B immunoglobulin (Chen et al., 2012; Yi et al., 2016). However, studies have shown that delivery of HepB-BD vaccination is not universal in Africa (Tamandjou et al., 2017). This is supported by a study in Zambia where in a sample of 10,851 children, only 1.1% received HepB-BD vaccination, with 5.4% receiving the vaccine by day seven (Miyahara et al., 2016).

Several factors act as a barrier to the timely administration of HepB-BD vaccination (Moturi et al., 2018; Okenwa et al., 2020). Piltch-Loeb and Diclemente (2020) in defining their vaccine uptake continuum outlined five inter-related factors that tend to influence vaccine uptake. These factors include awareness of health threats, availability of the vaccine, accessibility of the vaccine, affordability of the vaccine, and acceptability of the vaccine (Piltch-Loeb & Diclemente, 2020). In countries other than Ghana, barriers such as lack of integration of HepB-BD as part of newborn care, lack of daily vaccination services, lack of standard operating procedures, and inadequate healthcare providers' knowledge on prevention of MTCT of hepatitis B are well documented (Moturi et al., 2018; Mutyoba et al., 2021). For example, a study conducted in Nigeria found maternal knowledge and delivery at a facility offering routine immunisation as predictors of HepB-BD uptake (Okenwa et al., 2020). Also, inadequate education of midwives and time constraints at the workplace have been identified as barriers to uptake f immunisation more broadly (Frawley et al., 2020). However, it remains unclear whether these findings are generalisable to a Ghanaian context.

Although MTCT of HBV still occurs in Ghana (Hambridge et al., 2019), administration of hepatitis B birth-dose vaccine is not mandatorily ensured (Adjei et al., 2020; Awuku & Yeboah-Afihene, 2018; Adjei et al., 2016). Currently, hepatitis B vaccination (i.e., pentavalent vaccine) is routinely provided as part of the Expanded Programme on Immunisation (EPI) for newborns at 6, 10, and 14 weeks after birth (Adjei et al., 2016; Cho et al., 2012), but not routinely provided at birth. This schedule raises a concern about the vulnerability of newborns to hepatitis B positive mothers within the first 6 weeks of birth.

It is worth noting that several health facilities in Ghana have instituted measures to offer HepB-BD to neonates of mothers with HBV infection (Adjei et al., 2016, 2020). In this regard, the role of midwives in ensuring timely administration of HepB-BD cannot be ignored (Frawley et al., 2020), based on the evidence that mothers with hepatitis B and their newborns spend the first 12 hours after birth in the maternity unit under the supervision of midwives (Adjei et al., 2016). However, the previous study that was done in Ghana on preventive practices of midwives toward vertical transmission of HBV found late or no administration of HepB-BD to newborns of mothers with HBV (Adjei et al., 2022). This present study was therefore designed to explore the perspectives of midwives on reasons that account for the delayed or lack of administration of HepB-BD to eligible newborns in Ghana. Understanding this phenomenon is important, as the findings can inform the design of effective interventions that can contribute to the prevention of MTCT of HBV in Ghana.

## Methods

### *Study Design and Setting*

We employed an exploratory qualitative design given that little is known about the phenomenon in the study context. The midwives were recruited from a mission hospital and a government-owned hospital in the Greater Accra and Northern regions of Ghana, respectively. The two hospitals provide 24-hour maternity services (i.e., antenatal care [ANC], delivery services, and post-natal care). Ethics approval was provided by the Noguchi Memorial Institute for Medical Research Institutional Review Board (Protocol No. NMIMR-IRB CPN 050/19-20).

### *Participants and Recruitment*

In total, 18 midwives participated in the study. A purposive sampling technique was used in recruiting the participants. Midwives were included if they had assisted or cared for mothers with HBV and their newborns in labour or post-partum ward for at least 6 months. We excluded midwives

who were on national service placement because they may not have sufficient information on the topic being explored.

Data were collected between January and March 2020. To recruit the midwives, the research assistant visited the maternity departments of the facilities. The midwives in-charge were briefed on the purpose of the study and their assistance to recruit eligible participants. Midwives who met the inclusion criteria were contacted in their respective units and were also briefed on the study aim, the voluntary nature of the study, and measures put in place to ensure confidentiality of their information. Overall, 18 midwives were recruited because data saturation occurred after the 16 participants. Of the 18 participants, ten were recruited from the selected hospital in the Greater Accra Region, and the remaining eight were from the hospital in the northern region. Three of the midwives contacted later refused to participate in the study. Of these, two cited time constraints because they were the only staff on duty monitoring pregnant women in labour and the other declined to give a reason for refusal.

### Research Instrument

A semi-structured interview guide was developed based on related literature (Moturi et al., 2018; Okenwa et al., 2020) and reviewed by a qualitative research method expert (SR). The topics explored during the interviews with the midwives included (1) the services they provide for women with hepatitis B who access maternity care in their hospitals, (2) the information they share with women with hepatitis B during ante-natal care regarding the prevention of MTCT, specifically on HepB-BD, (3) whether birth dose vaccines (either hepatitis B immunoglobin and/or hepatitis B vaccines) are given to every newborn of mothers with hepatitis B and (4) if no, what acts as barriers to the administration of the HepB-BD.

### Data Collection

Prior to the commencement of the interviews, informed consent was signed by each of the participants. Face-to-face interviews were conducted at the staff stations by the principal investigator (CAA) and the research assistants (AYA, DS) supported with the setting up of the data collection fields. The staff stations were enclosed to ensure privacy. The interview was audio-recorded with the participant's permission and field notes were taken during the interviews. Each interview lasted between 45 minutes and 1 hour. All the interviews were conducted in English.

### Data Processing and Analyses

Data were processed with QSR Nvivo version 12.0. Braun and Clarke's (2006) procedure for data analyses was followed. First, verbatim transcription of the interviews was done by the research assistants and confirmed by the first author (CAA). Second, two of the transcripts from the midwives were coded by the first and last authors (CAA and SR), followed by discussions on the specific codes. Third, codes were collated into potential themes, and those that differed were discussed until a consensus was reached between the first and the second author (CAA and SR). Changes were documented throughout the process.

### Rigor

Four criteria were adhered to in order to ensure rigor. These include credibility, dependability, confirmability, and transferability. To ensure credibility, various strategies, including prolonged engagement of participants and member checking, were adopted (Johnson et al., 2020). We shared the preliminary findings with two representatives of the midwives to validate if they were consistent with their own experiences. Dependability and confirmability were ensured by describing the research process in detail and keeping field notes as well as voice records. Reflexivity was ensured by the researchers' consciousness of their own biases and personal beliefs about the phenomenon (Korstjens & Moser, 2018).

## Results

Eighteen midwives participated in the study. The participants' age ranged from 24 to 46 years. Almost all of them had worked in the delivery ward and the post-partum ward between 3 and 24 years. Two themes and five sub-themes emerged. The themes include maternal-related factors and health system-related factors. Table 1 presents the summary of themes and sub-themes and Table 2 presents the sociodemographic characteristics of the participants.

### Maternal-Related Factors

Three sub-themes emerged from the data. These include (1) mother's denial of hepatitis B seropositivity; (2) mother's ignorance of the impact of hepatitis B on their newborn; (3) partners' non-involvement in post-test counselling; and (4) high cost of hepatitis B immunoglobulin and hepatitis B monovalent vaccine.

**Table 1.** Summary of Themes and Sub-Themes.

| |
|---|
| *Maternal-related factors* |
| • Denial of hepatitis B seropositivity |
| • Mother's ignorance of hepatitis B's effect on the newborn |
| • Male partners' non-involvement in post-test counselling |
| • Financial accessibility |
| *Health system-related factors* |
| • Vaccine availability |
| • Oversight and documentation lapses |

**Table 2.** Socio-Demographic Data of Participants.

| Pseudonyms | Age | Location | Year of practice |
|---|---|---|---|
| Midwife | 24 | South | 3 |
| Midwife | 35 | South | 7 |
| Midwife | 38 | South | 9 |
| Midwife | 25 | South | 3 |
| Midwife | 36 | South | 12 |
| Midwife | 46 | South | 24 |
| Midwife | 30 | South | 5 |
| Midwife | 29 | South | 5 |
| Midwife | 26 | South | 3 |
| Midwife | 34 | South | 9 |
| Midwife | 24 | North | 3 |
| Midwife | 40 | North | 14 |
| Midwife | 32 | North | 4 |
| Midwife | 30 | North | 4 |
| Midwife | 38 | North | 9 |
| Midwife | 36 | North | 10 |
| Midwife | 27 | North | 3 |
| Midwife | 31 | North | 5 |

*Mother's Denial of Hepatitis B Seropositivity.* Several participants noted that some mothers who have been diagnosed with hepatitis B denied the positive status. The mother's inadmissibility was reported to affect their decision on whether or not to arrange for a HepB-BD vaccine for the newborn. According to the reports, mothers who do not accept their positive status generally cause a delay in vaccine arrangement and administration.

> '*Some women refuse to accept the fact that they have the condition* (hepatitis B) and therefore do not deem it necessary to get the hepatitis B vaccine for their babies'. **(Midwife, South)**

> 'Most of the mothers, I don't know if its ignorance or illiteracy will not even accept that they are hepatitis B positive even when you show them the laboratory result. Those women hardly agree to buy the vaccine for their newborns. It takes a lot of talking before they agree to our suggestion to buy the vaccine'. **(Midwife, North)**

One probable reason that reportedly accounts for the denial of the women's hepatitis B status is the widespread belief that promiscuity is the primary source of hepatitis B infection. This comes as a result of women's lack of identification with such act, making it difficult to accept the result. Interestingly, several women stated that they rely on their husband's negative hepatitis B status to justify their denial of the diagnosis.

> '*They* (the mothers) *believe that all such communicable diseases are acquired through promiscuity and then they tell you that they are faithful to their partners and that their partners are not having it so there is no way they can acquire such an infection*'. **(Midwife, South)**

Additionally, some mothers who initially agreed to purchase the hepatitis B vaccine following counselling at the ANC later claim to be negative after delivery. One of the most frequently cited reasons is faith healing following prayer from a pastor or spiritualist. Reportedly, mothers are disincentivised from purchasing the hepatitis B vaccine after birth due to their belief in spiritual healing.

> 'Some mothers are informed, and they send it to a prayer camp to pray over the condition and then they will end up refusing the fact that they have the condition. Once they believe that the infection is gone, they don't see the reason why they must get a vaccine for the baby. It's one of the most difficult issues we are facing. Even when you show them the laboratory result, they don't want to accept it'. **(Midwife, North)**

*Mother's Ignorance of Hepatitis B's Effect on the Newborn.* A number of the participants indicated that some mothers with HBV lack an understanding of the aetiology of hepatitis B, specifically the possibility of neonatal complications. In other words, they consider hepatitis B as a common disease that does not require specific intervention beyond the mother. Most mothers were reported to be unenthusiastic about the implications of HBV MTCT, as shown in the quotes below.

> 'In fact, the mothers don't know the effect or how great the infection can be. They just see it as a normal Malaria, and so they don't really care about what we tell them. Some of them even doesn't understand why it is important to get the birth dose vaccine for the baby. It is indeed a worrying situation'. **(Midwife, North)**

> '*For others, you can see that they don't really care. They see it as an ordinary infection with no consequences for the baby. Even after the education, they don't show any sign of seriousness to get the vaccine for the baby. It takes the mothers more than a day to agree with what we tell them. As you know, the more they delay in getting the vaccine, the less effective the vaccine becomes in achieving its purpose*'. **(Midwife, South)**

Despite the importance of education in the mothers' decision-making process, some participants admitted that less time was spent with pregnant mothers discussing the importance of the birth dose vaccine, a phenomenon they believed could be one of the reasons for the mothers' delayed acquisition of the vaccine. Unlike in the case of HIV/AIDS, all participants stated that pre-test and post-test counselling are not integrated into the healthcare system.

> 'Sincerely, I think that we are not good at sharing detail information on hepatitis B with the mothers. That to me explains why they do not attach much importance to the vaccine'. **(Midwife, North)**

'*Unlike the HIV patients that we provide proper counselling for them, patients with hepatitis B are not given the same attention in this hospital. Our counselling unit is only for patients with HIV and those who want to get family planning but do not target people with hepatitis B*'. **(Midwife, South)**

*Male Partners' Non-Involvement in Post-Test Counselling.* A number of the midwives stated that the spouses of mothers with HBV are frequently absent from ANC and hence do not benefit from post-test counselling. According to the midwives, this does not give the partners the opportunity to understand the necessity of the HepB-BD vaccination for the newborn. Notably, men are the principal breadwinners in the majority of Ghanaian communities, and their engagement in decision-making that affects the cost of medical care cannot be ignored. Almost all midwives cited a lack of partner participation in ANC, specifically post-test counselling, as one of the major reasons for the delay in HepB-BD administration.

'*The problem is that their husbands do not accompany them to the ANC. As you know, the husbands are the breadwinners, providing for the home. But we only see them when the mothers are here to deliver and at that time it becomes difficult for them to afford the vaccines for the baby. Some of these difficulties would have been solved if the husbands were coming for ANC with their wives to benefit from the counselling we give*'. **(Midwife, North)**

'Education is also one of the keys especially educating the woman and the partner. Usually, we take only the women and we do not add the partners so I think that is also another issue because if we can get the woman and the partner together, and educate them on it, I think that will also help a lot'. **(Midwife, North)**

Some midwives mentioned that they often call the partners of mothers with HBV to emphasise the importance of arranging for the HepB-BD vaccine for their newborns during the ANC period. Some claim that their efforts to reach out to the mothers' partners have yielded positive results.

'Sometimes we would have to call their husbands ourselves to counsel them why it is necessary to get the vaccine for the baby as soon as the mother delivers. If the husband is enlightened or much interested in the health of the newborn, then we pick it up from there but if they are not then that is it. We leave it as such'. **(Midwife, North)**

'….. After I explained the importance of the vaccine to the husband, he went about soliciting funds from her family and friends. Although it took her more than 24 hours to realise the amount, he finally came to the hospital with the money and eventually got the vaccine and the immunoglobulin for the baby. This particular patient had a high risk of transmitting the infection to the newborn because the envelop antigen was positive and that was my major concern'. **(Midwife, South)**

*Financial Accessibility.* The exorbitant price of hepatitis B immunoglobulin and hepatitis B vaccine has been identified as a significant barrier to timely HepB-BD administration. According to the midwives, the cost of immunoglobulin ranges from GHC 600 ($75) to GHC 800 ($100), depending on the supplier and the location of the health facility. In addition, the hepatitis B vaccine ranges in price from GHC 20 (≈$3) to GHC 30 (≈$4).

'The number one reason is the cost of the vaccine, yeah the cost, because currently is about GHC600.00 and the mother going to buy such a high-cost drug and aside from going to buy post-natal drugs is seen as a challenge. She wouldn't buy the hepatitis B vaccine but risk the baby's chances of infection. That's the primary challenge that we are faced with here'. **(Midwife 5)**

'*The cost of the immunoglobulin is expensive. I think the cost is about GHC700.00 to GHC1000.00 and most of them are farmers. Farmers that don't even send their food stuffs to the market but grow to eat it themselves. Obviously, the amount is too high for them to afford*'. **(Midwife 4)**

Earlier prompting by midwives, particularly during ANC, was said to give mothers some time to gather resources to purchase the vaccines before labour begins. However, those who are economically disadvantaged are unable to purchase the vaccine, regardless of the date of the prompt and reminders.

'The problem is that if you inform the family about the need for the vaccine within such a short time frame, the client will never get the vaccine but if it is earlier, they sometimes plan to work toward it. Except for those who are educated and gainfully employed that pays no matter when they are told, the majority are unable to do so'. **(Midwife, South)**

'Others genuinely cannot afford it although they were informed before labour. They will come and they will tell you they couldn't organize the amount needed for the immunoglobulin and the vaccine'. **(Midwife, North)**

Another factor exacerbating the problem is the late attendance at ANC by some of the mothers. According to the participants, women who report late are frequently unable to mobilise funds in time before labour begins. As a result, neonates born to these mothers do not benefit from HepB-BD. One problem is that mothers who can't get the vaccine for their babies are left unprotected.

'You know our people they don't come to antenatal at an early stage they mostly come during their second trimesters

25, 24 weeks. That short period how is she going to mobilize that Ghc 700 to buy the vaccine for the baby?' **(Midwife, North)**

'Those who complain of hardship and the cost of the drug, there is nothing we can do. If the client cannot get the vaccine and you cannot buy for the client, you just leave the client as it is'. **(Midwife, South)**

## *Health System-Related Factors*

Two sub-themes emerged: (1) vaccine availability and (2) midwives' oversight and documentation lapses.

*Vaccine Availability.* One of the key reasons for the delayed administration of HepB-BD is a lack of hepatitis B vaccine in health care facilities. Almost all of the participants stated that their facilities do not keep vaccines on hand for people who may require them. As a result, mothers with HBV or their relatives are expected to obtain their vaccines before the expected date of delivery. However, some hospitals have implemented an internal procedure coordinated by midwives to facilitate the supply of vaccines to mothers in need. Mothers, for example, are allowed to pay for the vaccine in installments before labour begins.

'*Here, we do not have the vaccine in stock. We often direct the mothers to get the vaccine from a pharmacy shop nearby or through other agents we know them to be dealing in vaccines*'. (**Midwife, North)**

'The client pays the money to the facility and the midwife goes for the vaccine or the supplier brings it to the pharmacy fridge. When a client delivers, a midwife again goes for the vaccine from the pharmacy. So the client does not even see it, the only time the client sees it is when it gets to the ward and we inform her that madam I am coming to give your baby the injection you bought'. **(Midwife, South)**

In one hospital, participants indicated that they frequently have one vaccine on reserve as a backup dose for clients who may forget to acquire the vaccine before delivery but may have money to get it immediately. According to the participants, this is to ensure timely acquisition and administration of the vaccine to neonates whose parents can afford the full cost at the time of delivery.

'…. Because the hospital does not store the vaccine but we the staff stock it on our own for the patients, we have a backup plan. We always have one vaccine available because we always have clients with such conditions. In case the clients with the money come, we use the one in stock and collect the money to buy a new one to replace the used one'. **(Midwife, South)**

However, one participant described an incident in which she generously supplied the vaccine to a patient who expressed a willingness to pay after the infant received the vaccination but did not follow through on her pledge. A lesson the participant regarded as extremely unpleasant, which ultimately resulted in her paying for the vaccine's cost.

'A client told me she didn't have the money, but money might get ready later after the delivery. I gave the available vaccine and after which taking the money back was hell if I should use it. Since then, if you have, I will give you but if you don't have I will just let you go because I don't want to incur the cost of paying back with my money. Now we have stopped giving it without full payment. If you have the vaccine or money, we give and if you don't have, we discharge you and your baby'. **(Midwife, South)**

*Oversight and Documentation Lapses by Midwives.* One of the reasons for the late or non-administration of HepB-BD is midwives' oversight or documentation lapses. According to the participants, some midwives forget to flag the hepatitis B status in the maternal health records. These documentation gaps hinder the tracking of HBV-positive mothers in delivery wards. A participant narrated an incident that occurred at one of the health facilities.

'The midwife at the ANC forgot to record the hepatitis B positive result in the patient's book. Apparently, the patient was not reminded throughout the contact she made with the midwives at the ANC, so she did not also see the importance of the test not talk of vaccine for the baby. It was after discharge, that is seven days after Caesarean section that she drew the attention of the midwife at the lying-in ward that she was told that she has hepatitis B virus at the ANC. We felt so bad for that missed opportunity to vaccinate the baby. Although sad, we only hoped that the baby won't be infected'. **(Midwife, South)**

'Is either the client didn't tell the midwife, or the midwife didn't ask the client if she is hepatitis B positive. It was later when the client came to deliver then we realize she was hepatitis B positive and usually because such a case should be indicated with red ink and the one did it with blue ink, it didn't draw the attention of the midwife'. **(Midwife, South)**

Several participants indicated that some mothers with hepatitis B choose not to inform midwives about their positive status during labour or immediately following delivery to avoid being questioned. This is considered to be a regular occurrence among those who are unable to arrange for the vaccine before birth.

'I have come into contact with a number of mothers who knew that they were hepatitis B positive and received

counselling on the need to obtain the vaccine for the unborn child before the delivery date but failed to do so and also failed to inform the midwives when labour started. Those persons often do that to avoid embarrassment from the midwives'. **(Midwife, North)**

## Discussions

Midwives in Ghana conveyed a broad range of maternal and health system-related factors that act as barriers to HepB-BD vaccination. The maternal-related barriers identified include the mother's hepatitis B status denial, mother's ignorance about the impact of hepatitis B on the neonate, non-involvement of male partners in post-test counselling following the mother's hepatitis B diagnosis and financial accessibility. In addition, vaccine availability, as well as oversight and documentation lapses by midwives, were reported as health system-related barriers.

First, we discovered that expectant mothers' denial of their hepatitis B status had a significant influence on their decision-making regarding vaccine acquisition for their newborns. One possible explanation is the commonly held stereotypical belief that hepatitis B results from sexual promiscuity (Adjei et al., 2017; Sasaki et al., 2013; Smith-Palmer et al., 2020). Notably, the expectant mothers who did not identify with the act of promiscuity ostensibly denied the positive result and hence did not consider themselves a source of infection to necessitate HepB-BD for their newborns. This is reflective of the fact that people's desire to obtain HepB-BD for their newborns is a function of their perceived risk to their contacts. Pregnant women must learn about the aetiology of hepatitis B and become aware of HepB-BD during ANC visits (Boisson et al., 2020).

Furthermore, the midwives claimed that most mothers were unaware of the implications of hepatitis B for their newborns. The primary complications, such as liver cirrhosis and liver cancer, which increase when newborns are exposed to HBV early in life, were not well understood by the mothers (WHO, 2022). The inadequate knowledge of the disease severity influenced the priority and investment that mothers placed in obtaining the HepB-BD vaccine. We relate this observation to healthcare providers' insufficient pre-test and post-test counselling on the efficacy and overall benefit of the HepB-BD vaccine (Kolbila et al., 2022). Prior evidence supports our contention that healthcare providers do not give adequate informational support to people with hepatitis B to make informed decisions about relevant interventions that could benefit them and their immediate contacts (Abraham et al., 2021; Chabrol et al., 2019; Wallace et al., 2011). This is of concern because the formal health care system and providers continue to be major sources of hepatitis-related information, particularly in Ghana. It is therefore critical to build healthcare practitioners' capacity on HepB-BD and its administration to increase their self-efficacy in counselling people with the infection.

Consistent with a prior study (Boisson et al., 2020), the high cost of hepatitis B immunoglobulin and the monovalent vaccine was identified as a major barrier to the timely delivery of HepB-BD. According to this study, the monovalent vaccine cost GHC 20 ($3) and the immunoglobulin cost GHC 800 ($100). Although the monovalent vaccine alone could be administered to newborns (WHO, 2022), particularly when the hepatitis B envelop antigen (HBeAg) is negative, we observed that the midwives insisted on getting the two vaccines from the mothers, which exacerbated the financial difficulties and resulted in the infant not receiving either vaccine. We feel that mothers should be provided with a more detailed explanation of the effectiveness of each vaccine in preventing MTCT of hepatitis B (Boisson et al., 2020). As part of their counselling messages to improve mothers' confidence in the vaccine, providers should use the success story of Taiwan, where administration of the HepB-BD contributed to a decrease in HBsAg from 9.8% in 1984 to 0.5% in 2014, as an example (Flores et al., 2022; Lu & Lu, 2020).

In addition to the high cost, the unavailability of the hepatitis B vaccine at health facilities was a significant barrier in this study, as previously documented in Africa (Boisson et al., 2020). Given that HepB-BD immunisation is not part of the Expanded Programme on Immunization (EPI) and facilities are not obliged to stock the vaccine for use, this observation is not surprising (Adjei et al., 2020). The few facilities that store vaccines have an arrangement with private suppliers to meet clients' demands. The absence of political will to adopt policies mandating HepB-BD vaccination is the main reason for the unavailability of vaccines in health facilities (Boisson et al., 2020). This is of concern since hepatitis B transmission from mother to child continues to occur in Ghana (Awuku & Yeboah-Afihene, 2018).

Midwife oversight and documentation lapses provide a unique barrier to the timely delivery of the HepB-BD vaccination identified in this study. Some midwives at the ANC who identified and diagnosed pregnant mothers with HBV forgot to record the positive result on the ANC card. As a result, it was difficult for the midwives on the delivery ward to identify the mothers who were positive in order to emphasise the need for the HepB-BD vaccination. This is a missed opportunity, especially in Ghana, where testing and diagnosis are frequently carried out at ANC. We believe that midwives could leverage the presence of the expectant mother's male partner to discuss the relevance of the HepB-BD, even if decisions have not been made regarding the arrangement of the vaccine at ANC. This opportunity is crucial because male partners frequently do not accompany their spouses to ANC but are available throughout labour. We would like to highlight that a well-structured process for testing, diagnosis, and tracking hepatitis B-positive mothers from ANC to the maternity unit should be established to prevent instances of documentation gaps.

## Strength and Limitations

Our study makes an important contribution to the very limited literature on factors that act as barriers to timely delivery of HepB-BD vaccine in Africa in general and Ghana in particular. We recommend following up on this study with a quantitative assessment of the frequency of and the predictors of these factors in the Ghanaian context. Further, the study is limited by recall bias given that the participants had to provide a retrospective account of their experiences. However, this was minimised by asking follow-up questions. There is also the possibility of desirability bias, in which midwives under reported their role in low HepB-BD vaccine uptake. Nevertheless, the findings of this study can be transferred to other context that share similar characteristics with this present study settings.

## Conclusions

This study highlights midwives' perspectives on what contributes to the delayed delivery of HepB-BD vaccines to neonates in Ghana. Key barriers identified include the mother's hepatitis B status denial, mother's ignorance about the impact of hepatitis B on the neonate, non-involvement of male partners in post-test counselling, financial accessibility, vaccine unavailability and midwives' oversight and documentation lapses. During ANC visits, we recommend educating expectant mothers on the importance and effectiveness of HepB-BD vaccination, as well as educating midwives on HepB-BD vaccination procedures. Furthermore, stocking and administering hepatitis B vaccines in the delivery ward should be done to guarantee that babies receive the vaccines on time.

## Abbreviations

| | |
|---|---|
| HepB-BD | Hepatitis B birth dose |
| PMTCT | Prevention of mother-to-child transmission |
| HBsAg | Hepatitis B surface antigen |
| HBeAg | Hepatitis B envelop antigen |

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### Authors' Contribution

The study was conceptualised and designed by CAA, SR, and SM. Data was collected by CAA, DS and AYA. Data analysis was done by CAA and SR. The manuscript was critically reviewed by SR and SM. All authors read and approved the final manuscript.

### Availability of Data and Materials

All data generated or analysed during this study are included in this article.

### Ethics Approval and Consent to Participate

Ethical clearance was obtained from the Noguchi Memorial Institute of Medical Research IRB (protocol no. NMIMR-IRB CPN 050/19-20). Permission was sought from the management of the data collection sites, and informed consent (written) was obtained from all participants included in the study.

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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### ORCID iD

Charles Ampong Adjei https://orcid.org/0000-0002-2590-604X

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