

Hepatitis B birth dose vaccination for newborns in Uganda: A qualitative inquiry on pregnant women's perceptions, barriers and preferences

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ABSTRACT

Background: Sub-Saharan Africa continues with very low hepatitis B (HBV) birth dose vaccination coverage. To guide policy on HBV vaccine for newborns, we explored perceptions, barriers and preferences of pregnant women regarding HBV and the HBV birth dose vaccination

Methods: We conducted eight focus groups discussions (FGDs) among 70 pregnant women, stratified by rural-urban residence, age and education level, using a structured focus group discussion guide to explore birth dose awareness, perceptions, barriers and preferences. Data were transcribed, coded and analysed using framework analysis.

Results: Perceptions related to HBV and liver cancer causes and prevention were diverse; most FGD participants did not perceive illnesses as distinctly different. Older women-groups, both urban and rural, had never heard about HBV, but were aware of liver cancer, viewing the disease as fatal. No FGD participants were aware of HBV birth dose. Concerns included vaccine safety, its availability to women who deliver outside the health system and mistrust in health-care worker (HCWs) when handling newborns. Rural-dwelling groups perceived absence of HBV services, while FGDs with young participants believed vaccine side-effects hampered birth dose planning. Most women-groups preferred (i) oral to injectable vaccines; (ii) receiving birth dose education during antenatal, to media-based education; (iii) that newborns receive the birth dose immediately after delivery in the mother's presence.

Conclusion: Although the birth dose is acceptable among pregnant women, planners need to continuously engage them as key stakeholders during planning to address concerns, in order to raise confidence, maximize uptake and strengthen HBV eradication efforts.

Background

Hepatitis B (HBV) has resulted in a major public health burden globally, with approximately 257 million people worldwide estimated to be infected.¹⁻⁴ Particularly in Asia⁵ and sub-Saharan Africa (SSA),^{6,7} it is the leading cause of liver cancer-related deaths. In response to this threat, the WHO, through global frameworks and strategies^{8,9} has called for strengthening of national hepatitis control programs, especially for HBV, in highly endemic countries of SSA. A key focus of this strategy is to expand HBV vaccination services to include universal newborn HBV

vaccination within 24 h after birth ('The Birth Dose').^{10,11} Countries that have successfully reduced incident HBV infections provide the birth dose, in addition to other routine vaccinations. This is meant to prevent mother-to-child transmission and infection during early infancy. Almost a decade after the recommendation of the birth dose vaccine for newborns, most SSA nations have not achieved this goal. Actual implementation of the birth dose has faced several challenges in both the health care system and the recipient community. Several studies have documented health system barriers,^{10,12,13} noting absence of standardized protocols for birth dose vaccine delivery, lack of a tracing system for

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women who give birth outside the mainstream health care system, and logistics of birth dose delivery.^{14,15} There has been limited focus on understanding potential impediments among end-users of the birth dose vaccination services, including pregnant women.

Pregnant women are recognized as an important sub-population for HBV prevention and control globally,¹⁰ but have scarcely been involved in planning and programming of HBV prevention. In many SSA settings, including Uganda, the responsibility to take infants for vaccination most often lies with mothers. Newborns carry a significant risk of HBV acquisition from infected mothers perinatally¹² or horizontally during the post-natal period, when they are in close contact with the infant.^{13,16} Regarding newborn HBV vaccinations, pregnant women are the closest point of access to newborns. Evidence has shown that high HBV birth dose vaccination uptake is directly related to facility-births and skilled attendance at birth,¹⁷ which makes pregnant women's involvement important. A study using structural equation modelling found that a mother's intent to vaccinate her newborn was the single largest contributor explaining the pentavalent-3 infant vaccination coverage in Uganda.¹⁸ Despite the fact that women are key stakeholders, very few studies in SSA have sought to understand their views on issues pertaining to HBV vaccination at birth. Although research has demonstrated that birth dose coverage is related to delivery in health units and with skilled birth attendance,^{17,19,20} a significant proportion of women in Uganda deliver outside health units.²¹ This limits opportunities for new mothers to engage with health workers and discuss issues relating to HBV vaccination at birth for newborns. Moreover, limited research has focused on women's views on the birth dose. There is a need for research on women's perspectives on HBV and the HBV birth dose so that their concerns and views are addressed when planning introducing and operationalizing delivery of this vaccine. This information may contribute to strategies that will shape HBV birth dose vaccination planning as well as increase demand for and acceptance of the birth dose. For us to comprehensively understand individual and contextual aspects around the HBV birth dose vaccination through the lens of pregnant women, we used the three C theoretical model.

The "three Cs" model is a theoretical framework²² that has been used to better understand both individual and contextual issues related to vaccine-related perceptions, barriers and acceptance.²²⁻²⁴ In this model three core elements intersect that drive acceptance and/or demand for vaccines (Fig. 1), i.e. confidence ("trust in the effectiveness and safety of vaccines and the system that delivers them, including the reliability and competence of health workers"), complacency ("Low perceived risks of

vaccine-preventable diseases and vaccination deemed unnecessary as a preventive action") and convenience ("Physical availability, affordability and willingness-to-pay, geographical accessibility, ability to understand, including language and health literacy and appeal of immunization services"). Individuals and communities are more likely to accept and demand a vaccine when (i) they have confidence in its efficacy and safety, as well as trust in the health workers who deliver it; (ii) they perceive a high risk of disease and (iii) the vaccine is easily available and they have capacity to obtain it.

Despite evidence of the cost-effectiveness of the birth dose in certain specific populations within SSA (25, 26), contextual factors such as beliefs, perceptions and preferences have received less attention. Evaluating pregnant women's perspectives is vital in developing culturally-relevant newborn HBV prevention guidelines and services in this population, including the prevention of HBV mother-to-child transmission. Findings will guide ways to mitigate anticipated barriers and to increase acceptability of birth dose vaccination for newborns. Our study qualitatively explored 1) awareness and perceptions regarding HBV, liver cancer and the HBV birth dose vaccination for newborns 2) perceived barriers to newborns' receiving an HBV birth dose vaccination and 3) preferences related to receipt of HBV birth dose vaccination for newborns, among pregnant women attending routine antenatal clinics in central Uganda.

Methods

Research design

In this qualitative study we collected data from pregnant women through focus group discussions (FGDs). FGDs consisted of two main groups: Rural (those who resided in rural areas) and Urban (those who resided in urban areas). Within each group, women were further grouped into two age categories; younger (less than 30 years of age) and older (aged 30 years and above), and for each age category, another grouping was done based on level of education; Primary (None to Primary level education) and Secondary (At least a Secondary education). Thus, a matrix design of 8 women-groups was formed, with the aim of achieving fairly homogeneous group membership. This design was used to facilitate peer-level interactions and free expression of views within each focus group during the discussions. It would also be varied enough to capture, overall, the desired major variation and allow for heterogeneity in perspectives related to HBV and the birth dose vaccination for newborns. Within each sub-group, a focus group was formed with 7–12 participants. An FGD guide with open ended questions allowed for views and ideas to emerge from participants, which were not in the guide *a priori*, and for moderators to inquire more deeply and get clarification on issues that participants viewed as important.

Study setting and sample selection

Between May and July 2018, eight FGDs were conducted with pregnant women attending routine antenatal clinic visits. Pregnant women were selected from two health centers in the central region, one urban and one rural. To be eligible for study participation, women had to be at least 18 years old, pregnant and attending the antenatal clinic. Four FGDs were conducted in Kiswa Health Center, a health center III in Kampala which serves an urban population, and the other four were carried out in Bukasa Health Center III, which serves a predominantly rural population in Wakiso district, Uganda. Recruitment occurred through the Health Center system, whereby the midwife in charge of the Health Center antenatal service worked closely with the researchers to introduce women to the study during their antenatal education sessions.

Data collection

Participants who fulfilled eligibility criteria were gathered into a

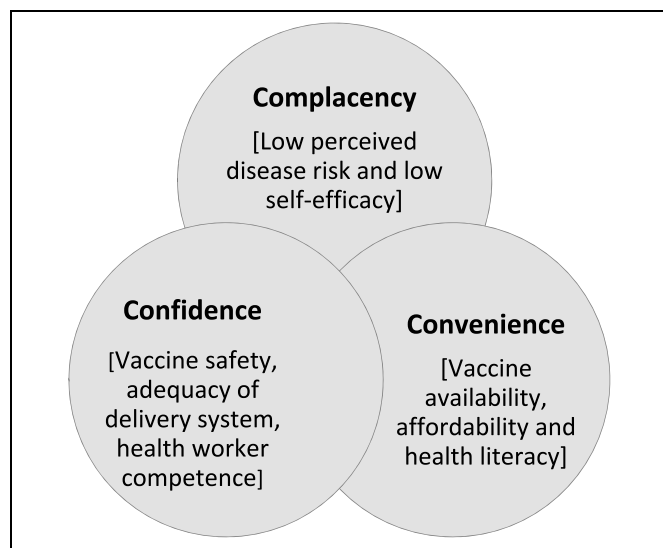


Fig. 1. The 3C's model for vaccine hesitancy is adapted from MacDonald et al., 2015.

private room at the health unit, where FGDs were conducted. Each FGD was conducted by two research assistants trained in qualitative methods, one moderated the discussion and the other took notes. All had public health training and experience in qualitative research. Tools were piloted among pregnant women at one urban (Kasangati Health Center) and one rural (Wakiso Epi-center) health center and mock-discussions were performed by each research assistant. Data from the pilot FGDs were transcribed and feedback was used to further refine the focus group guides. We utilized a focus group guide which was translated and back-translated into *Luganda*, the local language, to conduct the FGDs. Focus group discussions were recorded and transcribed verbatim by the research assistants and one of the investigators. Two debriefing sessions were done between the data collection team and the investigators. Focus group discussions centered on HBV awareness, liver cancer and HBV birth vaccine for newborns, perceptions on newborn vaccinations and perceptions on newborn risk for HBV acquisition, safety of vaccines in newborns as well as barriers and preferences in relation to newborns receiving HBV vaccination at birth. Facilitators used probing techniques to make inquiries more deeply into other themes that emerged during discussions, and to obtain clarification. On average FGDs lasted for 85 min.

Ethical clearance

The study received approval from the Makerere University School of Public Health Research and Ethics Committee and from the Uganda National Council for Science and Technology. Ethical guidelines and procedures were followed throughout participant recruitment, data collection and analysis. Participants willing to join the study were given information about the study and their consent (including permission to audio record) was obtained prior to participation.

Data analysis

Data were transcribed into English from the local *Luganda* language by two research assistants who also facilitated the FGDs, taking care to maintain key phrases in the original language. Transcripts were read multiple times to ensure familiarity and deep comprehension of the content. We approached analysis conceptually using the framework analysis.²⁷ Codes were carefully developed from transcripts of raw data through analysis of texts, by three coders who included the principal investigator (PI) and two research assistants. After coders agreed, all codes were constituted to form the analytic framework, which was then applied to the whole data. We analysed data both deductively using the FGD guides, and inductively, using information from participant narratives of their experiences. A matrix of topic and response codes was produced. From this matrix of codes, categories were created through an iterative process of comparing and contrasting codes, and codes that focused on a similar issue were merged to form sub-categories and categories. Then similar categories and sub-categories were further grouped into sub-themes and brought under emerging main themes. Coding and analysis was led by the PI. The main themes that emerged were a) low awareness and diverse perceptions about HBV and its prevention b) mistrust of vaccine and inefficient vaccine delivery processes are barriers to birth dose acceptance c) preference for oral vaccine formulations, immediate newborn vaccination and antenatal-based HBV

education. Consistent with these themes, corresponding results and relevant supporting quotes are presented.

Results

Participant profiles

A total of 70 pregnant women were recruited, using a matrix of socio-demographic characteristics, as shown in [Table 1](#). For participants younger than 30 years of age, 16 and 18 were recruited from urban and rural setting, respectively and of these, 15 had at most a primary education, while 19 had received at least a secondary education. Among participants aged 30 years or older, 22 and 14 were recruited from urban and rural settings, respectively with 19 having at most a primary education, 17 having at least a secondary education.

Our results under the main themes show that¹ perceptions about HBV and liver cancer causes, prognosis and prevention are diverse and that there is low awareness about the HBV birth dose vaccination² there are concerns over (i) vaccine safety and its availability to women who deliver outside the health system, (ii) mistrust in the competence and integrity of HCWs while administering the vaccine, and (iii) absence of comprehensive HBV services for pregnant women are barriers to uptake and acceptance of the birth dose³; there is a preference (i) for oral vaccine formulations to injectable formulations, as orally administered vaccine are perceived to be safer (ii) for newborns receiving the birth dose immediately after delivery, but in the presence of the mother, and (iii) for HBV birth dose education and information to be provided during antenatal sessions, rather than via electronic or print media.

Low awareness and diverse perceptions about HBV and its prevention

Awareness, perceptions about HBV and liver cancer: causes, prognosis and prevention

Rural-dwelling groups with primary education and older urban-dwelling groups with secondary education reported that they had never heard about HBV or liver cancer, while groups with secondary education generally reported that they had heard about both illnesses. Among the groups that had heard about HBV or liver cancer, both diseases were generally perceived as encompassing a range of illnesses and causes. Urban-dwelling older groups with secondary education, as well as rural-dwelling groups perceived liver cancer to be caused by modern family planning methods. Generally, groups across the age, education and rural/urban divide reported that they did not know what caused HBV or how it is acquired. Urban younger groups with secondary education gave descriptions of both diseases which conformed to biomedical disease definitions, including that HBV is an illness caused by a virus which if contracted can affect the liver, reducing its capacity to function effectively, and that liver cancer is an illness where cells which make up the liver become cancerous and go on to spread to the rest of the body. Conversely, urban younger groups with primary education felt that liver cancer was caused by eating too much oil, using family planning; others did not know what caused it. Other descriptions included that HBV is a disease which affects the liver and causes it to swell and to get injured; that the disease affects the lungs, the uterus; and that it is acquired during labour.

Table 1

Socio-demographic profiles/subgroups of the 70 pregnant women who participated in focus group discussions on hepatitis B and the HBV birth dose vaccination for newborns, May–July 2018.

Young pregnant women (<30 years)				Older pregnant women (≥30 years)			
Urban		Rural		Urban		Rural	
Primary education	Post primary education	Primary education	Post primary education	Primary education	Post primary education	Primary education	Post primary education
7	9	8	10	12	10	7	7

“They say that hepatitis B affects the lungs, what I don’t know is how it is contracted. I wonder if it is through blood contact just like the HIV virus. I don’t know” - Urban younger woman with secondary education.

Other participants did not know much about the nature of HBV and liver cancer, what caused these illnesses, how to treat them or whether they can be prevented, despite having some experience with the disease. This view came from FGDs from both rural and urban areas, and with participants with primary and secondary education.

While both diseases were described by some as affecting the liver, some indicated the two illnesses were viewed as one and the same, while in other instances women were not very certain about the differences between HBV and liver cancer.

Beliefs including that HBV is acquired during labour, that it is airborne, and that it affects the lungs, intestines and uterus were common. Body weakness and deficiencies were other explanations believed to cause HBV and/or liver cancer. Views about both diseases having a poor prognosis were commonly held, mainly by older groups from both rural and urban areas, who expressed views that HBV kills very fast if one does not seek medical attention quickly. They also held views that the disease is incurable.

“Hepatitis B is a disease, it is liver cancer. The internal organs are affected then one feels pain and when you go to the health facility for a check-up results indicate that one has cancer in the intestines, uterus.” - Rural older woman with secondary education.

Other views included that HBV might be acquired through blood, similar to HIV. One participant from an older women urban group with secondary education suggested that the name of the disease itself was not well understood, as they felt it was a complex medical term that does not easily translate into an illness they could comprehend.

Multiple terminologies. Our results show that multiple terminologies fostered poor perceptions of liver cancer. Participants differed in their description and interpretation of liver cancer; older women-groups with secondary education mostly described the biomedical description of the disease as a “tumour”, a “wound” and a “swelling” of the liver. Conversely, older women-groups from rural areas understood the disease to be cancer only when described with the lay term for cancer, “Kookolo”, while other descriptions included a swelling-*ekizimba*, or lay ethnic descriptions of the illness as intestinal fever – *omusujja gw’omu-byenda*; In addition, causes and prevention of liver cancer were not well understood across any of the women-groups. The disease was mostly perceived as a fatal illness, but not as a preventable illness.

“I think any illness can affect the liver and when it fails to heal, the wound there turns into cancer.” - Urban older woman with secondary education.

In addition, majority of participants from both urban and rural groups did not perceive HBV as a cause of liver cancer. Some groups, however, recognized that both illnesses affect the liver, as stated by this young urban woman with secondary education, “I understand it also as an illness which if contracted can affect the liver, reducing its effective functionality.”

HBV vaccine birth dose awareness

Participants were aware of the importance of vaccinating young children in general, but all focus groups denied knowledge of the HBV birth dose vaccine. Among the views expressed was the need to receive more information regarding the birth dose vaccine, as exemplified by this rural, older woman with primary education “*Since I didn’t know the disease, so I don’t know about the vaccine too*”, and this rural older woman with primary education “*I do not know about that vaccine, never heard of it. You should educate us.*” Vaccinating newborns against HBV was likened to measles vaccination, in terms of the likely benefits of averting

severe disease. Most participants believed it was important to vaccinate children early, though they were uncertain of the appropriate age that HBV vaccination should begin.

“Though they vaccinate at ten years, it is good if the child received that vaccine at an early age so that by the time she grows the effect is not too much. I don’t know the age at which they should start but to me it is important so that by the time you get to that age you have some vaccine protection in the body so that you are not affected. That’s what I think” - Rural older woman with primary education.

A few women-groups expressed the view that it is important to vaccinate a newborn as soon as possible after birth, to prevent any chances of them getting the disease. Others viewed the benefits of vaccination, through a lens of a common proverb that alludes to prevention

“Like we know that prevention is better than cure so we need to prevent so that if the child is infected with the disease the impact is not so bad like if there is no prevention at all.” - Rural older woman with secondary education

Barriers related to mistrust in vaccination and inefficient vaccine delivery process

Vaccine safety and efficacy

Participants revealed concerns about the ability of a newborn to fight an infection that it is exposed to early in life, and they felt that vaccine may instead introduce the newborn to infection.

“We were told that the vaccine is the same virus [and it is given] so that the baby fights it—so this can hinder me [prevent me from vaccinating my newborn] saying this is my newborn baby and you are infecting it with that virus how will it be fought?” -Rural older woman with secondary education.

Women-groups from urban areas with primary education mainly expressed concerns about vaccine safety, which included that the vaccine causes swelling, that it may be expired and make their newborns sick.

Absence of antenatal HBV testing

Among key concerns that emerged was the observation that lack of HBV testing during pregnancy may promote mother-to-child HBV transmission. Older women-groups felt that failure to have HBV testing during pregnancy raises the risk of newborns acquiring HBV from their infected mothers, as noted by this older urban woman with secondary education “*But for me I think since the mother is not screened to know her status, or to be immunized, it is highly risky that the new born can acquire it.*” -Urban older woman with secondary education and this rural older woman with primary education “*Yes they are at risk and the risk is quite high because if the mother carries the sickness and it is not known, it will easily be passed on to the newborn child. The risk is high because not so many expecting mothers know their status.*”

When asked about their views regarding the importance of testing for HBV during pregnancy, both rural and urban women-groups voiced the need to be tested for HBV during pregnancy, just as for HIV, and were concerned that this is not currently done. They perceived that a newborn can easily acquire HBV from its mother, given that women are not screened for HBV during pregnancy and they do not know their HBV status.

“Chances are high (for transmission to the baby), first we the mothers – because we did not get a chance of vaccinating ourselves – we may be having it without knowing. This raises the chances of the newborn acquiring it. It is like screening for HIV. Once health workers know one’s status they handle delivery with necessary care to protect the newborn child. Health workers should see to it that we are screened for hepatitis B before we deliver” -Urban

older woman with secondary education. Groups from rural areas expressed concern that women who planned to deliver outside the medical health care system may not easily access the birth dose vaccine for their newborns, since traditional birth attendants would not have this vaccine. Other concerns raised were vaccine shortages at health facilities.

“Yes that is true, some women go to traditional birth attendants and these may not have the vaccine. But also sometimes these vaccines may be absent from the health units. So absence of these vaccines may prevent newborn babies from receiving the hepatitis B vaccine.” Rural older woman with secondary education.

Disease awareness and health seeking behaviour

“At first I had never heard about the hepatitis B disease but got to know about it when my husband had it because he was in a very very very critical condition until he died. Generally it is worse than a patient suffering from HIV And at the end of it all, we were in Mulago so the Doctor told us that when that disease affects someone it destroys whatever is in the stomach ... But we got to that point because we didn't get to know about it early enough, we used to go to clinics and by the time we got to the hospital they told us that it was hepatitis B, everything was damaged and at the end of it all, he died.” -Urban younger woman with primary education.

Participants expressed views that the disease is often communicated using medical terminology, which is not easily comprehended by the lay public, as one older woman with primary-level education stated *“As for me some medical terminologies are not understood in English.”* Others also felt that limited awareness of the disease could result in late care-seeking with poor prognosis.

A common barrier that emerged was a low perceived severity of the disease. Participants felt they were not at risk of acquiring HBV or liver cancer. They did not think that vaccination was very necessary, equating the disease to other, more familiar conditions that do not result in adverse complications

“For example like ring worm can't affect someone's daily work but keeps on spreading so you may tell him why not treat it and he gets lazy so is that disease since it takes long to show. One may say will I live up to that age? That can [lead me to refuse] vaccination against HBV” -Rural older woman with secondary education.

“.. Someone will ask what [kind of] pain does it present with? — how do I know that I have it, why should this newborn be vaccinated because the disease may start at 40 years?” Rural older woman with secondary education.

Another barrier described was the cost of the HBV vaccine, where both rural and urban women-groups believe they could not afford to pay for the vaccine, and yet the vaccine may not be given free of cost.

Ineffective health care worker-mother communication

Participants mostly from urban women-groups felt that a barrier to newborn vaccination was created when health care workers failed to engage pregnant women about the HBV birth dose vaccine processes in a timely and meaningful way. Young women groups viewed HCWs as rude and uncaring, often not providing them with important information about their newborns.

“You may deliver a baby but when the midwife finishes, you may not see her again and if you don't know [what other services exist for the newborn] —you probably leave the hospital upon discharge, without vaccinating your newborn—but if the health worker cares and wishes you well and knows the disadvantages of not immunizing the baby she may care.” Urban younger woman with primary education.

Another barrier was about the limited communication between women and health workers regarding newborn vaccination needs, which impeded their involvement and follow-up, and may lead to missed opportunities for newborn vaccination. Notable too, was the finding from all women groups that there were no known cultural beliefs or practices that served as barriers to newborn vaccination.

Health care workers mistrust and timely HBV birth dose vaccination

Fears regarding the competence and ethical standards of HCWs while handling newborns were expressed, mostly by urban women-groups. Some fears concerned safety of the vaccines themselves, while others were concerned about the possible contamination of injections used on their newborns, and with unsafe injections, transmission of other diseases in the process.

“I know that these vaccines are imported from outside. The manufacturers may have hidden motives but we cannot refuse that because we do not have the capacity to check those drugs.” - Rural older woman with secondary education.

Other fears mentioned stemmed from past experiences where children developed side-effects following vaccination, as stated by this rural older woman with secondary education

“I am one of the people who hide these children [to avoid vaccination] — so if it is mass immunization mine is not immunized. I am scared because in Gayaza Kasangati there is a time children were immunized but some died while others became sick—their skins had a rash and that was before I had a baby —so if it is door to door [immunization] I don't allow them to immunize my child.”

Most women agreed that prior immunization-related harmful events, plus negative personal experiences with vaccinations played a key role in their decisions not to vaccinate newborns.

Preferences in relation to the HBV birth dose

HBV birth dose formulation, timing, place, and related preferences

When asked about whether they preferred injections to oral forms of the vaccine, most FGD-groups preferred oral vaccines to injectable formulation. Reasons given for preference of oral vaccines were that they are viewed as safer, not painful and not associated with swelling which occurs at an injection site. Other participants reasoned that oral formulations reduce the risk of HCWs making medical errors in the process of injecting their newborns. Regarding the preferred timing of the birth dose, all women-groups preferred that their newborns receive the HBV vaccine immediately after childbirth. A few participants, mainly from young, urban women-groups with secondary education and some from groups of rural older women with primary education felt they needed time to recover from the stress of childbirth before their newborn could be safely vaccinated. They believed a newborn must be protected by its mother and should not be “out of sight” of its mother, for protection. As such, any handling of a newborn must be done in full view of its mother. In addition, women cited fears related to trusting HCWs with their newborn as a reason to delay the birth HBV vaccine. Even groups who preferred newborns to receive the birth dose immediately after birth did not trust HCWs, citing reasons other than effective newborn protection, as demonstrated by this quote:

“Now for me I think it should be immediately [after] the baby is born, to limit the chances of the virus getting in contact with the newborn. But also consideration should be made for the women who may have been operated upon. They take like three days to recover so these can have their newborns vaccinated before they are discharged.” - Rural older woman with secondary education.

Most participants preferred to receive information about the HBV birth dose vaccination during antenatal visits and within healthcare

facilities, which they believed are able to provide them with accurate and comprehensive information, compared to media-delivered messages.

However, some participants preferred that information on HBV birth dose to be provided via the media, like radio and television. In addition, women preferred that health workers explain to them clearly which vaccine their newborn would receive, handle the newborn carefully to check body weight and body temperature before vaccination, rather than simply getting the baby from them and giving the injection straight away.

Discussion

In a country with high HBV prevalence that lacks services to prevent mother-to-child transmission of HBV, our findings reveal that¹ pregnant women have low awareness and hold misperceptions about HBV, liver cancer and the HBV birth dose²; women perceived mistrust of HCWs, absence of HBV screening services in public antenatal care facilities and low awareness about the birth dose, are obstacles to newborns accessing a birth dose vaccine³; women preferred receiving information and education about the HBV birth dose during antenatal clinic visits, oral vaccine formulation, and provision of the birth dose immediately after delivery and in presence of the mother. Inasmuch as previous African studies about the HBV birth dose have reported on health system barriers from the perspective of health care providers,¹³ cost-effectiveness in specific populations,^{25,26} and existing tools for birth dose delivery,^{14,15} to the best of our knowledge this is the first study in Uganda to explore HBV birth dose perspectives of pregnant women, as key stakeholders, in terms of perceived risk and prevention of HBV among newborns, perceived barriers and preferences in relation to their newborns' receipt of the HBV birth dose. Collectively, our findings contribute to the literature on maternal notions regarding the HBV birth dose vaccination and may inform national programs preparing to roll out the birth dose vaccine within SSA.

The implementation of strategies that were recommended to eliminate the public health threat due to HBV by 2030⁹ is at different stages in different SSA countries.²⁸ A key recommendation is “*universal implementation of the birth dose*” in highly-endemic SSA countries. Whereas health system-related barriers to effective birth dose planning have taken center-stage in the birth dose implementation discourse, issues related to end-users of the service have received less attention. Even within SSA countries where the birth dose has been implemented, data on pregnant women's engagement in relation to strengthening the birth dose is sparse.

Our study reveals that most pregnant women have limited overall understanding of the nature of HBV disease and its causes, including those who had heard about it. From mere affirmative statements of having heard about the disease, to statements revealing complete lack of information, participants generally displayed low awareness about HBV and liver cancer, two illnesses preventable by the HBV vaccine. This finding was similar across all socio-demographic sub-groups, with some views showing inaccurate understandings of disease presentation, risk of acquisition and prevention. The observation of limited HBV knowledge has been frequently reported in recent surveys within SSA^{29–31} and other high-burden settings.^{32–35} Limited knowledge has been linked to lower likelihood of children receiving required vaccinations in SSA settings.^{36,37} Low knowledge, when combined with other negating factors such as concerns over vaccine safety and HCW competence has been shown to increase vaccine hesitancy in Zambian³⁸ and Somali communities.³⁹ Consistent with the model of vaccine hesitancy, lower literacy levels, together with issues of vaccine availability and services quality lower convenience to accept a vaccine. It is therefore critical to provide accurate information and education about the risks of acquiring HBV and the importance of the HBV birth dose to mothers of newborns, in order to promote their confidence in the vaccine and to minimize complacency, which arises from inaccurate perceptions about disease

risk.

When discussing their perceptions of HBV, women tended to draw from their experiences with other diseases they knew which affected infants. This phenomenon was reflected across a spectrum of comparisons, where women's ideas about HBV were reflected through HIV, in terms of the illness being asymptomatic despite being present and the procedures of antenatal testing to ascertain infection status and plan for preventing mother-to-child transmission, with which they are already familiar. In keeping with the 3Cs model, such perceptions intersect with other elements of convenience to influence demand for the birth dose vaccine.

Although women espoused the idea of providing a birth dose vaccine to their newborns, they had concerns about HCWs ethics and competence, newborn safety and felt that they had limited information on HBV birth dose vaccination services. This observation is analogous to findings from a survey of Canadian French parents,⁴⁰ which revealed that levels of trust in vaccines and HCWs played a significant role in influencing vaccine acceptance. Similarly, a European study⁴¹ documented lack of confidence in the HBV vaccine, and high vaccine refusal. This low confidence in HCWs that intersects with complacency due to inaccurate perceptions of disease risk, and limited access to birth dose services is commensurate with the 3Cs vaccine hesitancy model as described by McDonald et al.²² Although there is limited evidence to point to the source of HCWs mistrust in this context, other reports have noted the increasing role of the information technology and access to online information that has varying levels of accuracy in fueling HCWs mistrust.⁴²

That the HBV disease is less well-described culturally has also been reported among the lay public in Uganda⁴³ and elsewhere.^{44,45} What has not been distinctly documented are perceptions related to the HBV vaccine given within 24 h of birth, including awareness of the importance of timely receipt by a newborn for adequate protection against HBV.

Contrary to this study, Fang et al.⁴⁶ reported cultural beliefs as barriers to HBV prevention among the Hmong, a US minority population with high HBV burden. Ali et al.⁴⁷ reported similar findings from Pakistan, a country with moderately high HBV burden. Our respondents across a range of ethnicities categorically denied presence of any cultural beliefs that may hinder newborn HBV birth dose vaccination, explaining that any refusals are due to reasons other than cultural beliefs or practices. Previous unpleasant experiences with vaccinations, or relating to vaccine side-effects, and suspicion that other harmful substances could be exposed to the body via vaccines, combine to undermine confidence in vaccines, as the hesitancy model explains that contextual factors interact with personal experiences and vaccine-specific factors to influence vaccine confidence. These observations, nonetheless, do not preclude further inquiry into the potential role of cultural beliefs in newborn birth dose vaccination.

Women preferred to receive information and education about the birth dose during antenatal visits at healthcare facilities and to be physically present when their newborn received the birth dose vaccine. Facility-based birth dose education was described as preferable to media-based information because women could ask questions and get them answered by trained professionals, instead of an undefined source. The preferred timing of birth dose vaccination ranged from 1 to 3 days. These findings are important to the ongoing discussion about the HBV birth dose vaccination schedule, in order to strengthen prevention in settings of moderate to high HBV prevalence.^{48,49}

The general lack of awareness and knowledge about HBV are akin to our recent findings among pregnant women in Uganda,⁵⁰ and has been reported by other authors.⁴³ Despite limited awareness about the birth dose, most women perceive the vaccine to be safe and useful in protecting newborns against HBV. Some women, however, felt that vaccinating newborns to prevent a disease that “may appear decades later” or “not appear” in their lifetime was of less significance. Such “prototypical beliefs”, as described by Bishop and Converse⁵¹ are not borne of

personal acquaintance with the disease in question, but rather, emanate from cultural and community-level knowledge sharing. It is therefore critical to share accurate information consistently within affected communities, using all available opportunities to engage with key stakeholders. This will improve individual-level disease awareness. It will help diffusion of correct messages into communities, so that the threat posed by failure to take preventive action is comprehended. The perception of early timing of vaccination implies that women can comprehend that early vaccination is of importance, despite limited overall knowledge of HBV birth dose vaccine. Similarly, women equated HBV testing in pregnancy to HIV testing in pregnancy, a concept with which they were more familiar. This idea of perceiving less well-known concepts through the lens of those they are more familiar with was a finding that can be potentially adopted to engage women through education and open discussions, centering education messages on phenomena they already know, such as prevention of mother-to-child transmission of HIV.

We note that this study has strengths. We sampled participants from urban and rural locations, stratified by age and education level, uncovering a broad range of perceptions, barriers and preferences. Our analysis and interpretation, theoretically backed by a model that frames vaccination hesitancy, may provide a useful basis for future research. We note limitations, as well. Although we attempted to include pregnant women from diverse backgrounds, women from different ethnic, social and cultural contexts may have been combined into a single focus group, making our merger and free discourse less than ideal. In addition, our study design was unable to tease apart women who planned to deliver at medical facilities from those who planned to give birth with traditional birth attendants, or those who usually vaccinate from those who do not. It therefore did not provide distinct perspectives of parents who do not typically deliver from health facilities or those who do not vaccinate, in terms of who they are, and what they stand for.

This, to our knowledge, is one of very few studies that have sought to document views of pregnant SSA women as key end-users of HBV birth dose vaccination services. These findings have implications for strengthening access to the HBV birth dose. This qualitative inquiry provides a socio-cultural, end-user focused context to existing evidence about HBV and the birth dose, critical to effective HBV prevention interventions among pregnant women in this region. It is increasingly acceptable that population-health interventions adopt patient-centered approaches to service delivery within country-level policies and program activities.⁵² This shift in care strategy implies that the views of end-users of health services become a prominent aspect in developing health policies, thereby shaping both the design and delivery of health programs and services. In Uganda, a country yet to implement the birth dose vaccination program, our findings point to a need to incorporate stakeholder and end-user views in drafting and/or reviewing its hepatitis B birth dose implementation policy.

Conclusion

In conclusion, our qualitative exploration reveals women's willingness to take up the HBV birth dose once introduced. However, issues that may undermine effective uptake include low awareness of the birth dose, mistrust of health care workers, and perceived health worker incompetence. Concerns over vaccine safety in newborns, a general "fear of the unknown", plus a desire to protect a newborn from any harm, persist.

Effective implementation of the birth dose in Uganda may benefit from continuous engagement and education of pregnant women in the prevention of early life HBV infections. There is a need to dispel inaccurate perceptions, discuss available and alternative options that address existing barriers, concerns and preferences in order to innovatively plan for timely birth dose vaccination for both babies born within and outside the health facilities. This will contribute to achieving HBV elimination goals.

Declaration of competing interest

The authors declare no conflict of interest in relation to this work.

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List of Abbreviations

FGDs	Focus Group Discussions
HBV	hepatitis B virus
HCWs	Health Care Workers
HIV	Human Immuno-deficiency Virus
MTCT	Mother-to-Child Transmission
SSA	sub-Saharan Africa
WHO	World Health Organization

Ethics approval and consent to participate

This study received approval from Makerere University School of Public Health Higher Degrees, Research and Ethics Committee (IRB Number 00005876; FWA Number 00011353) AND Uganda National Council for Higher Education. All eligible study participants went through a consenting process and provided written informed consent in English or the local language (Luganda) to participate in the study.

Consent for publication

N/A.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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Authors' contributions

JNM conceptualized the study, participated in collecting data, analysis and wrote the initial manuscript draft. PO, FM, JA, LA & GDK supported conceptualization of the study. PO PS FM & LA contributed to analysis and writing of the manuscript. All authors read and approved the final manuscript.

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