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Original article

Sexually transmitted infections and associated factors during pregnancy in Gondar city, Northwest Ethiopia, 2021: A multicenter study

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ABSTRACT

Background: Sexually transmitted infections are one the most important public health problems in the developing countries that have been reported to have many adverse pregnancy outcomes. Despite the adverse pregnancy outcomes, studies on the prevalence and associated factors of sexual transmitted infection among pregnant women in Ethiopia, especially in our study setting are scarce. Therefore, this study aimed to assess the prevalence and associated factors of sexually transmitted infection among pregnant women in Gondar city, Ethiopia.

Methods: An institution-based cross-sectional study was conducted among 507 pregnant women who were attending antenatal care in public health facilities in Gondar city from September 1 to 30, 2021. A systematic random sampling technique was used to select the study participants and data were collected using pretested and interviewer-administered questionnaire. Data were entered using Epi-data version 4.6 and cleaned, and analyzed using SPSS version 25 software. Multivariable logistic regression model was used to determine factors associated with sexual transmitted infection among pregnant women. Adjusted odds ratio (AOR) with 95% of confidence interval and p value < 0.05 were used to declare the significant variables.

Results: A total of 507 pregnant women were included in this study, and making a response rate of 97.3%. The prevalence of sexually transmitted infections among pregnant women was 15.2% (95% CI: 12.1%, 18.3%). Being rural resident (AOR = 2.96, 95% CI: 1.43, 6.12), having history of stillbirth (AOR = 2.68, 95% CI: 1.08, 6.68), having history of sexually transmitted infections (AOR = 2.77, 95% CI: 1.10, 7.01) and husbands suspected of having other sexual partners (AOR = 4.73, 95% CI: 2.16, 10.38) were significantly associated with sexually transmitted infections.

Conclusion: In this study, sexually transmitted infections were a public health problems because one sixth of pregnant women experienced sexually transmitted infections. Pregnant women with the identified factors need special focus to tackle the problem and its negative health consequences. Moreover, it is better to provide community-based education programmes focusing on changes to sexual behavior for male to tackle this public health important problem.

1. Introduction

Sexually transmitted infections (STIs) are defined by a variety of clinical syndromes caused by pathogens that can be acquired and transmitted from one person to another through unprotected sexual activity.[1] It is a major public health problem in developing countries. The management of STIs during pregnancy in many developing countries has, however, been complicated by the lack of simple and affordable diagnostic tests.[2] More than a million people acquire STIs every day, with an estimated 499 million new cases of curable STIs occur every year.[3] The prevalence of STIs among pregnant women varies from country to country. In 2016, 53.6% pregnant women in Papua New Guinea was infected with at least one STIs.[4] In 2018 and 2021 in South Africa, the prevalence of STIs was 41%[5] and 37%,[6] respectively. More than half (53.6%) of pregnant women in Gambia were infected with STIs during 2021.[7] A study conducted in Kenya in 2017 also found that

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20.8% of pregnant women had acquired STIs.[8] In Ethiopia, the prevalence of STIs among pregnant women was 19.1% in Southwest Ethiopia[9] during 2021 and 26.6% in central Ethiopia[10] during 2017.

STIs compromise quality of life, as well as sexual and reproductive health, and newborn and child health. STIs during pregnancy have major consequences for the mothers and infants.[2,11,12] STIs has a significant association with a number of adverse pregnancy and neonatal outcomes, such as spontaneous abortion,[2] prematurity,[13–15] premature rupture of membranes,[16] perinatal mortality,[16,17] stillbirth and low birth weight.[12,13,18] Untreated STIs during pregnancy also increase the risk of miscarriage, stillbirth, neonatal deaths, prematurity, low birth weight, and congenital syphilis.[17,19,20] STIs increase the risk of human immunodeficiency virus (HIV) transmission, human papilloma virus infection, infertility, physical, psychological, and social consequences.[21] Syphilis in pregnancy leads to over 143,000 early fetal deaths and stillbirths, 61,000 neonatal deaths, 41,000 preterm or low-birth weight births, and 109,000 infants with clinical congenital syphilis.[22]

Several factors associated with STIs during pregnancy have been identified in different parts of the world. Most importantly, maternal age,[5–7,11] residency,[11] marital status,[6,9] educational status,[23] occupational status,[5] having multiple sexual partners,[24,25] alcohol use,[5] history of spontaneous abortion,[9] and parity[7,26] are some of the factors that are significantly associated with STIs.

Despite studies have been conducted on the negative consequences of STIs on pregnant women and their unborn babies, a large portion of infected women do not seek medical care. According to the 2016 Demographic Health Survey of Ethiopia, only 33% of women who were infected with STIs in the 12 months prior to the survey had health-seeking behavior.[27] In Ethiopia, pregnant women are routinely screened for syphilis, HIV and hepatitis B and C by etiologic diagnosis approach during the first ANC visit.[28] To the best of our knowledge, there is no sufficient evidence on the prevalence and its associated factors in our study area. Therefore, this study aimed to assess the prevalence and associated factors of STIs among pregnant women who attending Antenatal Care (ANC) in public health institutions in Gondar city, Ethiopia.

2. Methods

2.1. Study design and period

A multicenter institutional based cross-sectional study was conducted from September 1/2021 to September 30/2021 in public health facilities in Gondar city.

2.2. Study setting

This study was conducted among pregnant women who attend antenatal care at public health facilities in Gondar city. Gondar city is located 727 km away from Addis Ababa, the capital city of Ethiopia, and 175 km from Bahir Dar, the capital city of Amhara National Regional State. Gondar city has one public comprehensive specialized hospital and eight health centers (HC) serving the people of Gondar city and the surrounding districts. From a facility-based report in 2013, 8 health institutions had a combined case flows of 432,191 population.

2.3. Source and study population

The source population for this study was all pregnant women who attending ANC in public health facilities in Gondar city. All pregnant women who attending ANC from the selected public health facilities in Gondar city and were available at the time of data collection were the study population for this study.

2.4. Sample size determination and sampling procedure

The sample size was determined using the single population proportion formula, considering the following assumptions: The proportion of STIs among pregnant women from the previous study was 19.1%,[9] level of confidence 95%, and margin of error 5%. Therefore, the sample size, $n = \frac{Z^2 p(1-P)}{d^2} = \frac{(1.96)^2 * 0.191(1-0.191)}{0.05^2} = 237$. By multiply the design effect of 2 and adding a 10% non-response rate, the total sample size was 521. From nine public health facilities, Gondar University comprehensive specialized hospital, and three HCs such as Belajig HC, Maraki HC, and Teda HC were randomly selected. The total sample size was proportionally allocated for each selected public health facility depending on their client flow. Systematic sampling technique was used to select the study participants. By using the formula, considering N (total number of pregnant women attending ANC in the selected public health facilities) which is 3155 in one month, n (the required minimum sample size is 521) and k-interval ($K = N/n => 3155/521 = 6.05 \approx 6$). The first participant was selected randomly, and the rest were selected every 6th interval.

2.5. Study variables

The dependent variable of this study was STIs, which was a binary outcome variable coded as "0″ if a pregnant woman did not present with any syndrome, and "1″ if a pregnant woman presented with at least one of the following syndromes: vaginal discharge, genital ulcer or sores, lower abdominal pain, and inguinal bubo syndromes.[9] Whereas residence, maternal age, maternal education, religion, marital status, maternal occupation, husband education, husband occupation, parity, gravidity, multiple sexual partners, history of stillbirth, history of STIs, history of abortion, husband having multiple sexual partners, drinking of alcohol, chat chewing, and condom utilization were independent variables. The syndromic diagnosis approach was used to measure the outcome variable. The syndromic diagnosis approach is one of the simple, rapid, and inexpensive STI screening approaches to the identification of clinical syndromes and giving treatment targeting all the locally known pathogens that can cause the syndrome.[29]

2.6. Data collection tool and quality assurance

The data collection tool was developed by reviewing different literature.[5–7,9,11,23,26] Data were collected using a structured questionnaire through face-to-face interview. The questionnaire was prepared in the English version and translated to the local language (Amharic) and back to English to keep its consistency. Four BSc and 2 MSc midwives were recruited for data collection and supervision, respectively. To assure the quality, a one day training was given for data collectors and supervisors about the objective of the study, interview technique and supervising the data process. Besides, pretest was done on 5% of the determined sample size in the Maksegnit HC to look for the understandability and appropriateness of the study tool. The completeness of the questionnaire was checked by the supervisors daily.

2.7. Data management and analysis

Data were entered into Epi Data version 4.6 and exported to SPSS version 25 software for cleaning, coding, and further analysis. We used descriptive statistics like frequency, mean, and proportion to present participants' characteristics. Binary logistic regression analysis was fitted, and variables having a p-value of ≤ 0.2 in bivariable logistic regression were included in the multivariable logistic regression analysis. In the multivariable logistic regression analysis, a p-value of <0.05 with a 95% CI for the adjusted odds ratio was used to declare significant association between the outcome variable and independent variables. The goodness-of-fit of the model was tested by Hosmer and Lemeshow

and was found fit. Multi-collinearity was also checked using the variance inflation factor (VIF) and indicates that there was no multi-collinearity since all variables have VIF <2.

2.8. Ethical considerations

Ethical clearance was obtained from the School of Midwifery on behalf of the **University of Gondar institutional review board (Reference number: MIDW/106/2021). Written informed consent was taken from each study participant after a clear explanation of the aim of the study.** Moreover, there were no any personal identifiers included in the data.

3. Results

3.1. Sociodemographic characteristics of the study participants

A total of 507 pregnant women were included in this study, making a response rate of 97.3%. Of these, 386 (76.1%) of pregnant women were urban residents and majority (74.3%) of pregnant women were Orthodox Christian religion followers. Among the total pregnant women, 305 (60.2%) were aged 25–34 years, and the mean age of the respondents was 28.7 years old (±SD 5.2). The majority (89.3%) and (80.7%) of the pregnant women were married and formally educated, respectively (Table 1).

Table 1
Sociodemographic characteristics of pregnant women who attending ANC in public health facilities in Gondar city, Northwest Ethiopia, 2021.

Variable	Category	STIs		Percentage	P-value
		Yes	No		
Maternal Age	18–24	17 (15.0%)	96 (85.0%)	113 (22.3%)	0.180
	25–34	41 (13.4%)	264 (86.6%)	305 (60.2%)	
	35–49	19 (21.3%)	70 (78.7%)	89 (17.6%)	
Residence	Urban	42 (10.9%)	344 (89.1%)	386 (76.1%)	0.000
	Rural	35 (28.9%)	86 (71.1%)	121 (23.9%)	
Religion	Orthodox	62 (16.4%)	315 (83.6%)	377 (74.3%)	0.260
	Christian Muslim	12 (10.0%)	108 (90.0%)	120 (23.7%)	
	Other*	3 (30.0%)	7 (70.0%)	10 (2.0%)	
Marital status	Unmarried	13 (24.1%)	41 (75.9%)	54 (10.7%)	0.050
	Married	64 (14.1%)	389 (85.9%)	453 (89.3%)	
Maternal education status	Not formally educated	25 (25.5%)	73 (74.5%)	98 (19.3%)	0.002
	Educated	52 (12.7%)	357 (87.3%)	409 (80.7%)	
Maternal occupation	Unemployed	44 (17.0%)	215 (83.0%)	259 (51.1%)	0.250
	Employed	33 (13.3%)	215 (86.7%)	248 (48.9%)	
Husband education status	Not formally educated	12 (20.7%)	46 (79.3%)	58 (12.8%)	0.120
	Educated	52 (13.2%)	343 (86.8%)	395 (87.2%)	
Husband occupation	Unemployed	20 (26.3%)	56 (73.7%)	76 (16.8%)	0.001
	Employed	44 (11.7%)	333 (88.3%)	377 (83.2%)	

* Protestant/Catholic/Jew.

3.2. Behavioral, sexual and reproductive health related characteristics

Of the total 507 pregnant women, 362 (71.4%) women were multigravida. About 74 (20.0%) and 46 (13.0%) had a history of abortion and still birth, respectively. Regarding multiple sexual partners, 89% of pregnant women did not have multiple sexual partners. The majority (92.7%) of pregnant women did not have a history of STIs (Table 2).

3.3. Prevalence of sexually transmitted infections among pregnant women

The overall prevalence of STIs among pregnant women was 15.2% (95% CI: 12.1%, 18.3%). Regarding STIs syndrome, 4.9% (95% CI: 3.0%, 6.8%) of pregnant women had vaginal discharge, 5.1% (95% CI: 3.2%, 7.1%) genital ulcer, 6.5% (95% CI: 4.1%, 8.7%) lower abdominal/pelvic pain, and 2.4% (95% CI: 1.0%, 3.7%) inguinal bubo (Fig. 1).

3.4. Factors associated with sexually transmitted infections

In the final multivariable logistic model, four variables were significantly associated with STIs. The odds of experiencing STIs among rural resident pregnant women were 2.96 (AOR = 2.96, 95% CI: 1.43, 6.12) times higher compared to urban resident. Pregnant women with history of stillbirth and STI had 2.68 times (AOR = 2.68, 95% CI: 1.08, 6.68) and

Table 2
Behavioral, sexual and reproductive health related characteristics of pregnant women who attending ANC in public health facilities in Gondar city, Northwest Ethiopia, 2021.

Variable	Category	STIs		Percentage	P-value
		Yes	No		
Gravidity	Prim-gravida	18 (12.4%)	127 (87.6%)	145 (28.6%)	0.271
	Multigravida	59 (16.3%)	303 (83.7%)	362 (71.4%)	
Parity	Nulliparous	21 (13.7%)	132 (86.3%)	154 (30.2%)	0.675
	Primiparous	20 (14.3%)	120 (85.7%)	140 (27.6%)	
	Multipara	36 (16.8%)	178 (83.2%)	214 (42.2%)	
History of abortion	Yes	22 (29.7%)	52 (70.3%)	74 (20.4%)	0.000
	No	55 (12.7%)	378 (87.3%)	433 (79.6%)	
History of stillbirth	Yes	22 (45.8%)	26 (54.2%)	48 (13.0%)	0.000
	No	55 (12.0%)	404 (88.0%)	459 (87.0%)	
History of STIs	Yes	15 (40.5%)	22 (59.5%)	37 (7.3%)	0.000
	No	62 (13.2%)	408 (86.8%)	470 (92.7%)	
Chat chewing	Yes	2 (28.6%)	5 (71.4%)	7 (1.4%)	0.320
	No	75 (15.0%)	425 (85.0%)	500 (98.6%)	
Alcohol drinking	Yes	13 (22.4%)	45 (77.6%)	58 (11.4%)	0.103
	No	64 (14.3%)	385 (85.7%)	449 (88.6%)	
Multiple sexual partner	Yes	11 (19.6%)	45 (80.4%)	56 (11.0%)	0.325
	No	66 (14.6%)	385 (85.4%)	451 (89.0%)	
Husband have multiple sexual partners	Yes	16 (39.0%)	25 (61.0%)	41 (9.1%)	0.000
	No	48 (11.7%)	364 (88.3%)	412 (90.9%)	
Condom utilization	Yes	4 (20.0%)	16 (80.0%)	20 (3.9%)	0.541
	No	73 (15.0%)	414 (85.0%)	487 (96.1%)	

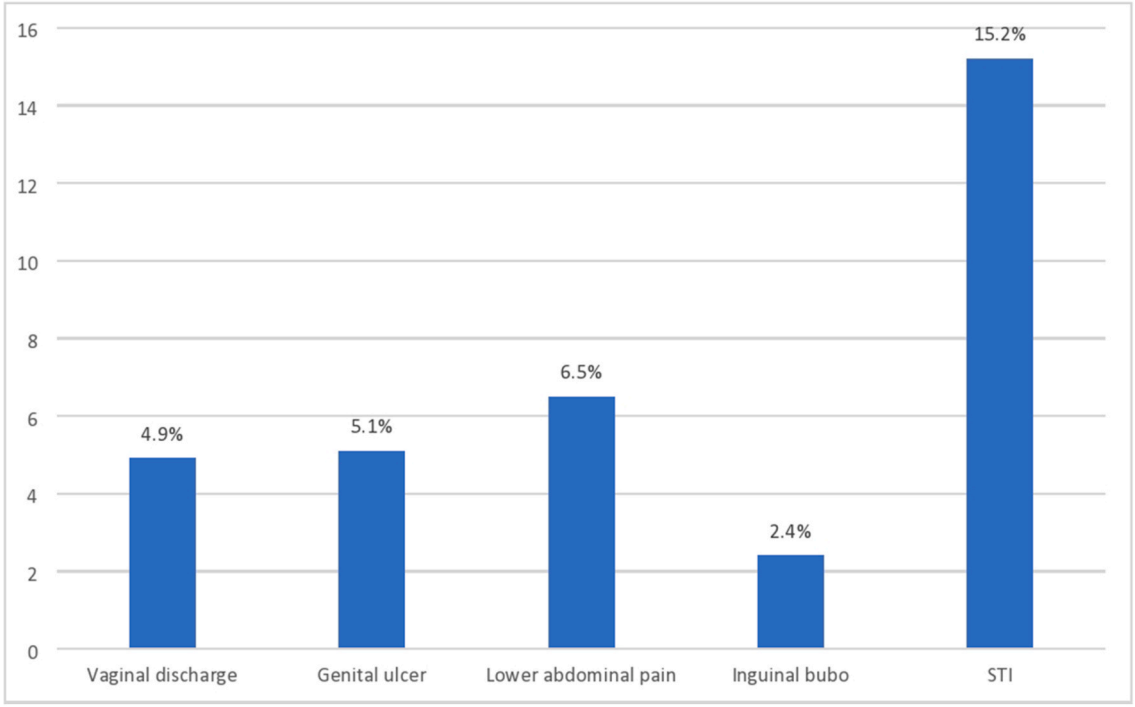

Fig. 1. Sexually transmitted infection syndromes among the sampled pregnant women at selected public health facilities in Gondar city, Northwest Ethiopia, 2021.

2.77 times (AOR = 2.77, 95% CI: 1.10, 7.01) higher odds of experiencing STI than pregnant women who did not have history of still birth and STI, respectively. Furthermore, the odds of having STIs were 4.73 (AOR = 4.73, 95% CI: 2.16, 10.38) times higher among pregnant women whose husband have multiple sexual partners than pregnant women whose husband who have not multiple sexual partners (Table 3).

4. Discussion

Our study assessed the prevalence and associated factors of STIs in pregnant women who were attending ANC in public health facilities in Gondar city, Northwest Ethiopia. Based on our assessment, STIs is a public health problem and the risk factors for having STIs include rural residency, pregnant women whose husband having multiple sexual partners, having a history of STI and still birth. The prevalence of STI among pregnant women was 15.2% (95% CI: 12.1%, 18.3%), which is higher than a study done in Nepal 8.6%.[30] The possible variations might be differences in the sociodemographic characteristics of the study population. Thus, almost all of the study participants (96.4%) in Nepal were educated, which may have provided an opportunity for them to practice preventive behavior by accessing information as compared to uneducated women, since 19.3% of women in the present study did not have formal education. . In addition, in this study, 10.7% of women were unmarried, but a study done in Nepal was conducted among married pregnant women. Being unmarried might increase the risk of being infected with STIs as compared to married pregnant women. This justification is supported by different studies conducted elsewhere.[9,31,32] In our study, 24.1% and 14.1% of unmarried and married women were infected with STIs, respectively.

On the other hand our study finding is lower than studies conducted in Southwest Ethiopia 19.1%,[9] Kenya 20.8%,[8] Gambia 53.6%,[7] Tanzania 49.4%[26] and Thailand 28.1%.[33] The possible discrepancy might be the difference of the study population and method of diagnosis approach. In our study, we used a syndromic approach as the method of diagnosis, which might lead to underreporting of STIs due to a failure to report asymptomatic pregnant women. In contrast, studies conducted in Tanzania, Gambia, and Thailand used a clinical diagnosis approach using blood, urine, and high vaginal swabs samples, which provides more confidence in reporting STIs by clinically examining all pregnant women, including those who are asymptomatic. Besides, the study population for a study done in Thailand was teenage pregnant women, but in our study we included all reproductive aged pregnant women. STIs are more common among the teenage population as compared to their counterparts.[6,31,34,35]

Regarding factors associated with experiencing STIs, living in rural areas was significantly associated with increased odds of experiencing STIs among pregnant women. It contradicts with a study reported in Sub Saharan Africa[36] and consistent with a study conducted in Tanzania.[37] This might be explained by the fact that pregnant women who reside in rural areas may have less access to information about the risks of STIs as well as poor health seeking behavior. This may translate to non-utilization of preconception STIs diagnosis and treatment services, increasing the chance of acquisition of STI during pregnancy.[38]

In this study, history of stillbirth was significantly associated with higher odds of experiencing STIs among pregnant women. The possible justification could be that the previous still birth might have been caused by either an undiagnosed, diagnosed but not treated, or diagnosed and treatment started but not completed, STI. This indicates that the STIs was subclinical during the inter-pregnancy period, which manifests during the current pregnancy.

Consistent with previous studies,[9,25] this study revealed that history of STIs was significantly associated with the experience of STIs among pregnant women. Pregnant women with history of STIs had higher odds of STIs as compared to their counterparts. This might be due to unprotected sex with untreated positive sexual partners, relapse, inappropriate treatment or poor adherence to treatment, and resistance of antimicrobial drugs to STIs treatment increase the chance of infected with STI.[39,40]

Moreover, husbands who suspected to have other sexual partner was strongly associated with the development of STIs. Husband who suspected to have another sexual partners had higher odds of experiencing STIs compared to their counterparts. The possible explanation is the fact having multiple sexual partner is a risk factor for experiencing STIs[25,41] because if husband who have unprotected sexual intercourse with

Table 3
Bivariable and multivariable logistic regression analysis of factors associated with sexually transmitted infections among pregnant women who attending ANC in public health facilities in Gondar city, Northwest Ethiopia, 2021.

Variable	Category	COR	P-value	AOR	P-value
Maternal age	18–24	0.65 (0.32, 1.35)	0.247	1.44 (0.55, 3.74)	0.457
	25–34	0.57 (0.31, 1.05)	0.070	0.90 (0.41, 1.99)	0.839
	≥35	1		1	
Residency	Urban	1	0.000	1	0.003
	Rural	3.33 (2.01, 5.53)		2.96 (1.43, 6.12)	
Marital status	Unmarried	1.93 (0.98, 3.80)	0.058	1.80 (0.67, 4.84)	0.126
	Married	1		1	
Maternal education status	No formal education	2.35 (1.37, 4.03)	0.002	0.81 (0.35, 1.86)	0.623
	Educated	1		1	
History of abortion	Yes	2.91 (1.64, 5.16)	0.000	1.51 (0.67, 3.44)	0.080
	No	1		1	
History of stillbirth	Yes	6.23 (3.30, 11.72)	0.000	2.68 (1.08, 6.68)	0.034
	No	1		1	
History of STIs	Yes	4.49 (2.21, 9.11)	0.000	2.77 (1.10, 7.01)	0.031
	No	1		1	
Alcohol drink	Yes	1.74 (0.89, 3.40)	0.107	1.09 (0.47, 2.51)	0.839
	No	1		1	
Husband have multiple sexual partners	Yes	4.85 (2.42, 9.73)	0.000	4.73 (2.16, 10.38)	0.000
	No	1		1	

another sexual partner and getting STIs from others, which leads to increasing experiencing STIs among the pregnant women. Lastly, this study used a multicenter public health institutions and probability sampling technique, which increases the generalizability of the study findings. As a limitation, we used a syndromic approach for the diagnosis of the outcome variable, which does not truly reflect the prevalence of STIs because the approach misses asymptomatic cases. Furthermore, the prevalence of STIs may be underestimated due to sensitivity, social desirability bias, and feelings of shame in reporting their syndromes.

5. Conclusions

This study revealed that STIs was prevalent among pregnant women, indicating that it is a significant public health problem in our study setting. Study participants who were from a rural area, had history of STIs and stillbirth, and husband who had multiple sexual partners were found to be factors that significantly increase the risk of being infected with STIs among pregnant women. Therefore, it is better to give special attention for pregnant women with the identified risk factors to avert the problem. In addition to the one-time diagnosis of syphilis and HIV during the first ANC visit, it is better to emphasize the syndromic diagnosis approach of STIs for pregnant women during each ANC visit to prevent adverse pregnancy and birth outcomes. Besides, community-based education programmes focusing on changes to sexual behavior are better to tackle this public health problem.

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Authors' contributions

NTT was involved in the conception and design of the study, participated in data collection, analyzed the data, drafted the manuscript, and approved the final version of the manuscript. BA, TE, TA, MK, TTH, ATS, KYW, and ME approved the proposal with some revisions, participated in data analysis, and revised subsequent drafts of the manuscript, and approved the last version of the manuscript. All authors have read and approved the manuscript.

Data sharing statement

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

Consent to publish

Not applicable.

Declaration of competing interest

The authors declare that they have no competing interests.

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Abbreviations

AOR	Adjusted Odds Ratio
ANC	Antenatal Care
CI	Confidence Interval
COR	Crude Odds Ratio
HC	Health Care
SPSS	Statistical Package for Social Science
STIs	Sexually Transmitted Infections

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