

Timing of Hepatitis B Vaccine Birth Dose in Exposed Newborns, Southwest Ethiopia: A Cross-Sectional Study

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Abstract

Introduction: Hepatitis B virus disease is a global acute and chronic communicable disease. Mother-to-child transmission is the reason for high carrier rates. Unvaccinated newborns infected through mother-to-child transmission are at >95% risk of developing chronic hepatitis B virus disease. Vaccination is the most effective measure to reduce the global incidence of hepatitis B virus disease. Despite the World Health Organization's target to achieve 90% of the hepatitis B vaccine birth dose by 2030, little is known about the vaccination status of exposed newborns.

Objective: The present study aimed to determine the timing of the hepatitis B vaccine birth dose in exposed newborns in Southwest Ethiopia.

Methods: An institution-based cross-sectional study was employed on 422 systematically selected exposed newborns from April 2, 2022, to August 28, 2022. A pretested, interviewer-administered questionnaire was used for data collection. Data were entered into Epi data 3.1 and exported into SPSS version 23 software for analysis. Both bivariable and multivariable binary logistic regressions were performed. Variables with a *p*-value <.05 at a 95% confidence interval (CI) were considered statistically significant.

Results: The proportion of neonates who received their first dose of the hepatitis B vaccine on time was 57 (42.5%) (95% CI: 38.3–46.1%). A higher likelihood of vaccinating their exposed newborns on time was associated with formal education (adjusted odds ratio [AOR] = 3.01, 95% CI: 2.21–7.09), four or more ANC visits (AOR = 2.33, 95% CI: 2.05–6.21), and husband engagement (AOR = 4.31, 95% CI: 2.03–6.34).

Conclusion: The proportion of timely initiation of the hepatitis B vaccine birth dose in Southwest Ethiopia was low. Thus, strengthening health education on the hepatitis B vaccine, encouraging women to have at least four ANC visits, and encouraging male involvement help improve the timely administration of the hepatitis B vaccine.

Keywords

hepatitis B vaccine, timing of birth dose, exposed newborns, Southwest Ethiopia

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Introduction

Hepatitis B virus (HBV) disease is a global acute and chronic communicable disease that causes major hepatic disease (WHO, 2017, 2022). Hepatitis B infection is caused by HBV that infects the liver and causes hepatocellular inflammation, cirrhosis, hepatocellular carcinoma, and death

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(CDC, 2020, 2023; WHO, 2015). Globally, more than 2 billion people have been infected with HBV, 240 million people are chronic carriers; and over 686,000 people die each year (WHO, 24 June 2022, 2021, December 2015). Mother-to-child transmission (MTCT) of HBV accounts for an estimated 21% of death worldwide, while regionally it ranges from 13% in the Eastern Mediterranean region to 26% in the Western Pacific region (Franco et al., 2012). Mother-to-child transmission is usually the reason for high chronic infection carrier rates (Machaira, Papaevangelou, Vouloumanou, Tansarli & Falagas, 2015; WHO, 27 July 2020). One of the distinctive features of HBV infection is that the risk of developing chronic infection varies greatly with the age at which the infection is acquired. Around 90% develop a chronic infection following perinatal infection (Lai, Ratziu, Yuen & Poynard, 2003; Orlando et al., 2015; WHO., 2015). Vaccination is the most effective measure to reduce the global incidence of HBV disease (CDC, 19 July 2021; Franco et al., 2012). Provision of the hepatitis B vaccine birth dose within 12–24 h can prevent up to 95% of HBV transmission (CDC, 19 July 2021; Reardon et al., 2019; Zhang et al., 2022). A single birth dose of the hepatitis B vaccination strategy is cost-effective (Biondi et al., 2023). In addition to the hepatitis B vaccine birth dose, administration of Tenofovir (TDF) for the mother at 28 weeks of gestation when HBV DNA is $>2 \times 10^5$ IU/mL reduces the risk of MTCT (Liu et al., 2022). Even though MTCT is a major contributor to the ongoing HBV epidemic, only 11 of 54 (20.3%) sub-Saharan African countries have introduced the birth dose of HBV vaccine into their regular immunization schedule which is not in Ethiopia (Boisson et al., 2022). Unvaccinated newborns infected through MTCT are at $>95\%$ risk of developing chronic hepatitis B virus disease (Joshi & Coffin, 2020; WHO, 24 June 2022). World Health Organization (WHO) target is to achieve 90% of hepatitis B vaccine birth dose by 2030 (Seaman et al., 2020; WHO, December 2015). Universal screening of all pregnant women, at-birth prophylaxis with specific anti-HBV immune globulin, and HBV vaccination for exposed newborns are effective in reducing the risk of vertical transmission. A good understanding of the current status of the hepatitis B vaccine birth dose also helps WHO 2030 target in improving exposed newborns' vaccination status. Therefore, this study aims to assess the timing of the hepatitis B vaccine birth dose in exposed newborns and associated factors among exposed newborns at public health institutions in Southwest Ethiopia, 2022.

Literature Review

A study conducted in Central Europe, Eastern Europe, and Central Asia showed that the hepatitis B vaccine birth dose coverage was 63.5% in Southeast Asia and East Asia, 79.0% in Oceania, 33.8% in North Africa and the Middle East, and 10% in Sub-Saharan Africa (Seaman et al.,

2020). According to the global report, the overall global coverage of the birth dose of the hepatitis B vaccine among exposed newborns that was given within 24 h after birth was 42% and only 10% in Africa (Zhao, Zhou & Zhou, 2020).

In America, the hepatitis B vaccine birth dose vaccination coverage ranged from 17% in St. Kitts and Nevis to 99% in Cuba (Álvarez et al., 2017). In the study conducted in the South-East Asia Region, the hepatitis B vaccine birth dose coverage status and progress of hepatitis B control through vaccination increased from 9% in 2011 to 34% in 2015 (Childs, Roesel & Tohme, 2018). According to a 2015 report of the study done in China, 95.14% of hepatitis B exposed newborns got their first dose of the hepatitis B vaccine within 24 h of birth (Li et al., 2012).

A multicenter study conducted in China on the Management Algorithm for Prevention of MTCT of the HBV showed that administration of TDF for the mother at 28 weeks of gestation when HBV DNA is $>2 \times 10^5$ IU/mL reduces risk of MTCT of the HBV (Liu et al., 2022). A study conducted in Greenland revealed that among the children born to hepatitis B positive women, 58% received a 3-dose hepatitis B vaccine series and 20% received no vaccinations (Børresen et al., 2012). A study conducted in the United Kingdom on the immunization of babies born to HBsAg-positive mothers revealed that 99.4% of exposed newborns received birth dose, and 9.8% has taken HBIG within 24 h (Keeble, Qusted, Barker, Varadarajan & Shankar, 2015).

A study conducted in China on the Perinatal hepatitis B prevention program revealed that hepatitis B vaccine birth dose coverage (within 24 h) remained high (96.3–97.1%) during this period, and the coverage of HBIG increased from 85.0% (before July 2011) to 92.1% (after July 2011) (Zhang et al., 2014). According to the global, regional, and national burden of hepatitis B report by 2019, only 68 out of 194 countries had already achieved the 2030 target proposed by WHO (Lancet, 20 June 2022).

According to the vaccination registry report in Italy, 155 of the enrolled subjects 94% had received the hepatitis B vaccine birth dose (Zanella et al., 2020). A study done on newborns vaccination on the hepatitis B in China revealed that 97.34% of subjects received the hepatitis B vaccine first dose within 24 h after birth (Wu, Li & Zhou, 2016). A study conducted in Georgia on under vaccination of hepatitis B vaccine revealed that 14%–18.5% of exposed newborns received birth dose within 24 h of birth (Jiles, Daniels, Yusuf, McCauley & Chu, 2001).

A study conducted in USA showed that 63.9% hepatitis B exposed newborns received the hepatitis B vaccine birth dose and 64.8% received the HBIG timely within 12 h of birth (Schillie et al., 2015). Implementing a birth dose of the hepatitis B vaccine in five African countries revealed that 7% in the Gambia, 13% in Nigeria, and 74% in the Botswana of exposed newborns received the hepatitis B vaccine birth

dose timely (Moturi et al., 2018). A study conducted in Nigeria on the prevention of MTCT of the hepatitis B infection and 9 months follow-up of the hepatitis B exposed infants showed that 327 exposed infants (89.6%) had received the hepatitis B vaccine within 24 h of delivery (Ndububa et al., 2022).

A study done in Ontario showed that a switch to a single birth dose of the hepatitis B vaccination strategy is cost-effective (Biondi et al., 2023). A study conducted at a tertiary hospital in North-Central Nigeria on the timing of receiving the hepatitis B vaccine birth dose showed that 133 exposed infants (33%) received a timely birth dose of hepatitis B vaccine birth dose (Bada et al., 2022). A study conducted in Arsi Zone showed that 20.7% of hepatitis B exposed newborns have received the hepatitis B vaccine birth dose, and 83 (54.6%) have received both the hepatitis B vaccine and HBIG (Bayu, Elias, Abdisa, Tune & Namo, 2020b).

Objectives of the Study

To assess the timing of hepatitis B vaccine birth dose in exposed newborns and associated factors at Gurage Zone public health institutions, SNNPR, Southwest Ethiopia, 2022. The results of this study will provide an important input for the health bureau of Southwest Ethiopia to determine possible interventions aimed at improving the hepatitis B vaccine birth dose and addressing child health problems.

Methodology

Study Design, Period, and Setting

An institution-based cross-sectional study design was employed from April 2, 2022, to August 28, 2022, in Gurage Zone public health institutions. Gurage Zone is located about 158 kilometers southwest of the capital city of Ethiopia, Addis Ababa, and 255 kilometers from Hawassa, the capital city of SNNPR. The study was conducted at four governmental hospitals situated in the Gurage zone. Wolkite University Specialized Referral Teaching Hospital was established in 2018 G.C. and is located 170 km away from the capital city of Ethiopia, Addis Ababa. It provides services for more than 1.2 million inhabitants living in the Gurage zone and surrounding districts. Attat Primary Hospital, which is 175 km from Addis Ababa, was established in 1969 and serves 800,000 people. Butajira General Hospital is situated 130 km South of the capital of Ethiopia, Addis Ababa, and 50 km West of Ziway town in the Rift Valley. The hospital provides clinical services for the town of Butajira and its surrounding communities, serving approximately 1,300,000 people, and Gunchire Primary Hospital has been in operation since 2015 G.C. and serves 270,000 people. The daily average patient flow is 250 patients.

Research Questions

What is the proportion of timing of hepatitis B vaccine birth dose to exposed newborns in public hospitals of the Gurage zone?

What are the factors associated with timing of hepatitis B vaccine birth dose to exposed newborns in public hospitals of the Gurage zone?

Study Population

The study population included all HBV-exposed newborns (newborns delivered to mothers who were already diagnosed HBV positive) delivered at Gurage Zone health institutions during the study period.

Study Unit

Exposed newborns were selected using a systematic sampling technique based on the chronological order of their admission with their mothers to the postnatal care ward.

Inclusion Criteria

All HBV-exposed newborns admitted with their mothers to the immediate postnatal care ward.

Exclusion Criteria

Those mothers of exposed newborns who were not willing to take part in the study after details of the study purpose were provided during data collection.

Study Variables

Dependent Variables. Timing of the hepatitis B vaccine birth dose (received within 24 h or not).

Independent Variables. Sociodemographic characteristics (age, residence, occupation, educational status, marital status, household size, income, religion, and ethnicity). Reproductive health variables (number of ANC visits, parity, and birth interval).

Operational Definitions. *Exposed newborns:* An infant that born from HBsAg positive mother (Chen, 2009).

Timely administration of hepatitis B birth dose: is the first dose of hepatitis B vaccine that is given as soon as possible after birth, ideally within 24 h (WHO, July 2017, July 2020; WHO, 2019). Yes/No.

Sample Size Determination. The actual sample size was determined for the present study by using a single population proportion formula with assumptions of ($p=50%$, $95%$

confidence interval [CI], 5% margin of error, and 10% non-response rate, which yielded 422).

Sampling Techniques and Procedures

The Gurage zone has seven public hospitals: one specialized referral hospital, one general hospital, and five primary hospitals. First, from those hospitals, the researchers selected four hospitals by using a simple random sampling technique. The one-year total number of hepatitis B positive mothers in each hospital was identified (277 in Wolkite University Specialized Referral Hospital [WUSRH], 233 in Attat Primary Hospital [APH], 249 in Butajira General Hospital [BGH], and 197 in Gunchire Primary Hospital [GPH]). A total of 956 hepatitis B-positive mothers were identified in four selected hospitals. Then, the possible number of respondents in each hospital was allocated proportionally based on a one-year report of hospitals. Finally, systematic random sampling was used to select the study participants in each hospital as $K = N/n = 956/422$, where $K = 2$ (Figure 1).

Data Collection Tools

Data were collected using an interviewer-administered, pre-tested questionnaire containing questions related to sociodemographic characteristics, Obstetrics characteristics, and

vaccination status of exposed newborns. The questionnaire was prepared in English after different literature reviews (Bayu et al., 2020b; Li et al., 2012; Organization, 2017, 2019; Poland & Jacobson, 2004; Zanella et al., 2020) and translated into Amharic, the local language. Three BSc midwives were recruited to collect data. The general content validity of the questionnaires was checked by relevant professionals against the conceptual framework of the study, and the reliability of the questionnaire was checked using Cronbach's alpha value, which was 0.75.

Data Quality Management

Training was given to the data collectors and supervisors before data collection. A 5% pretest was done so that the questionnaire was then assessed for its clarity, length, and completeness. The quality of the collected data was checked daily by the principal investigator and supervisors. Everyday, the collected data were reviewed and cross-checked for completeness and relevance by the supervisors and principal investigators.

Statistical Analysis

The data were cleaned, entered into Epi Data 3.1, and exported to SPSS 23 for analysis. The data were cleaned by running Frequency, checking for missing values, and

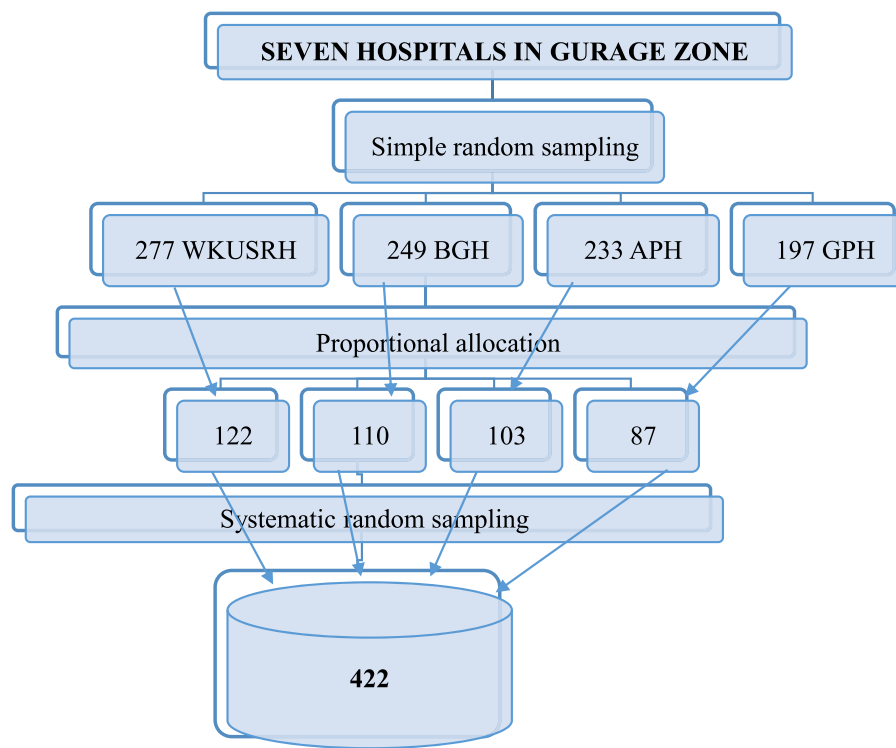


Figure 1. Schematic representation of sampling procedure for timing of hepatitis B vaccine birth dose in exposed newborns at public health institutions, Gurage Zone, SNNPR, Ethiopia, 2022.

checking for the presence of outliers. We summarized participants' characteristics using proportions of categorical variables and the mean with standard deviation (SD) based on the distribution of data for continuous variables. Normality was checked using the Shapiro–Wilk test. Factors associated with the outcome variable were analyzed using binary logistic regression. Bivariable analysis, a crude odds ratio with 95% CI, was used to see the association between each independent variable and the outcome variables. Variables with a p -value of ≤ 0.25 in the bivariable analysis were selected for the multivariable binary logistic regression model. Multi-collinearity was checked to see the linear correlation among the independent variables by using the variance inflation factor (VIF). The VIF of the data was < 10 , and no sign of multicollinearity was detected. A multivariable binary logistic regression analysis was computed to control the possible effects of confounders. The goodness of the fitness model was tested by the Hosmer–Lemeshow statistic, and its value was above 0.05. The strength of the association between dependent and independent variables was assessed using an adjusted odds ratio (AOR) with a 95% CI. A p -value was used to report the level of significance of each independent variable with respect to a dependent variable.

Results

Sociodemographic Characteristics of the Study Sample

All of the respondents responded to the questionnaire, making the response rate 100%. Nearly half 193 (45.7%) of the mothers of the exposed newborns were in the age group of 26–35 years, with a mean age of 28 years (28 ± 2.3 SD). More than two-thirds of the mothers of exposed newborns 292 (69.2%) were Gurage in ethnicity, more than half 214 (51.7%) were Orthodox religion followers, and more than half 240 (56.9%) were from rural areas. More than four-fifths of the mothers of exposed newborns 355 (84.1%) had formal education, and the average household size was 3.4 persons (3.4 ± 1.57) (Table 1).

Obstetric Characteristics of the Mothers

More than half 234 (55.5%) of the mothers of the exposed newborns had more than four children; two-thirds 281 (66.6%) had four or more ANC visits; and more than three-fourths 321 (76.1%) had a birth interval of more than two years (Table 2).

Prevalence of Hepatitis B Birth Dose Vaccination Among Hepatitis B Exposed Newborns

Among the 422 neonates that were exposed to HBV, 134 (31.7%) received the birth dose of the hepatitis B vaccine, and 57 (42.5%) received the vaccination punctually within

Table 1. Sociodemographic Characteristics of the Study Sample at Gurage Zone Public Health Institution, Southwest Ethiopia ($N = 422$).

Variables	Frequency	Percentage (%)
Age		
15–25	132	31.3
26–35	193	45.7
≥ 36	97	22.9
Residence		
Urban	182	43.1
Rural	240	56.9
Marital status		
Married	417	98.8
Unmarried	5	1.2
Ethnicity		
Gurage	292	69.2
Amhara	64	15.2
Kembeta	41	9.7
Oromo	25	5.9
Religion		
Orthodox	214	50.7
Muslim	157	37.2
Protestant	51	12.1
Educational status of women		
No formal education	67	15.9
Formal education	355	84.1
Occupation of women		
Housewife	241	57.1
Merchant	127	30.1
Government employee	54	12.8
Family monthly income(Birr)		
< 3000	93	22.0
≥ 3000	329	78.0
Family Size		
< 4	193	45.7
≥ 4	229	54.3

24 h of birth. Only 19 (14.2%) exposed newborns received the hepatitis B Immunoglobulin G vaccine. Eighty-one (60.4%) of the fathers of the exposed newborns were took part in the immunization program (Table 3).

Factors Associated with Timing of the Hepatitis B Vaccine Birth Dose

Using a bivariable binary logistic regression model, it was discovered that the following factors were statistically significantly associated with the timing of the hepatitis B vaccine birth dose: residence, women's educational level, family size, birth interval, number of ANC visits, and husband involvement in newborn vaccination. The multivariable binary logistic regression analysis indicated that the husband's involvement, the women's educational level, and the number of ANC visits were statistically significant at

Table 2. Obstetric Characteristics of the Mothers of the Exposed Newborns at Gurage Zone Public Health Institutions, Southwest Ethiopia (N = 422).

Variables	Frequency	Percentage (%)
Number of alive children		
<4	188	44.5
≥4	234	55.5
Number of ANC Visits		
Three or less times	141	33.4
Four and above	281	66.6
Birth Interval		
<1 year	101	23.9
>2 years	321	76.1
Mode of delivery		
SVD	377	89.3
Instrumental	28	6.6
Cesarean section	17	4.0
Birth weight		
<2500gm	47	11.1
≥2500gm	375	88.9

Table 3. Vaccination Status of the Hepatitis B Exposed Newborns That Born at Gurage Zone Public Health Institution, Southwest Ethiopia (N = 422).

Variables		Frequency	Percentage
Newborn vaccinated at birth (n = 422)	Yes	134	31.7
	No	288	68.3
Timing of vaccination (n = 134)	Within 24 hours	57	42.5
	Within 48 hours	77	57.5
HBIG received at birth (134)	Yes	19	14.2
	No	115	85.8
Timing of vaccination (n = 19)	Within 24 hours	11	57.9
	Within 48 hours	8	42.1
Husband involvement in vaccinating newborn (n = 134)	Yes	81	60.4
	No	53	39.6

the *p*-value 0.05 level. In this study, women with formal education had a 3.01 times higher likelihood of immunizing their exposed newborns on time than women without formal education (AOR = 3.01, 95% CI: 2.21–7.9); women who had four or more ANC visits were 2.33 times more likely to vaccinate their exposed newborns on time than women who had three or fewer visits (AOR = 2.33, 95% CI: 2.05–6.21); and husband participation in newborn vaccination increased the odds of giving the hepatitis B vaccine birth dose on time by 4.31 times compared to those who did not (AOR = 4.31, 95% CI: 2.03–6.34) (Table 4).

Discussion

In the current study, 57 (42.5%) (95% CI: 38.3–46.1%) of the exposed neonates received their first dose of the hepatitis B vaccine within 24 h. This result is significantly lower than the outcome of a large-scale study conducted in Greenland, where 80% of the exposed babies to the HBV had received a birth dose immunization on schedule (Børresen et al., 2012). The result of this study was also lower than the studies conducted in China, which revealed 97.3% and 96.3–97.1% (Wu et al., 2016; Zhang et al., 2014); Italy 94% (Zanella et al., 2020); United Kingdom 99.4% (Keeble et al., 2015); South Tarawa 95% (Wang et al., 2017); Western Pacific Region 67% (Kabore et al., 2022); Botswana 74% (Moturi et al., 2018), Nigeria 89.6% (Ndububa et al., 2022); and Arsi Zone 52.6% (Bayu, Elias, Abdisa, Tune & Namo, 2020a). The sociodemographic and socioeconomic variations of the study participants are the cause of the differences between prior studies and the current study. The finding of the present study was higher than the study done in the African Region (Nigeria, Democratic Republic of the Congo, Ethiopia, Rwanda, Cabo Verde, Sao Tome, Principe, Algeria, Senegal, and Botswana), which found that 14% of exposed newborns received the birth dose of the hepatitis B vaccine on time during the COVID-19 pandemic outbreak (Kabore et al., 2022) and in North-Central Nigeria, 33% (Bada et al., 2022). This difference from the present study is due to differences in the study period and the sociodemographic characteristics of the study participants. The current study was also higher than the studies conducted in Gambia 7% and Nigeria 13% (Moturi et al., 2018). This wide gap is due to differences in the sociodemographic, and socioeconomic characteristics of the study participants.

In this study, women with formal education had a 3.01 times higher likelihood of immunizing their exposed newborns on time than women without formal education (AOR = 3.01, 95% CI: 2.21–7.9). This is due to the fact that women with formal education know the consequences of the disease on their newborns, so they vaccinate them timely. The study conducted in Kinshasa, Democratic Republic of the Congo strengthens the current study that intensified education initiatives in highly endemic areas to improve prevention of MTCT efforts (Thahir et al., 2022). Women who had four or more ANC visits were 2.33 times more likely to vaccinate their exposed newborns timely than women who had three or fewer visits (AOR = 2.33, 95% CI: 2.05–6.21). This is due to the fact that mothers who have more antenatal care visits may have more information about hepatitis, vaccines for newborns, and the consequences of the disease. This encourages the mothers to be ready ahead of time to buy a vaccine for their exposed newborns.

Husband participation in newborns vaccination increased the odds of giving the hepatitis B vaccine birth dose on time

Table 4. Bivariable and Multivariable Binary Logistic Regression Analyses for HBV Exposed Newborns at Public Health Institutions, Southwest Ethiopia ($N = 422$).

Variables	Timely initiation of vaccine		COR (95% CI)	AOR (95% CI)	p value
	Yes	No			
Residence					
Rural	20	220	1		
Urban	37	145	2.81 (1.67–9.39)	2.10 (0.94–6.41)	0.103
Marital status					
Married	56	361	0.62 (0.32–2.27)	0.45 (0.71–3.19)	0.526
Unmarried	1	4	1		
Educational status of women					
No formal education	4	63	1		
Formal education	53	302	2.76 (2.34–7.01)	3.01 (2.21–7.09)	0.027
Family income in birr					
<3000	16	77	1		
≥3000	41	288	0.69 (0.54–4.31)	0.76 (0.43–1.94)	0.647
Family size					
<4	37	156	2.47 (2.09–6.21)	1.37 (0.97–2.71)	0.385
≥4	20	209	1		
Number of ANC Visits					
Three or less	10	131	1		
Four or more	47	234	2.63 (1.98–5.20)	2.33 (2.05–6.21)	0.031
Birth interval					
<1 year	13	88	1		
≥2 years	44	277	1.08 (1.01–4.84)	0.81 (0.23–2.03)	0.427
Husband involvement in newborn vaccination					
Yes	38	43	1.58 (2.35–5.22)	4.31 (2.03–6.34)	0.016
No	19	34	1		

p value less than 0.25 in bivariable analysis, and p value <0.05 in multivariable analysis indicates statistical significance.

by 4.31 times compared to those who did not (AOR = 4.31, 95% CI: 2.03–6.34). This might be due to the fact that husbands empower the household economy and have the capability to buy vaccines for their exposed newborns. The women who keep a secret about their hepatitis sero-status from their husbands might be incapable of buying vaccines.

Strength and Limitations of the Study

The cross-sectional study design makes it impossible to measure cause-and-effect relationships, and selection bias could also be a weakness of this study.

Implications for Practice

The findings from this study have several implications for improving the timely administration of the hepatitis B vaccine birth dose in exposed newborns. This study revealed the factors that have a significant association with the timing of the hepatitis B vaccine birth dose in exposed newborns, and it provides important information for zonal health offices and their respective districts to improve the vaccination status of the hepatitis B vaccine birth dose in exposed

newborns. It should also promote strong community-based behavioral change on the importance of timely administration of the hepatitis B vaccine birth dose. Health facilities should enhance linkage with health posts to increase ANC service utilization, and health extension workers should promote and give health education about the hepatitis B vaccine.

Conclusion and Recommendations

In Southwestern Ethiopia, timely delivery of the hepatitis B vaccine at birth to exposed newborns was not sufficient. Therefore, strengthening health education about hepatitis B and the hepatitis B vaccine, encouraging women to attend at least four antenatal care visits, and encouraging the participation of men in the vaccination process will improve the vaccination status of the exposed newborns. Currently, in Ethiopia, the government has not focused on vaccinating newborns exposed to hepatitis B. This vaccine is only available in private pharmacies and is not affordable for the vast majority of the population. So, the government has to get involved and provide vaccines to the exposed newborns at a reasonable cost.


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Authors' Contributions


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Data Availability

Data that support the findings are available from the corresponding author upon a reasonable request.

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.

Ethical Approval and Consent to Participants

The ethical clearance was obtained from the Institutional Review Board (IRB) of Wolkite University, College of Medicine and Health Sciences, with reference number CMHS/IRB's 0025/2022. A formal letter was written by the IRB to each hospital, and official permission was secured. Written informed consent was obtained from all mothers of exposed newborns before the study. The purpose and importance of the study were explained to women, and they were also informed about the possibility of refusing participation at any time during data collection. The confidentiality of the data was assured and maintained; a code number was assigned to the study participants without mentioning their names, and the information that was collected for the study was kept in a file and locked with a key.

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Informed Consent

Written informed consent was obtained from all subjects.

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