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Seroprevalence of syphilis and associated factors among pregnant women who attended antenatal care follow-up at public hospitals in Bahir Dar city, north-west Ethiopia: a cross-sectional study

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ABSTRACT

Background Syphilis, caused by *Treponema pallidum*, remains a significant global public health concern, especially among pregnant women due to its severe impact on maternal and fetal health. Although the burden of syphilis and its risk factors has been extensively studied worldwide, data specific to Bahir Dar, particularly within the context of three public hospitals, remain limited. This is further compounded by the inconsistent implementation of existing prevention and treatment policies. Untreated syphilis can lead to adverse pregnancy outcomes, including spontaneous abortion, stillbirth, early neonatal death and congenital syphilis. This study aimed to assess the seroprevalence of syphilis and associated factors among pregnant women attending antenatal care (ANC) at three public hospitals in Bahir Dar, North-West Ethiopia.

Methods A cross-sectional study was conducted among 551 pregnant women attending ANC at Tibebe Ghion Specialized Hospital, Felege Hiwot Comprehensive Specialized Hospital and Addis Alem Hospital from January to April 2023 Gregorian Calender (G.C). Participants were selected using systematic random sampling, and data were collected through structured interviews using a pretested questionnaire. Data were processed using EpiData V.3.1 and analysed with SPSS V.25, employing bivariate and multivariable logistic regression to identify significant factors.

Results The seroprevalence of syphilis was 2.4% (95% CI: 1.3-3.8), with a higher prevalence among urban residents (3.6%) compared with rural residents (1%). Significant associations were found between syphilis prevalence and a history of stillbirth (adjusted OR (AOR)=7.28; 95% CI: 1.05-24.87) and a history of active or previous sexually transmitted infections (AOR=5.3; 95% CI: 1.23-22.52).

Conclusion The study's seroprevalence aligns with previous findings, emphasising the need for routine syphilis screening and treatment in ANC services. Special attention should be given to women with a history of stillbirth, other adverse pregnancy outcomes or sexually transmitted infections. Enhanced counselling on syphilis screening and treatment is essential to reduce the burden of syphilis and improve maternal and fetal health outcomes.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Syphilis remains a significant public health issue globally, particularly among pregnant women, due to its potential to cause severe maternal and fetal complications.
⇒ Routine syphilis screening in antenatal care (ANC) service is recommended by the WHO to detect and treat the infection early, thereby preventing adverse pregnancy outcomes.
⇒ Despite these recommendations, syphilis continues to be prevalent in low-resource settings, and factors such as poor access to healthcare, lack of awareness and inadequate screening contribute to its persistence.

INTRODUCTION

Syphilis, caused by the bacterium *Treponema pallidum*, is a widespread sexually transmitted infection (STI) with significant implications for public health globally, particularly in developing nations.[1] The primary means of transmission is through sexual contact and vertical transmission, with a rare instance of blood transfusion. Transmission of syphilis from mother to fetus can occur transplacentally or during passage through the birth canal, with recent studies showing access to the fetal compartment as early as 9–10 weeks of gestation.[2] Despite the availability of effective diagnostic tests and treatment options, syphilis continues to pose a high threat to public health.[3]

WHAT THIS STUDY ADDS

⇒ This study provides updated data on the seroprevalence of syphilis among pregnant women in Bahir Dar, North-West Ethiopia, offering insights into the current burden of the disease in this region.
⇒ The study identifies key factors associated with syphilis seropositivity, such as a history of stillbirth and previous sexually transmitted infection, which are critical for targeted interventions.
⇒ The findings highlight the disparity in syphilis prevalence between urban and rural areas, underscoring the need for tailored public health strategies to address these differences.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This study's findings can serve as a basis for further research into the underlying causes of high syphilis in specific populations and the effectiveness of different intervention strategies.
⇒ Healthcare providers may use these data to enhance their screening and counselling practices in ANC services, mainly focusing on high-risk groups identified in the study.
⇒ Policymakers could leverage these findings to strengthen the syphilis screening programme in Ethiopia, especially by integrating more comprehensive and accessible screening services into routine ANC care, and developing targeted public health campaigns to raise awareness and reduce the burden of syphilis.

In 2015 alone, around 357.4 million new cases of STIs were reported, with syphilis accounting for an estimated 12 million cases, including 2 million in pregnant women.[4–6] Maternal syphilis is associated with various adverse outcomes, including abortion, stillbirth, congenital syphilis and low birth weight, particularly among those with inadequate antenatal care (ANC) follow-up.[7] According to the WHO, an estimated 3.4 million new cases of syphilis are diagnosed annually among individuals aged 15–49 years in Africa.[8] Syphilis prevalence among pregnant women varies widely, with notably high rates in sub-Saharan Africa. The prevalence ranges from 4% to 15%, resulting in adverse outcomes in 50%–80% of pregnancies.[9] Among sub-Saharan countries, Ethiopia ranks in the top three for the highest number of adverse pregnancy outcomes caused by syphilis.[10]

Studies indicate that a significant percentage of children born to seropositive mothers in Ethiopia exhibit signs of syphilis, with increased rates of stillbirth and abortion compared with the general population.[11] Seroprevalence rates among pregnant women are typically low in developed nations, varying from 0.02% in Europe to 4.5% in certain regions of the USA.[7] Nonetheless, there has been a notable increase in the incidence of congenital syphilis in rural areas of Eastern Europe and Central Asia. Consistently higher rates of syphilis seropositivity, ranging from 3% to 8%, have been reported at antenatal clinics across Africa.[12]

In 2004, syphilis was responsible for 24% of all reported stillbirths in Zambia, while congenital syphilis was associated with 30% of all cases of perinatal mortality.[13] Moreover, approximately 2.7% of pregnant women in South Africa were affected by syphilis infection, posing a risk to over 900 000 pregnancies each year. Furthermore, among pregnant women attending ANC, the prevalence of syphilis was observed to be 3% in Khartoum[14] and 0.9% in Rwanda.[15]

In nations like Ethiopia, untreated syphilis during pregnancy constitutes a significant contributor to morbidity and mortality, leading to fetal deaths, stillbirths, preterm or low birthweight babies, neonatal fatalities, and infant syphilis infections. Furthermore, it contributes to an elevated risk of HIV transmission among pregnant women.[10 16] The Ethiopian Public Health Institute report revealed that the overall prevalence of syphilis increased from 1.0% in 2012 to 1.2% in 2014.[17] Furthermore, studies conducted across various regions of Ethiopia have reported differing levels of syphilis seroprevalence, attributed to variations in screening methodologies, programme implementation, lack of awareness among service providers, and inadequate logistical support for healthcare providers.[18–21] Specifically, syphilis seroprevalence was 7.3% at Hawassa Referral Hospital,[22] 3.7% at the University of Gondar Teaching Hospital[23] and 2.4% at Asella Teaching Hospital.[24] Additionally, a study conducted in Debre Berhan town, Ethiopia, revealed a syphilis prevalence of 5.1%.[25]

Syphilis during pregnancy has been linked with various factors across different settings, including HIV infection, substance abuse, age, history of stillbirth, marital status, level of education, previous spontaneous or induced abortions, multiple pregnancies, and having multiple sexual partners.[15 26–28] Furthermore, previous studies showed that pregnant mothers who did not visit the health facility for ANC, whose husband has more than one wife, who had abnormal vaginal discharge, homosexual practices, and a previous history of STIs had a higher risk for syphilis infection.[29–31]

As pregnant women who test positive for syphilis face an elevated risk of transmitting the infection to their babies, enhancing access to STI services becomes a crucial element of global strategies aimed at achieving the Millennium Development Goals.[32] In 2016, the WHO unveiled a new plan to address STIs from 2016 to 2021. This strategy places a priority on the eradication of congenital syphilis by advocating for widespread syphilis screening and treatment among pregnant women, as well as in targeted populations. The overarching goal is to achieve a 90% reduction in syphilis incidence worldwide and to ensure that 80% of countries have 50 or fewer cases of congenital syphilis per 100 000 live births by 2030.

Despite national guidelines mandating the screening of all mothers attending ANC for syphilis infection, adherence to these guidelines remains inadequate in many public health facilities across Ethiopia. Furthermore, while a few studies have been conducted in various regions of Ethiopia, no research has been undertaken in the specific study site. Consequently, there is a shortage of information regarding the prevalence and contributing factors of syphilis infection in the study area. Thus,

determining the seroprevalence of syphilis infection and its associated factors is a prerequisite for policymakers and healthcare providers to facilitate evidence-based interventions. Therefore, this study aimed to determine the seroprevalence of syphilis infection and its related factors among ANC mothers in Bahir Dar city public health facilities.

METHODS

Study area and period

An institution-based study was conducted from January 2023 to April 2023 G.C., in three hospitals located in Bahir Dar, Amhara Regional State and North-West Ethiopia: Tibebe Ghion Specialized Hospital (TGSH), Felege Hiwot Comprehensive Specialized Hospital (FHCSH) and Addis Alem Hospital. Bahir Dar, the capital city of Amhara Regional State, is located 565 km north-west of Addis Ababa at an altitude of 1799 m above sea level and has an estimated population of 300 000, according to the 2022 World Population Review. The city has a warm temperate climate and three public and four private hospitals, each located in different parts of the city.

Study design

A cross-sectional, institution-based study was used.

Study population

All pregnant women who attended ANC follow-ups at TGSH, FHCSH and Addis Alem Hospital during the study period.

Inclusion criteria

All women who provided informed consent and attended ANC follow-ups at TGSH, FHCSH and Addis Alem Hospital during the study period.

Exclusion criteria

Pregnant women who had attended prior ANC contact or those who were unwilling to provide informed consent were excluded from the study.

Sample size calculation

The sample size was determined by applying the formula for estimating a single population proportion. Therefore, the formula used to determine the sample size was as follows:

Mathematically,

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

Where n = sample size, Z = standard normal value at 95% CI that is 1.96, P=13.7% largest value from the previous study, d = possible margin of error tolerated which is 0.03

$$n = \frac{(1.96)^2 0.137(1-0.137)}{(0.03)^2} = 504$$

Based on the assumption, the calculated sample size (n)=504; adding 10% for the non-response rate during the actual study, the sample size became 554.

To reduce the potential for bias in the study, the participants were allocated in a 1:1 ratio between urban and rural settings, with 277 participants recruited for each arm of the study. The share of each hospital is determined based on the number of clients from the previous 1 year report. Data were collected by midwives, interns and first-year residents under the supervision of senior residents.

Variables of study

Dependent variable

Serology test for syphilis (positive/negative).

Independent variables

- Sociodemographic factors: Age, marital status, educational status, occupation and residence.
- Obstetric factors: Gravidity, parity, gestational age, history of abortion, history of stillbirth and ANC.
- Behavioural factors: Multiple sexual partners, history of STI and HIV status.
- Awareness-related factors: Awareness about syphilis, sexual transmission and vertical transmission.

Operational definitions

Seropositive

Any pregnant woman screened for syphilis using treponemal and/or non-treponemal test and at least one result is positive.[33]

Spontaneous abortion

Termination of pregnancy spontaneously before the age of viability (before 28 weeks or before 1 kg).[34]

Stillbirth

Loss of pregnancy after the age of viability and before delivery.[34]

Urban area

A single geographical setting or community with a population >50 000 and/or places with a high population and built-up infrastructures like water, electricity, market, and educational and administrative centres.[35]

Rural area

A single geographical setting or community with a population of <25 000–50 000 people, and/or areas that don't fulfil the criteria for an urban area.[35]

Data collection

A structured interviewer-administered questionnaire was adopted from WHO and other related research. All the variables were evaluated and structured appropriately. The questionnaire was prepared in English, translated into the local language, Amharic, and then translated back into English to ensure consistency. The questionnaire was pretested on 5% of mothers at Injibara Hospital before the data collection. Corrections and modifications were made based on the gaps identified during the pretest interview. To ensure completeness, data collectors and supervisors reviewed the checklist within the questionnaire daily.

Data processing and analysis

The data were initially entered into EpiData V.3.1 and then transferred into SPSS software V.25 by the principal investigator for analysis. Descriptive statistics were computed, and the overall level of the outcome variable was determined by categorising it into seropositive and seronegative. Binary logistic regression was conducted to evaluate the relationship between independent variables and the outcome variable. Variables with values of p<0.25 in binary logistic regression were included in the multivariable logistic regression analysis. Those variables with values of p<0.05 in multivariable logistic regression were considered statistically significant associated factors. The degree of association between dependent and independent variables was determined using an OR with a 95% CI. The results were described using tables.

Data quality assurance

Before data collection, the checklist was tested to check the consistency of the checklist format and the ability of the data collector to perform. Data collectors received intensive training, and regular supervision was conducted by the principal investigator and supervisors to maintain data collection standards. Data consistency and completeness were checked daily by the supervisors.

Sample collection and testing procedures

Pregnant women who attended ANC and provided informed consent were initially screened for syphilis using the rapid plasma reagin (RPR) test, a non-treponemal test. For participants with a positive RPR result, confirmatory testing was conducted using a treponemal-specific test. Both tests were performed in a single laboratory to maintain consistency in results. To ensure the integrity of the research, the laboratory team was not informed that the testing was conducted as part of a research study. Participants who tested seropositive for syphilis, along with their partners, received counselling and were provided with appropriate treatment based on clinical guidelines.

RESULTS

Sociodemographic result

In this study, 551 pregnant women receiving ANC at TGSH, FHCSH and Addis Alem Hospital were recruited over 12 weeks. Out of these, 275 were recruited from urban areas, while 276 were from rural areas. The mean age of the participants in the study was 26.9±4.86 years. Most of the participants in both urban and rural areas were married, comprising 540 individuals (98.9%). Among all participants, 35.9% had completed primary-level education, 25% had no formal education, and 15% had attended college or university. Notably, more women in urban areas had tertiary-level education than those in rural areas. One hundred eighty-eight women (34.4%) had husbands who attended college or university, with husbands of urban dwellers having higher tertiary education levels than those of their rural counterparts. Furthermore, 340 participants (62.3%) were housewives, while 82 (15%) were government employees. In terms of husbands' occupations, 197 (36.1%) were farmers and 161 (29.5%) were government employees (table 1).

Gynaecological and obstetrical characteristics of respondents

The mean gestational age of participants in the study was 19.37±7.35 weeks. Of the participants, 220 (40.3%) were primigravida, and 326 (59.7%) were multigravida. The majority of the participants were multigravida, and 77 (14%) had a history of one or more spontaneous abortions. Additionally, 305 participants (55.9%) had one or more previous deliveries, and among these, 40 (7.3%) had a history of one or more stillbirths (table 2).

Medical history and sexual behaviour

Among the total participants, 34 (6.2%) reported having more than one lifetime sexual partner, while 12 (2.2%) reported an active or previous history of STIs. Additionally, 33 participants (6%) had some knowledge about syphilis, with 32 (5.8%) of them believing it to be transmitted through sexual activity, and 25 (4.5%) participants thought it could be transmitted to the fetus.

Out of all participants, 522 (95.6%) had negative HIV status, 23 (4.2%) had an unknown HIV status, and only 1 participant tested positive for HIV.

Prevalence of syphilis

Out of the 551 pregnant women who participated in the study, 13 tested positive for syphilis, resulting in a prevalence rate of 2.4%. Further analysis revealed that the prevalence of syphilis was 3.6% in urban areas and 1% in rural areas.

Factors associated with seropositivity of syphilis

The entire variable was analysed using binary logistic regression. Of all, urban residency, previous history of abortion, previous history of stillbirth, and active or previous history of STI had a value of p<0.2. However, in multivariable logistic regression analysis urban residency and previous history of abortion showed no association with seropositivity of syphilis. However, pregnant mothers with a previous history of stillbirth and an active or previous history of STI had shown a significant association with a value of p<0.05. This study found that pregnant women with a previous history of stillbirth were almost seven times more likely to test seropositive for syphilis than those with no previous history of stillbirth (AOR=7.28; 95% CI: 1.05-24.87). The pregnant women with active or previous history of STI were five times more likely to be seropositive for syphilis than those with no history of active or previous history of STI (AOR=5.3; 95% CI: 1.23-22.52) (table 3).

DISCUSSION

According to the findings of this study, the seroprevalence of syphilis was 2.4%. This result is consistent with previous studies conducted in Ethiopia, where the

Table 1 Sociodemographic characteristics of women in both rural and urban areas who attended ANC follow-ups at Tibebe Ghion Specialized Hospital (TGSH), Felege Hiwot Comprehensive Specialized Hospital (FHCSH), and Addis Alem Hospital, Bahir Dar, North-West Ethiopia, 2023 G.C

Variables	Rural (276)	Urban (275)	Total (551)
Age in years (mean±SD)	27.8±4.90	26.29±4.71	26.89±4.84
Age category in years			
18–24	84 (30.4%)	102 (37.1%)	186 (33.8%)
25–29	91 (33%)	99 (36%)	190 (34.5%)
30–34	70 (25.4%)	54 (19.6%)	124 (22.5%)
≥35	31 (11.2%)	20 (7.5%)	51 (9.3%)
Marital status no (%)			
Single	0	5 (1.8%)	5 (0.9 %)
Married	276(100)	269 (97.8%)	545 (98.9%)
Divorced	0	1 (0.4%)	1 (0.2%)
Level of education			
Illiterate	127 (46%)	11 (4%)	138 (25%)
Primary school	138 (50%)	60 (21.8%)	198 (35.9%)
Secondary school	10 (3.6%)	116 (42.2%)	126 (22.9%)
Tertiary education	1 (0.4%)	88 (32%)	89 (16.2%)
Occupation			
Government employee	1 (0.4%)	83 (30.2%)	84 (15.2%)
Private company	2 (0.7%)	14 (5.1%)	16 (2.9%)
Private work/merchant	5 (1.8%)	96 (34.9%)	101 (18.3%)
Housewives	267 (96.7%)	75 (27.3%)	342 (62.1%)
Daily labourer	1 (0.4%)	7 (2.5%)	8 (1.5%)
Partner level of education			
Illiterate	118 (42.8%)	5 (1.8%)	123 (22.3%)
Primary education	100 (36.2%)	21 (7.6%)	121 (22%)
Secondary education	45 (16.3%)	71 (25.8)	116 (21.1%)
Tertiary education	13 (4.7%)	178 (64.7%)	191 (34.7%)
Partner occupation			
Government employee	6 (2.2%)	158 (57.5%)	164 (29.8%)
Private company	17 (6.2%)	18 (6.5%)	35 (6.4%)
Private work/merchant	52 (18.8%)	88 (32%)	140 (25.4%)
Farmer	194 (70.3%)	3 (1.1%)	197 (35.8%)
Daily labourer	7 (2.5%)	8 (2.9%)	15 (2.7%)
History of multiple sexual partners			
Yes	17 (6.2%)	18 (6.5%)	35 (6.4%)
No	259 (93.8%)	257 (93.5%)	516 (93.6%)
Active/previous STI			
Yes	6 (2.2%)	8 (2.9%)	14 (2.5%)
No	270 (97.8%)	267 (97.1%)	537 (97.5%)
Syphilis test			
Positive	3 (1%)	10 (3.6%)	13 (2.4%)
Negative	273 (99%)	265 (96.4%)	538 (97.6%)

ANC, antenatal care; STI, sexually transmitted infection.

Table 2 Obstetric characteristics of women who attended antenatal care (ANC) follow-up at Tibebe Ghion Specialized Hospital (TGSH), Felege Hiwot Comprehensive Specialized Hospital (FHCSH) and Addis Alem Hospital Bahir Dar North-West Ethiopia, 2023 G.C

Variables	Rural	Urban	Total
Gestational age in weeks (mean±SD)	21.6±7.3	17.02±6.66	19.3±7.3
Parity			
Nulliparity	106 (38.4%)	140 (50.9%)	246 (44.6%)
Prim parity	54 (19.6%)	49 (17.8%)	103 (18.7%)
Multiparty	101 (36.6%)	83 (30.2%)	184 (33.4%)
Grand multiparity	15 (5.4%)	3 (1.1%)	18 (3.3%)
Previous history of abortion			
Yes	38 (13.8%)	39 (14.2%)	77 (14%)
No	238 (86.2%)	236 (85.8%)	474 (86%)
Previous history of stillbirth			
Yes	22 (7.8%)	18 (6.5%)	40 (7.3%)
No	254 (92.2%)	257 (93.5%)	511 (92.7%)

national prevalence of syphilis was reported as 2.3%,[36] and in Felege Hiwot Referral Hospital where it was 2.6%.[37] However, the prevalence observed in this study was lower than the 2.9% found in studies at Gondar University,[34] in Addis Ababa (2.9%),[38] and in Jinka Town Public Health Facilities, southern Ethiopia (4.8%).[39] Conversely, it is higher than the prevalence reported in Jimma (1.1%),[40] Sede Muja District South Gondar, North-West Ethiopia (1.9%),[41] Buno Bedele Zone South-West Ethiopia (1.4%),[42] and Bulchana Health Centre in Sheshemene, West Arsi zone (1.1%).[43]

When compared internationally, the prevalence of syphilis seropositivity among pregnant women is higher than that reported in Nigeria (1.89%)[35] and tertiary care hospitals in southern India (0.61%).[3] However, it is slightly lower than the reported rates in sub-Saharan Africa (2.9%),[33] in Khartoum, Sudan (3%).[14] Notably, it is much lower than the prevalence in South Sudan, where 22.1% tested positive.[31]

The differences in syphilis prevalence among different populations of pregnant women, both within and outside Ethiopia, may reflect variations in sexual behaviour within the communities where the studies were conducted. Geographical differences, disparities in access to STI treatment, cultural practices and variations in laboratory techniques used to detect syphilis infection could also contribute to these discrepancies. It is important to note that all previous studies conducted in different parts of

Table 3 The logistic regression model (univariate and multivariate) for independent predictors of syphilis infection for women who attended antenatal care (ANC) follow-up at Tibebe Ghion Specialized Hospital (TGSH), Felege Hiwot Comprehensive Specialized Hospital (FHCSH) and Addis Alem Hospitals, Bahir Dar North-West Ethiopia, 2023 G.C

	Univariate models		Multivariate models	
Variable and category	OR (95% CI)	P value	OR (95% CI)	P value
Residency				
Rural	1		1	
Urban	5.66 (1.24 to 25.80)	0.025	7.89 (0.92 to 67.74)	0.06
Previous history of abortion				
No	1		1	
Yes	4.05 (1.28 to 12.70)	0.017	1.62 (0.29 to 9.00)	0.74
Previous history of stillbirth				
No	1		1	
Yes	5.31 (1.14 to 24.64)	0.03	7.28 (1.05 to 24.87)	0.04
History of active or previous STI				
No	1		1	
Yes	7.97 (1.59 to 39.93)	0.012	5.3 (1.23 to 22.52)	0.03

STI, sexually transmitted infection.

Ethiopia were based in urban centres and did not include representative samples from rural settings, which may result in variations in reported prevalence rates.

Binary logistic regression analysis revealed a statistically significant difference in the prevalence of syphilis between urban and rural areas. However, multivariate analysis indicated a statistically insignificant increased risk of syphilis in urban areas. Women living in urban areas have almost eight times the increased risk of having a positive result for syphilis compared with rural residents. The higher prevalence of syphilis in urban areas (3.6%) compared with rural areas (1%) in this study contrasts with the finding from Felege Hiwot Referral Hospital (FHRH), which reported a prevalence of 2.1% in urban areas and 6.8% in rural areas.[37 44] This variance may be attributed to a low number of representatives from rural settlements in the study conducted at FHRH.

This study showed that a history of previous stillbirth delivery and a history of active or previous STIs were significantly associated with an increased seropositivity rate of syphilis. Pregnant mothers with a prior history of stillbirth delivery were found to have a higher rate of seropositive prevalence than pregnant mothers with no history of stillbirth delivery. This finding was consistent with the study done at Felege Hiwot Referral Hospital,[44] public health facilities in Shashemene town, southern Ethiopia,[45] Zambia,[46] and South Sudan.[31] This might be attributed to the fact that syphilis seropositive women had a higher likelihood of experiencing adverse pregnancy outcomes.

This study showed that women with an active or previous history of STIs had a higher risk of developing syphilis. This finding had similarities with studies done in Felege Hiwot Referral Hospital,[44] Wolaita zone, southern Ethiopia,[47] and public health facilities in Shashemene town, southern Ethiopia.[45] This finding was also supported by a study indicating that pregnant women with a history of STIs were more likely to acquire syphilis than those who did not.[25] STIs can cause skin breakouts or sores, which can facilitate the transmission of syphilis during sex.[48]

The findings of this study have important public health implications. The observed prevalence of syphilis in this study, although relatively moderate, calls for strengthened prenatal care protocols and syphilis screening in public health facilities across Ethiopia. Routine syphilis screening and treatment during pregnancy should be prioritised to reduce the risk of maternal and fetal morbidity and mortality. Moreover, targeted intervention aimed at high-risk populations, such as women with a history of STIs and stillbirths, could be instrumental in reducing the burden of syphilis.

Strengths and limitations of study

- Uses systematic random sampling with a 1:1 ratio for pregnant mothers from urban and rural areas.
- Hospital-based design limits the generalisability to the broader community.
- Potentials for responder recall bias and interviewer bias affecting data reliability.
- The sample size is relatively small, which may not be representative.
- The cross-sectional study design limits causal inference between syphilis and associated factors.
- Conducting the study in public hospitals only limits generalisability to women not attending ANC or using private clinics.

CONCLUSION

In conclusion, this study provides valuable evidence of the seroprevalence of syphilis among pregnant women in Bahir Dar, which highlights the importance of routine syphilis screening in ANC to prevent adverse outcomes. Public health policies that emphasise early diagnosis and treatment of syphilis in pregnant women could play a critical role in improving maternal and fetal health outcomes. Further research into sociocultural factors contributing to syphilis prevalence and the effectiveness of current interventions will be vital for enhancing syphilis control strategies in Ethiopia and beyond.

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Contributors BNA and WAW selected the topic, designed the study, collected the data, and performed the analysis and interpretation. BNA, WAW, LAF and AMA contributed to writing the results and discussion sections, as well as preparing the manuscript for submission. BNA is the guarantor and is responsible for the overall content of the manuscript. All authors reviewed and approved the final manuscript before its submission.

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Ethics approval Ethical approval was obtained from the institutional review board of the College of Medicine and Health Sciences at Bahir Dar University on 23 November 2022, with protocol number 607/2022. A formal letter of permission and support was written to Tibebe Ghion Specialized Hospital, Felege Hiwot Comprehensive Referral Hospital, and Addis Alem Hospital from the College of Medicine and Health Sciences, Bahir Dar University. All methods used in this study were performed under the relevant guidelines and human rights regulations. Written informed consent was obtained from study participants, and for those under 18, consent was also obtained from their legal guardians or parents. All the information was kept confidential throughout the study using codes and other personal characteristics. The study participants had the right to withdraw at any time during the research.

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