

# Sero-Prevalence of Hepatitis B Virus and Associated Factors among Pregnant Women's Attending Antenatal Clinics in Public Hospitals of Hawassa City, Southern, Ethiopia, 2021. Cross Sectional Study

Makonnen Bogale Shiferaw<sup>1</sup>, Bargude Balta Anjulo<sup>1\*</sup>

Hawassa University, Hawassa Ethiopia

**\*Corresponding Author:**

Bargude Balta Anjulo, Hawassa University, Hawassa Ethiopia

**Submitted:** 01 Oct 2022; **Accepted:** 12 Oct 2022; **Published:** 14 Apr 2023

**Citation:** Shiferaw, M. B., Anjulo, B. B. (2023). Sero-Prevalence of Hepatitis B Virus and Associated Factors among Pregnant Women's Attending Antenatal Clinics in Public Hospitals of Hawassa City, Southern, Ethiopia, 2021. Cross Sectional Study. *J Gene Engg Bio Res*, 5(1), 66-74.

## Abstract

**Introduction:** Viral hepatitis caused by the hepatitis B virus (HBV) is now recognized as a growing worldwide health issue. A significant global public health issue is the estimated 350 million people who have been diagnosed with chronic HBV infection and the 686,000 deaths that occur each year. Since HBV infected pregnant women are at risk of transmitting virus to their babies, knowing prevalence of HBV and its risky factors in the area is very essential. Providing area-specific hepatitis B burden data to enable health policymakers to develop suitable and cost-effective HBV infection prevention strategies.

**Objective:** The objective of this study was to determine the sero-prevalence of HBV and related factors in pregnant women attending ANC at hospitals in Hawassa City, 2021.

**Method:** From May 20 to July 30/2021, 320 pregnant women were the subjects of a hospital-based cross-sectional research at the Public Hospital in Hawassa City. SPSS version 25.0 was used to enter and analyze the data. HBV prevalence was determined using descriptive statistics; bivariate and multivariate logistic regression analysis was utilized to find independent predictors of HBV status at  $p$ -value  $<0.05$ .

**Results:** Overall Sero-prevalence of HBV infection was [6.9% (95% CI (6.6%, 7.2%)). History of transfusion, history of vulvar ulcer, and contact with patients who had jaundice were all independently predictive of HBV in the study area (AOR = 19, 95%CI, (2.1-27.1), AOR = 14.8 (95%CI, 1.12-19.4), and AOR = 12.7.6[12-13.4], respectively).

**Conclusion:** In the studied area, intermediate endemicity of HBV prevalence was found. To decrease HBV endemicity, it is crucial to raise awareness about HBV transmission specially contact history of jaundice individual, vulvar ulcer and conduct early screenings at blood donor sites before transfusion.

**Keywords:** HBV, Pregnant Women, Hawassa, Ethiopia

## Introduction

Around 350–400 million people worldwide have chronic hepatitis B virus (HBV) infections, with over 65 million of them people living in Africa. With chronic hepatitis B, one in four persons experience severe health issues. Hepatitis B virus (HBV) infection may be routinely screened for, and those who need treatment or vaccine can be identified. It is becoming more widely acknowledged that the hepatitis B virus (HBV) infection has a significant worldwide impact and that viral hepatitis is a new global health issue [1].

Pregnant women in sub-Saharan Africa are at high risk of hepatitis B virus (HBV) infection. Screening for HBV is important to stop infection from spreading vertically from mother to child, which is linked to a higher likelihood of producing carriers and, as a result, sustaining the infection in the community [2]. There are several epidemiological studies on the prevalence of the hepatitis B virus in Ethiopian expectant mothers accessible. This distinct research showed significant variance over time and between different geographic locations.

Up to 20% of individuals with HBsAg sero conversion may reactivate and become HBeAg positive again. After sero conversion, ongoing follow-up with quantitative measurement of hepatitis B viral DNA and aminotransferase levels is essential to assure its durability [3].

Since HBV infected pregnant women are at risk of transmitting virus to their babies, knowing prevalence of HBV and its risky factors in the area is very essential. Providing area-specific hepatitis B burden data to enable health policymakers to develop suitable and cost-effective HBV infection prevention strategies. As a result, this study was carried out to provide the estimated seroprevalence of the problem in the city, as well as factors associated with it, as input for program planning, implementation, and evaluation of interventions aimed at the prevention and control of transmissible infections from mother to child [4-6].

## Methods

### Study Area

This study was carried out in the Adare General Hospital in the Sidama Region of Hawassa City, the Comprehensive Specialized Hospital of Hawassa University, and the Tula Primary Hospital in the Tula Sub-city. Hawassa City is 275 kilometers south of Addis Abeba. The CSA estimates that the town has a total population of 371,826 people, with a male to female ratio of 191,352 to 180,474 people living in 8 sub cities. In the town, there are three government hospitals, ten government health centers, one non-governmental organization health center, five primary private hospitals, three specialty clinics, and twenty-two medium clinics that offer healthcare services to the local population [7-10].

Regular prenatal screening services, including as HIV testing, hemoglobin determination, blood group testing, fast plasma testing, and daily urinalysis, are offered by the hospital's ANC clinic. From May 20 to July 30, 2021, an analytical cross-sectional study was conducted at hospitals affiliated with Hawassa University College of Medicine and Health Science, Adare General Hospital in the Sidama Region of Hawassa City, and Tula Primary Hospital in the Tula Sub-City.

### Study Design and Study Period

From May 20 to July 30, 2021, an institutionally based cross-sectional study was carried out at the antenatal clinic in Hawassa City. All pregnant women's attending ANC at HUCSH, Adare and Tula hospitals at study period was included in this study.

### Sample Size of the Study

Hepatitis B virus prevalence among pregnant women was 7.3%, according to a prior research conducted in the Wolayta zone (2). The minimal sample size for this investigation is determined using this prevalence. To calculate the sample size, a single proportion formula with a 95% confidence level ( $Z_{(1-\alpha/2)} = 1.96$ ) and 3% marginal errors will be employed;

$$n = z^2 \frac{P(1-P)}{d^2}$$

Where n=maximum sample size

P=7.3% (prevalence from Previous study)

d= (0.03) marginal error between sample and population  $Z_{\alpha/2} = (1.96)$  critical value at 95% confidence interval  $n = (1.96)^2 \times .073 \times .927 / 0.0009 =$ . By adding 10% non-respondents rate gives total sample size 320 respondents.

### Data Collection Tool and Collection Methods

Following training for sample collection and testing procedures given to four female nurses and one laboratory technologist, data was collected via face-to-face interviews utilizing the pretested questionnaires. The principal investigator and two trained supervisors were present at each step of the data collecting procedure each day to confirm the validity of the collected data. Data was collected from June 20 to July 30, 2021.

### Data Processing and Analysis

The Statistical Package for Social Sciences (SPSS) version 25.0 was used to export the data that had been entered into Epi data. Describing statistics including frequencies, proportions, and summary statistics were used to compare the prevalence of HBV in the research to relevant factors. The researchers to evaluate the association between various predictor variables and the dependent variable used bivariate and multivariate analysis with logistic regression models. To assess the bivariate relationship between each independent variable and the outcome variable, a binary logistic regression analysis was utilized. The variables that showed a significant association on bivariate analysis with a p-value of 0.25 were used in multivariate logistic regression. Multivariate logistic regression analysis was used to detect HBV determinants. The strength of the relationship between the dependent and independent variables was analyzed using the adjusted odds ratio with a 95% CI and a p-value < 0.05 [11-15].

### Data Quality Assurances

Every day, the accuracy and completeness of the data were checked. Using known positive and negative controls collected from pregnant women who underwent quick HBsAg testing, the effectiveness of the rapid HBsAg test kit was assessed. Further validating the results was the appearance of a color band at the control line, which served as a procedural control.

### Ethics Approval and Consent to Participate

The institutional review board of the Pharma College received the proposal, assessed it, and gave its approval. After receiving the go-ahead from those relevant bodies, the project was then carried out. By gaining the consent of the study participants, the data and sample were gathered. Using codes, all participant data and results were kept confidential.

## Result

### Socio - Demographic Characteristics

The study comprised 326 pregnant women who were receiving ANC services at public health facilities in Hawassa city, with a response rate of 98.2%. Participants' ages ranged from 15 to 39, respectively, with a mean of 28.73 (SD + 6.64 years). The majority, 335 (681%) were between the ages of 25 and 29. About

306 (95.6%) of the study's participants were married. There were 131 (40.9%) protestant religious adherents. More than half (171) (53.4%) of them worked as homemakers. In terms of their level of education, 126 (39.5%) of the respondents had finished high school. In terms of monthly income, 153 (47.8) were over \$300. (Table 1).

**Table 1: Socio-Demographic Characteristics of reproductive women is of Hawassa city, Sidama region, Ethiopia 2021.**

| Variable              | Category                        | Frequency | Percent (%) |
|-----------------------|---------------------------------|-----------|-------------|
| Age                   | 15-19                           | 18        | 5.6         |
|                       | 20-24                           | 88        | 27.5        |
|                       | 25-29                           | 130       | 40.6        |
|                       | 30-34                           | 49        | 15.3        |
|                       | 35-39                           | 35        | 10.9        |
| Residence             | Urban                           | 243       | 75.9        |
|                       | Rural                           | 77        | 24.1        |
| Religion              | Protestant Orthodox             | 131       | 40.9        |
|                       | Muslim                          | 108       | 33.8        |
|                       |                                 | 81        | 25.3        |
| Marital status        | Married                         | 306       | 95.6        |
|                       | Divorced                        | 7         | 2.2         |
|                       | Widowed                         | 7         | 2.2         |
| Occupation            | Governmental House wife Student | 67        | 21.0        |
|                       | Merchant                        | 171       | 53.4        |
|                       |                                 | 43        | 13.4        |
|                       |                                 | 39        | 12.2        |
| Educational level     | No education                    | 31        | 9.7         |
|                       | Primary Secondary               | 95        | 29.7        |
|                       | More than Secondary             | 126       | 39.4        |
|                       |                                 | 68        | 21.2        |
| Monthly income (Birr) | <1000                           | 39        | 12.2        |
|                       | 1001-2000                       | 63        | 19.7        |
|                       | 2001-3000                       | 65        | 20.3        |
|                       | >3001                           | 153       | 47.8        |

### Clinical Factors

252 (78.8%) of the individuals in this research who did not previously have any teeth extracted and 295 (92.2%) of the people who were Prancing sharpened material. Most women—286 or 89.4%—do not have tattoos. Most of the participants—306 (95.6%)—

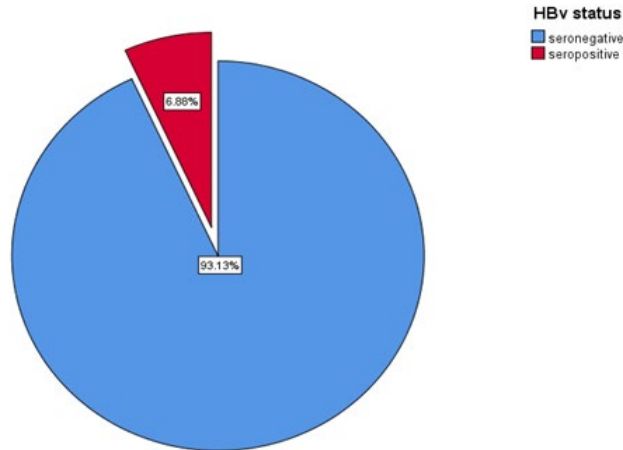
had no prior history of HIV infection, and nearly all the respondents—316 (98.1%)—did not interact with those who had yellow eyes. Around 298 (89.1%) have never received a blood transfusion, and 276 (86.2%) have never undergone surgery (Table 2).

**Table 2: Clinical Characteristics of reproductive women is of Hawassa city, Sidama region, Ethiopia 2021.**

| Variable                                  | Category | Frequency | Percent (%) |
|---|----------|-----------|-------------|
| Hepatitis B virus(+ve)                    | Yes      | 22        | 6.9         |
|   | No       | 298       | 93.1        |
| Tooth extraction                          | Yes      | 68        | 21.2        |
|   | No       | 252       | 78.8        |
| Surgical procedure                        | Yes      | 44        | 13.8        |
|   | No       | 276       | 86.2        |
| Tattooing                                 | Yes      | 34        | 10.6        |
|   | No       | 286       | 89.4        |
| Prancing sharped material                 | Yes      | 25        | 7.8         |
|   | No       | 295       | 92.2        |
| Blood Transfusion                         | Yes      | 35        | 10.9        |
|   | No       | 285       | 89.1        |
| HIV status                                | Yes      | 14        | 4.4         |
|   | No       | 306       | 95.6        |
| HBV Vaccinated                            | Yes      | 18        | 5.6         |
|   | No       | 302       | 94.4        |
| More than one partner sexual participated | Yes      | 18        | 5.6         |
|   | No       | 302       | 94.4        |
| History of Diabetic mellitus              | Yes      | 10        | 3.1         |
|   | No       | 310       | 96.9        |
| Yellowish eye                             | Yes      | 4         | 1.3         |
|   | No       | 316       | 98.7        |
| History of admitted in hospital           | Yes      | 47        | 14.7        |
|   | No       | 273       | 85.3        |
| History of admitted in hospital           | Yes      | 47        | 14.7        |
|   | No       | 273       | 85.3        |
| Work in clinical place                    | Yes      | 14        | 4.4         |
|   | No       | 306       | 95.6        |
| Contact with jaundice patients            | Yes      | 19        | 5.9         |
|   | No       | 301       | 94.1        |

### Prevalence of HBV Infection

As indicated in Fig. 1, out of a total of 320 study participants, 22 (or 6.9%) tested positive for HBsAg in a laboratory test, whereas the remaining 298 (or 92.7%) did not.



**Figure 1:** Pie chart shows that prevalence of HB in pregnant women is attending ANC at Hawassa town Sidama regional state 2021.

### Reproduce Health Related Factors

About 262 (81.9%) and 249 (77.8%) of the study's subjects were multi-gravid and multi-Para, respectively. 180 patients in all, or 56.3%, had more than two ANC follow-up visits throughout their

current pregnancies. Less than half of them (44.7%) were in the first trimester or earlier of their current pregnancy. A nearly identical number of 277(86.6) have never had an abortion and have never had many sexual encounters (Table 3).

**Table 3: Reproductive Characteristics of reproductive Women is of Hawassa City, Sidama Region, Ethiopia 2021.**

| Variable                        | Category      | Frequency | Percent (%) |
|---------------------------------|---------------|-----------|-------------|
| History of gravity              | Prime gravid  | 58        | 18.1        |
|                                 | Mult gravid   | 262       | 81.9        |
| Stage of pregnancy              | 1st trimester | 95        | 29.7        |
|                                 | 2nd trimester | 94        | 29.4        |
|                                 | 3rd trimester | 131       | 40.9        |
| Visited health facility         | One time      | 62        | 19.4        |
|                                 | Two-time      | 78        | 24.4        |
|                                 | Three time    | 96        | 30.0        |
|                                 | Four time     | 84        | 26.3        |
| History of party                | One           | 71        | 22.2        |
|                                 | Two           | 84        | 26.3        |
|                                 | Three         | 103       | 32.2        |
|                                 | Four          | 62        | 19.4        |
| Cesarean section                | Yes           | 55        | 17.2        |
|                                 | No            | 265       | 82.8        |
| Abortion                        | Yes           | 43        | 13.4        |
|                                 | No            | 277       | 86.6        |
| Female genital mutilation       | Yes           | 184       | 57.5        |
|                                 | No            | 136       | 42.5        |
| Vulvar Ulcer                    | Yes           | 15        | 4.7         |
|                                 | No            | 305       | 95.3        |
| Sexual contact multiple partner | Yes           | 43        | 13.4        |
|                                 | No            | 277       | 86.6        |

### Bivariate and Multivariate Logistic Regression Analysis of Factors Associated to HBV

In the bivariate analysis, the following variables become candidates for multivariate analysis ( $p < 0.25$ ): tattooing, sharing sharp objects, cesarean section, and history of abortion, blood transfusion, history of hospital admission, vulvar ulcer, and history of contact with patients who have jaundice. Pregnant women undergoing ANC at public hospitals in Hawassa town had a substantially higher risk of HBV infection if they had a history of blood transfusions, vulvar ulcers, or previous contact with patients who

had jaundice among the variables incorporated in the multivariate analysis. Persons who had a history of blood transfusions were almost 19 times more likely to get HBV infection than participants without a transfusion history (AOR = 19, 95%CI, 2.1-27.1. Women who had a history and those who had contact with patients who had jaundice were 12.8[12-13.4] 13 times more likely of HBV infection and Pregnant women with a history of vulvar ulcer (AOR = 14.78; 95% CI (1.12-19.4) were nearly fifteen times more likely to acquire HBV infection compared to those who had no history of vulvar ulcer (Table 4).

**Table 4: Bivariate and Multivariate Analysis of Factors Associated with HBV Pregnant of Women's of Hawassa city, Sidama region, Ethiopia 2021.**

| Characteristics  | HBV status |          | P value | COR (95%CI)         | P-value | AOR (95%CI)        |
|--|------------|----------|---------|---------------------|---------|--------------------|
|  | Positive   | Negative |         |                     |         |                    |
| <b>Tattooing</b>   |            |          |         |                     |         |                    |
| Yes  | 8          | 26       | p≤0.001 | 6[2.29–15.6]1       | 0.05    | 6.9[0.98–48.7] *   |
| No   | 14         | 272      |         |                     |         |                    |
| <b>Sharing sharp material</b>  |            |          |         |                     |         |                    |
| Yes  | 10         | 15       | p≤0.001 | 15.7[5.86–42.2] 1   | 0.4     | 2.43[0.3–19] *     |
| No   | 12         | 283      |         |                     |         |                    |
| <b>Caesarian section</b>   |            |          |         |                     |         |                    |
| Yes  | 13         | 42       | p≤0.001 | 8.86[3.54–21.9] 1   | 0.05    | 8.3[0.99–69.5] *   |
| No   | 9          | 256      |         |                     |         |                    |
| <b>Abortion</b>  |            |          |         |                     |         |                    |
| Yes  | 7          | 36       | 0.13    | 3.46[1.3–8.89] 1    | 0.13    | 6.4[0.58–72] *     |
| No   | 15         | 262      |         |                     |         |                    |
| <b>Blood transfusion</b>   |            |          |         |                     |         |                    |
| Yes  | 14         | 21       | p≤0.001 | 23.6[8.7–61.2] 1    | p≤0.001 | 19[2.1–27.1] **    |
| No   | 8          | 277      |         |                     |         |                    |
| <b>Hospital admission</b>  |            |          |         |                     |         |                    |
| Yes  | 12         | 35       | p≤0.001 | 9[3.63–22.5] 1      | 0.9     | 0.9[0.09–8.4] *    |
| No   | 10         | 263      |         |                     |         |                    |
| <b>Vulvar ulcer</b>  |            |          |         |                     |         |                    |
| Yes  | 8          | 7        | p≤0.001 | 23.76[7.54–74.83] 1 | 0.04    | 14.8[1.12-19.4] ** |
| No   | 14         | 291      |         |                     |         |                    |
| <b>Contact jaundice patient</b>                                      |            |          |         |                     |         |                    |
| Yes  | 14         | 5        | p≤0.001 | 10.2 [9.7–35.4] 1   | p≤0.001 | 12.8[12–13.4] **   |
| No   | 8          | 293      |         |                     |         |                    |
| AOR = adjusted odds ratio, COR = crude odds ratio *≤0.25<br>** ≤0.05 |            |          |         |                     |         |                    |

---

## Discussion

HBV is a major public health burden in globe and one of the most infectious viruses with the most considerable mortality. Various studies have tried to determine the prevalence and factors associated with HBV in Ethiopia; however, findings were inconsistent and inconclusive due to single set up study. In this study, we analyzed a total of 320 ANC women from three different hospitals. In this study, the overall prevalence of HBsAg was 6.9 % and the study area was categorized under intermediate endemicity. The overall prevalence rate for HBV in this study was 6.9% was higher compared with the prevalence rate in pregnant women's of Rwanda 3.7% Turkey 2.1%, West Harerege, Ethiopia 6.1%, Bahir Dar city 6.6% and Bishoftu General 5.4 % [16-20].

Finding of this study were in contrast, lower than previous study in Hawassa, Ethiopia 9 %(10), Gedeo Zone, Southern Ethiopia 9.2% , Cameroon 25.3% , Gambia 9.20% , Ghana 7.7% , Wolaita Zone, South Ethiopia and Gambela region, South Western Ethiopia prevalence of 7.3% and 7.9% Finding from Daworo Zone Southwest Ethiopia was 3.5% which is twice lower than this study. the result is similar to a study in Deder Hospital, Eastern Ethiopia 6.9 and Addis Ababa 7% [12]. The variation in prevalence could be due to difference in geographical, socio cultural and behavioral factors of study participants [21-24].

The study revealed that, History of transfusion, history of vulvar ulcer, and contact with patients who had jaundice were all independently predictive of HBV in the study area.

According to this study, the prevalence of hepatitis b infection was significantly higher among pregnant women who had history of blood transfusions, contact history with jaundice individuals and vulvar ulcer. Blood transfusion was one of determinant predictors of HBV, those who has history of transfusion has 19 time more likely to be positive. which is congruent with study done in Bahir Dar city, Northwest Ethiopia in which previous history of transfusion the main factors of HBV and Hargeisa, Somaliland but contradicted by study conducted at West Harerege history of abortion, traditional tonsillectomy (tonsillectomy conducted by an untrained practitioner), admission to a health facility, multiple sexual partners were associated with hepatitis B virus infection among pregnant women and Gambela shows that history of abortion, occupation and multiple sexual partners are the major factors associated with HBV.

History of Pregnant women having history of vulvar ulcer were showed statistically significant association with HBV infection this study which is similar with study done Somaliland and contradicts with finding from Wolaita zone southern Ethiopia in which HBV be linked to body fluids, semen and vaginal secretions. HBV infection was highly related with history of contact jaundice in which those history of contact jaundice were 13 times more likely to be HBV positive which is congruent with research done in

Mizan Aman Southwest Ethiopia History of contact with jaundice patients was significantly associated [15,16].

## Conclusion

Intermediate endemicity of prevalence of hepatitis HBV was detected among pregnant women attending ANC in Hawassa city public hospitals according to WHO classification. Blood transfusion, history of Vulvar ulcer and history of contact with jaundice patient were found to be the determinant factors of sero-positivity of HBV.

## Recommendations

Recommendation based on the study finding, the following recommendations were forwarded to concerned bodies in order to reduce transmission of HBV from the mother to child and its consequences. Health education programs on the mode of HBV transmission, especially on prevention of contact with jaundice patients.

- Early screening on blood before blood donation and transfusion were suggested
- Reduction of high-risk behaviors including having unprotected contact with vulvar ulcer and methods of preventions should be given to communities as well as to ANC attendants at antenatal care clinics to raise the awareness of mothers and community.
- Further study should be performed by using more sophisticated diagnostic methods like ELISA, molecular HBV- Deoxyribonucleic acid test

## Declarations

### List of Acronyms

CLD: Chronic Liver Disease

DNA: Di nucleic Acid

DHBV: Duck Hepatitis B virus

HBsAg: Hepatitis B Surface antigen HCC: Hepatocellular Carcinoma HHBV: Heron hepatitis B virus

HIV: Human Immunovirus

GSHV: Ground Squirrel Hepatitis B virus NPC: Nuclear Pore Complex

## Ethics Approval and Consent to Participate

The study was conducted after getting approval from pharma college institutional review board (IRB) to conduct the study. A formal support letter was written to three of selected hospitals, where the study conducted. Both verbal and written consents were obtained from the study participants. For those who are unable to read and write verbal consent were obtained after explaining the purpose of the study while for those who are able to write and read, written consent was obtained. During the consent process first IRB-approved version of consent form in Amharic (the local language) language prepared. Confidentiality is kept at each step of data collection and processed. In addition, positive HBsAg test results of the study participants were communicated with their physician for farther investigation and better management of the patients.

## Consent to Publish

Not applicable.

## Availability of Data and Materials

For those who are interested the datasets analyzed during the current study are available from the corresponding author on reasonable request.

## Competing Interests

The authors declare that they have no competing interests.

## Funding

Not applicable

## Authors Contribution:

BB, MB, conceived and designed the study and developed the data collection instruments. BB and MB performed the statistical analysis and wrote all versions of the manuscript. All authors critically revised and approved the final manuscript.

## Acknowledgment

We would like to say thank you very much for all mothers who are involved as study participant in this study. A preprint has previously been published

## Strength and Limitations of the Study

Study involved specialized, General hospitals and districts hospitals it is good to estimate pooled prevalence in city Laboratory technologists performed all testing blinded through use of coded specimens.

Since study involved multicenter so it have appropriate sample size and it can explain real prevalence comparison to single site study.

It is cross sectional design goes it does not measure cause and effect of relationship.

Number of positives are few that can may weak the association of predictor

## References

1. Bargude B., Mokenen B L. (2020). Sero-Prevalence of Hepatitis B virus and associated factors among pregnant women attending antenatal clinics in hawassa town public hospitals, Sidama region, Ethiopia. Research square.
2. Mamuye, B., Gobena, T., & Oljira, L. (2020). Hepatitis B virus infection and associated factors among pregnant women attending antenatal clinics in West Hararghe public hospitals, Oromia region, Ethiopia. The Pan African Medical Journal, 35.
3. Bancha B., Kinf AA., Chanko KP., Workie SB., Tadese T. (2020). Prevalence of hepatitis B viruses and associated factors among pregnant women attending antenatal clinics in public hospitals of Wolaita Zone, South Ethiopia. PLoS One 15(5):1–12.
4. Ocama, P., Opio, C. K., & Lee, W. M. (2005). Hepatitis B virus infection: current status. The American journal of medicine, 118(12), 1413-e15.
5. Alemu, A. Y., Endalamaw, A., Belay, D. M., Mekonen, D. K., Birhan, B. M., & Bayih, W. A. (2020). Healthcare-associated infection and its determinants in Ethiopia: A systematic review and meta-analysis. PloS one, 15(10), e0241073.
6. Awole, M., & Gebre-Selassie, S. (2005). Seroprevalence of HBsAg and its risk factors among pregnant women in Jimma, Southwest Ethiopia. Ethiopian Journal of Health Development, 19(1), 45-50.
7. Bittaye, M., Idoko, P., Ekele, B. A., Obed, S. A., & Nyan, O. (2019). Hepatitis B virus sero-prevalence amongst pregnant women in the Gambia. BMC infectious diseases, 19(1), 1-8.
8. Dortey BA., Anaba EA., Lassey AT., Damale NKR., Maya ET. (2020). Seroprevalence of Hepatitis B virus infection and associated factors among pregnant women at Korle-Bu Teaching Hospital, Ghana, PLoS One15(4):1–10.
9. Taye, M., Daka, D., Amsalu, A., & Hussien, S. (2019). Magnitude of hepatitis B and C virus infections and associated factors among patients scheduled for surgery at Hawassa University comprehensive specialized Hospital, Hawassa City, Southern Ethiopia. BMC research notes, 12(1), 1-6.
10. Makuza, J. D., Rwema, J. O. T., Ntihabose, C. K., Dushimiyimana, D., Umutesi, J., Nisingizwe, M. P., & Nsanzimana, S. (2019). Prevalence of hepatitis B surface antigen (HBsAg) positivity and its associated factors in Rwanda. BMC infectious diseases, 19(1), 1-10.
11. Cetin, S., Cetin, M., Turhan, E., & Dolapcioglu, K. (2018). Seroprevalence of hepatitis B surface antigen and associated risk factors among pregnant women. The Journal of Infection in Developing Countries, 12(10), 904-909.
12. Yazie, T. D., & Tebeje, M. G. (2019). An updated systematic review and meta-analysis of the prevalence of hepatitis B virus in Ethiopia. BMC infectious diseases, 19(1), 1-13.
13. Tadiwos MB., Kanno GG., Areba AS., Kabthymmer RH., Abate ZG., Aregu MB. (2021). Sero- Prevalence of Hepatitis B Virus Infection and Associated Factors Among Pregnant Women Attending Antenatal Care Services in Gedee Zone, Southern Ethiopia. J Prim Care Community Heal. 12.
14. Metaferia, Y., Dessie, W., Ali, I., & Amsalu, A. (2016). Seroprevalence and associated risk factors of hepatitis B virus among pregnant women in southern Ethiopia: a hospital-based cross-sectional study. Epidemiology and health, 38.
15. Gedefaw G., Waltengus F., Akililu A., Gelaye K. (2019). Risk factors associated with Hepatitis B virus infection among pregnant women attending antenatal clinic at Felegehiwot referral hospital, Northwest Ethiopia, 2018: An institution based cross sectional study. 1–4.
16. Tanga, A. T., Teshome, M. A., Hiko, D., Fikru, C., & Jilo, G. K. (2019). Sero-prevalence of hepatitis B virus and associated factors among pregnant women in Gambella hospital, South



- Western Ethiopia: facility based cross-sectional study. *BMC infectious diseases*, 19(1), 1-7.
17. Al-Mamari, A. (2019). Determine seroprevalence and associated risk factors of HBV infection among pregnant women and its relationship with blood transfusion at Hargeisa Group Hospital, Hargeisa, Somaliland. *International Journal of Clinical Virology*, 3(1), 001-009.
  18. Asaye, Z., Aferu, T., Asefa, A., Feyissa, D., Regasa, T., Kebede, O., & Feyisa, M. (2021). Prevalence of hepatitis B virus among pregnant women on antenatal care follow-up at mizan-tepi university teaching hospital and mizan health center, southwest Ethiopia. *International Journal of General Medicine*, 14, 195.
  19. Zenebe, Y., Mulu, W., Yimer, M., & Abera, B. (2014). Seroprevalence and risk factors of hepatitis B virus and human immunodeficiency virus infection among pregnant women in Bahir Dar city, Northwest Ethiopia: a cross sectional study. *BMC infectious diseases*, 14(1), 1-7.
  20. Zelalem Desalegn., Adane Mihret, HBB, Yilma M., Yimer Seid., Tamiru W., Abebe Ejigu., WA, Boka. A, Ebstie., and YA. (2017). Survey of Hepatitis B virus infection and risk factors among pregnant women at public hospital in Ethiopia. *Int J Biomed Res* 8(12):8.
  21. Chernet, A., Yesuf, A., & Alagaw, A. (2017). Seroprevalence of Hepatitis B virus surface antigen and factors associated among pregnant women in Dawuro zone, SNNPR, Southwest Ethiopia: a cross sectional study. *BMC research notes*, 10(1), 1-5.
  22. Bancha B., Kinf AA., Chanko KP., Workie SB., Tadese T. (2020). Prevalence of hepatitis B viruses and associated factors among pregnant women attending antenatal clinics in public hospitals of Wolaita Zone, South Ethiopia. *PLoS One* 15(5):1–12.
  23. Tanga, A. T., Teshome, M. A., Hiko, D., Fikru, C., & Jilo, G. K. (2019). Sero-prevalence of hepatitis B virus and associated factors among pregnant women in Gambella hospital, South Western Ethiopia: facility based cross-sectional study. *BMC infectious diseases*, 19(1), 1-7.
  24. Umare A., Seyoum B., Gobena T., Mariyam TH. (2016). Hepatitis B virus infections and associated factors among pregnant women attending antenatal care clinic at dedera hospital, eastern Ethiopia. *PLoS One*. 11(11):1–11.

*Copyright:* ©2023 Bargude Balta Anjulo, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.