

## RESEARCH ARTICLE

**Sexually Transmitted Infections Treatment Seeking Behaviour and Associated Factors among Symptomatic Students in Hawassa Teacher's education College, South Ethiopia: A cross sectional study**Binyam Bekele<sup>1</sup>, Getachew Nenko<sup>2</sup>, Robel Hussen<sup>3</sup>, Jarsso Tadesse<sup>4</sup>, and Moges Mareg<sup>1\*</sup>

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**Abstract**

**Background:** Sexually transmitted infections (STIs) pose a significant public health challenge globally, impacting quality of life and leading to severe illness and mortality. While treatment-seeking behavior is critical for disease prevention and management, there is limited data on this behavior and its influencing factors in the study area.

**Objective:** To evaluate treatment-seeking behavior and associated factors for STIs among symptomatic students at Hawassa Teachers Education College, Southern Ethiopia.

**Methods:** An institution-based cross-sectional study design was employed, involving 415 students selected through simple random sampling. Data were entered using Epi-data version 3.1 and analyzed with Statistical Package for Social Science version 25. Bivariate and multivariable binary logistic regression analyses were conducted to identify variables significantly associated with the outcome, using Adjusted Odds Ratios (AOR) and 95% Confidence Intervals (CI). A p-value of  $\leq 0.05$  was considered statistically significant.

**Results:** The prevalence of treatment-seeking behavior was 47.2% (95% CI: 42.3-52.2). Factors significantly associated with treatment-seeking behavior included: female sex (AOR: 0.16, 95% CI: 0.06-0.46), students earning pocket money of 1501-2000 birr (AOR: 3.22, 95% CI: 1.19-8.66), preference for self-treatment (AOR: 0.20, 95% CI: 0.07-0.61), comfort in expressing symptoms to health professionals (AOR: 2.76, 95% CI: 1.01-7.59), and poor knowledge of STIs (AOR: 0.32, 95% CI: 0.11-0.92).

**Conclusion:** The prevalence of treatment-seeking behavior among students was low. Factors such as sex, financial resources, perception of disease burden, privacy concerns, and STI knowledge were significantly associated with treatment-seeking behavior. It is recommended to discourage self-treatment and embarrassment while enhancing participants' knowledge about STIs.

**Keywords:** Hawassa education college, Southern Ethiopia, Treatment-seeking behaviour, STIs, associated factors

\*Correspondence: [metanmann@gmail.com](mailto:metanmann@gmail.com)

<sup>1</sup>Department of Reproductive Health, College of Health Sciences and Medicine Dilla University, Ethiopia.

## 1 Introduction

### 1.1 Background

Sexually transmitted infections (STIs) represent a major public health challenge worldwide, adversely affecting quality of life and leading to serious illness and death [1]. STIs significantly impact the physical, mental, and social health of children, adolescents, and adults globally [2]. Some STIs directly influence reproductive and child health by causing infertility, genital cancer, and negative pregnancy outcomes [3]. Additionally, they indirectly affect health by facilitating the sexual transmission and acquisition of the Human Immunodeficiency Virus (HIV) [4].

Every day, more than 1 million people worldwide contract an STI that can be treated [5]. However, among high-risk groups, the prevalence of STIs has been reported to range from 3.5% to 12% [6]. Demographic and Health Surveys conducted in 20 countries in Sub-Saharan Africa indicate that up to 11% of female and 16% of male adolescents reported having an STI in the 12 months prior to the surveys [7].

Several studies from Ethiopia have highlighted the prevalence of risky sexual behavior among school-age youth and university students, which increases their vulnerability to STIs [8-12]. According to the national reproductive health report of 2006, the highest infection rates in the country are currently observed among young women aged 15 to 24 [13].

Individual behavior is typically understood as a product of a person's personality, the environment in which they live, and the interactions between these factors [14]. Treatment-seeking behavior refers to any action taken by individuals who believe they are susceptible to a health issue or are unwell in order to find appropriate treatment [15]. Without effective treatment-seeking behavior, patients may carry infections for extended periods, increasing the risk of comorbidities, complications, or even related mortality [16]. Achieving good treatment-seeking behavior is challenging, as it is influenced by a decision-making process shaped by individual and household behaviors, community norms and expectations, and provider-related characteris-

tics [17].

In 2016, the World Health Organization (WHO) released its Global Health Sector Strategy on STIs, aiming for zero new infections, zero STI-related complications and deaths, and zero discrimination. The vision is a world where everyone has free and easy access to STI prevention and treatment services, enabling people to live long and healthy lives. The goal is to end STI epidemics during the period from 2016 to 2021 [18].

Even though developing countries are included in this agenda, they face numerous challenges in controlling STIs, including a lack of accurate data, high incidence and prevalence in certain populations, a high rate of complications and sequelae, significant issues with antibiotic resistance, a dramatic interaction with HIV infection, substantial socioeconomic impacts, and insufficient or nonexistent control programs [19].

Self-medication with antibiotics or other methods is another contributing factor; self-treatment using ineffective techniques can prolong the period of infection before appropriate treatment is received and may lead to the emergence of resistant strains [20]. Service providers worldwide utilize etiologic, clinical, and syndromic diagnostic techniques (e.g., diagnosing based on symptoms like genital ulcers). However, the majority of developing countries primarily rely on syndromic methods due to resource constraints [18]. Ethiopia has adopted the syndromic approach since 2001, aligning with WHO general recommendations as its national STI control guidelines [3].

HIV and STIs significantly amplify each other, exhibiting epidemiological synergism; STIs facilitate HIV transmission, while HIV contributes to the spread of other STIs by prolonging their duration and infectiousness [21]. Therefore, early and effective treatment and control of STIs are crucial for preventing HIV transmission. Achieving effective treatment-seeking behavior is a vital component of disease prevention, early diagnosis, and management, helping to reduce costs, morbidity, and disease-related mortality [22].

In developing countries, STIs and their complications rank among the top five disease categories for which adults seek health care [24]. The incidence, burden, and distribution of STIs in Ethiopia are generally comparable to those in other developing countries [25, 27]. STIs compromise not only the quality of life but also the sexual and reproductive health of mothers, newborns, and children. STIs during pregnancy can have serious consequences for both mothers and infants [28, 29].

A variety of risk factors contribute to young people's exposure to STIs, including physiological and behavioral factors, cultural or social influences, lack of knowledge about the transmission and contraction of sexually transmitted diseases (STDs), difficulties accessing prevention services, inadequate adult supervision, and the number of sexual partners [30].

The 2016 Ethiopian Demographic and Health Survey indicates that 66.7% of women and 64.6% of men who experienced STIs or STI symptoms in the 12 months prior to the survey did not seek any advice or treatment [27].

In Ethiopia, various interventions have been implemented to reduce the burden of STIs, including promoting male circumcision, screening and early treatment for pregnant mothers during antenatal care (ANC) follow-ups, improving access to health care, and HIV screening programs [31]. Despite these efforts, the prevalence of STIs and HIV remains high in the country [3]. This suggests that, despite available services, many young people struggle with seeking treatment for STIs due to one or more distinct barriers.

Consequently, it is important to examine the factors influencing students' treatment-seeking behavior to address their health challenges related to diseases that disproportionately affect them. While several studies have explored the prevalence of STIs and associated factors in various regions of Ethiopia, there have been relatively few investigations into how college students seek treatment for symptomatic STIs. Therefore, this study aims to assess treatment-seeking behavior and associated factors among students at

Hawassa Teachers College of Education. The findings and recommendations will be valuable for developing appropriate health interventions to prevent the spread of STIs and HIV/AIDS in high-risk settings like colleges and universities, serving as a resource for researchers and program developers.

## 2 Methods and Materials

### 2.1 Study setting and period

This study was conducted among students at Hawassa Teachers Education College, one of the oldest public colleges in Hawassa. The city is situated 268.4 kilometres south of Addis Ababa, the capital of Ethiopia. Hawassa Teachers Education College is in the heart of the city. According to the college registrar, during the 2021/2022 academic year, there were 2,446 students enrolled, comprising 1,817 males and 629 females. The college hosts four active student clubs, including two focused on Gender and HIV/AIDS. Additionally, there is a student clinic and a separate sexual and reproductive health clinic within the college. The study was conducted from October 17 to December 11, 2021, at Hawassa Teachers Education College, Southern Ethiopia.

### 2.2 Study design

The school-based cross-sectional study design was employed.

### 2.3 Source population

All regular program students who had experienced the symptoms of STIs were the source population.

### 2.4 Study population

Students enrolled in the regular program and who had STIs symptom during the study period.

### 2.5 Inclusion and exclusion criteria

All regular program students who reported STI symptoms during a one-year recall period were included in the study. Students who reported STI symptoms but were unable to communicate

or were absent during the data collection period were excluded.

## 2.6 Sample size and sampling techniques

### Sample size determination

The sample size for the quantitative portion of the study was calculated using a single population proportion formula based on the following assumptions: a proportion (p) of 56.8% from a study conducted in Gambella town, Ethiopia, a margin of error (d) of 5%, and a confidence level (Cl) of 95%. Additionally, a 10% non-response rate was factored in, resulting in a maximum calculated sample size of 415.

$$n = \frac{(z_{\alpha/2})^2 P(1-P)}{d^2} = 378, \text{ adding } 10\% [38] \text{ non-response rate} = 415.$$

Where:  $n$ =the desired sample size,  $z=1.96$  which corresponds to 95% confidence level

$P=56.8\%$  from the study conducted in Gambella town, Ethiopia,  $d=5\%$ , which is the margin of error,  $q=1-p = 0.44$

Sample size was also calculated using factors affecting treatment seeking behaviour (self treatment) 35.3% in southern Ethiopia, 10 non response rate. Then the sample size was 385. The largest sample, 415 was used for this study.

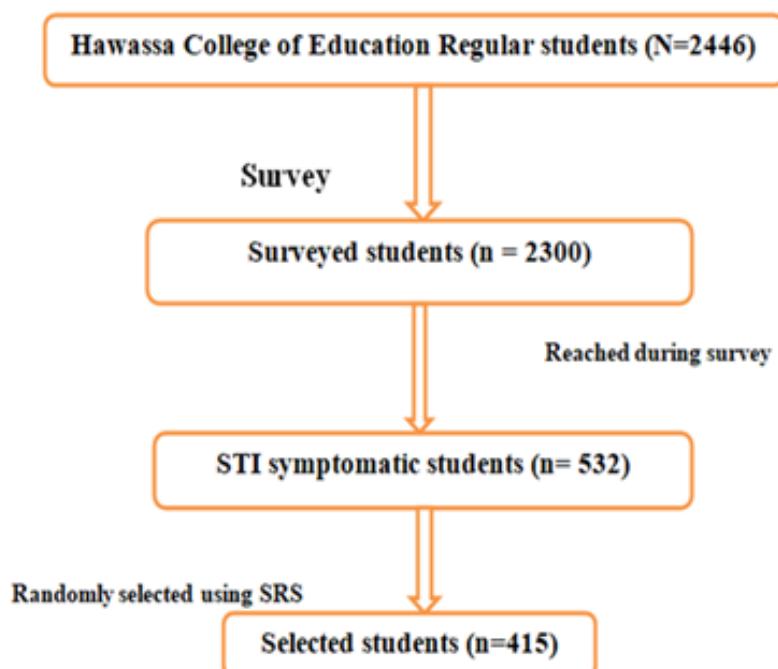
### Sampling Techniques

A survey was conducted among students at Hawassa Teachers Education College to identify those who reported experiencing STI symptoms in the past 12 months. A simple random sampling technique was then employed to select study participants from the students who identified as STI symptom positive during the survey. Out of a total of 2,446 regular students, 2,300 were reached, and 532 were identified as having STI symptoms in the past year. From this group, 415 students were randomly selected for the study (see Figure 1).

## 2.7 Variables of the study

### Dependent variable

Treatment-seeking behavior (Yes/No)



**Figure 1** Schematic representation of the sampling procedure for different objectives for the study of treatment-seeking behaviour among college students in Hawassa education college students, 2021

## Independent variables

The independent variables in this study include socio-demographic factors (such as sex, marital status, religion, level of education, and economic status), perceived severity of illness, use of traditional medicine and self-medication, cost of healthcare services, the approach of healthcare professionals (HCPs), privacy concerns, and the duration of illness. Additional independent variables include past sexual history, self-reported STIs, STI history, comprehensive knowledge of HIV, presence or absence of STI symptoms, and the source of service (e.g., governmental hospital, private clinic, pharmacy, or traditional healer).

## 2.8 Data collection tools and procedures

Data were collected using a structured, self-administered questionnaire. The questionnaire focused on socio-demographic characteristics, health system factors, past sexual history, previous sexually transmitted diseases, knowledge-related factors, and personal behavioral characteristics. Five trained master's students collected the data under the supervision of the researcher. A structured, self-administered Amharic questionnaire was distributed to 415 randomly selected students, with oversight provided by the data collectors and overall supervision by the principal investigator.

## 2.9 Data quality control

The questionnaire and consent documents were initially developed in English and subsequently translated into Amharic for data collection. To ensure consistency, subject matter experts re-translated the questionnaire back into English in collaboration with a translation expert. Necessary corrections were made accordingly. Data collectors and supervisors received two days of training prior to the actual data collection. Overall supervision was provided by the researcher. Questions were reviewed daily by supervisors and the lead investigator for completeness and consistency, and feedback was given to data collectors the following morning.

## 2.10 Operational definition

**Behaviour:** Is defined as the internally coordinated responses of individuals and groups to

an external or internal stimulus that is variable [14].

**Treatment-seeking behaviour:** This is the process of seeking treatment in individuals' use of formal healthcare facilities to improve perceived illness [15].

**Sexually transmitted infections (STI):** This study evaluates treatable syndromic sexually transmitted infections (STIs) based on self-reporting.

**Delay in seeking health care:** Waiting more than seven days without seeking treatment [31].

**The male student was considered STIs positive:** If he reported one or more of the following syndromes: a history of Genital ulcer or sores, urethral discharge, scrotal swelling, inguinal bubo syndromes in the past 12 months before data collection [10].

**A female student was considered STIs positive:** If she reported one or more of the following syndromes: abnormal vaginal discharge, genital ulcer or sores, and lower abdominal pain syndromes in the past 12 months before data collection [10].

**Knowledge of STIs and HIV/AIDS:** Students who scored the mean or above on knowledge assessment questions were considered to have a good knowledge of sexually transmitted diseases and HIV/AIDS, while students who scored below the mean were considered to have poor knowledge [9].

## 2.11 Data processing and analysis

Data were checked for completeness, coded, and entered Epi-data version 3.1, then exported to SPSS version 25.0 for analysis. Multicollinearity was assessed using the variance inflation factor (VIF), which was found to be below 8.6. The Hosmer-Lemeshow model fitness test indicated a p-value of 0.75. Frequencies and percentages were used to summarize descriptive statistics. Bivariate and multivariable binary logistic regression analyses were conducted to identify variables associated with treatment-seeking behavior for STIs among students at Hawassa Teachers

Education College. Variables with a p-value of less than or equal to 0.25 in bivariate analysis were included in the multivariable logistic regression. Finally, variables with an adjusted odds ratio (AOR), 95% confidence interval (CI), and a p-value of less than or equal to 0.05 were considered to have a significant association. Results were presented using text, tables, and figures.

**Table 1** Socio-demographic characteristics of college students in Hawassa Teachers education college students, 2021 (n= 415)

Characteristics	Category	Frequency	Percent (%)
Sex	Male	233	56.1
	Female	182	43.9
Marital status	Single	338	81.4
	Married	58	14
	Divorced	19	4.6
Age	19-23	202	48.7
	24-28	213	51.3
Education	Year one Student	57	13.7
	Second year Student	245	59
	Third year Student	113	27.2
Religion	Protestant	199	48
	Orthodox	132	31.8
	Islam	74	17.8
	Others	10	2.4
Pocket money	1000-1500	228	54.9
	1501-2000	185	45.1

Note: \*other = catholic, Adventist.

### 3.2 Knowledge level of respondents on STIs and HIV/AIDS

Only two hundred fifteen (51.8%) and two hundred twenty-five (54.2 %) of the study participants were assessed as having good knowledge of STIs and HIV/AIDs respectively (figure 2).

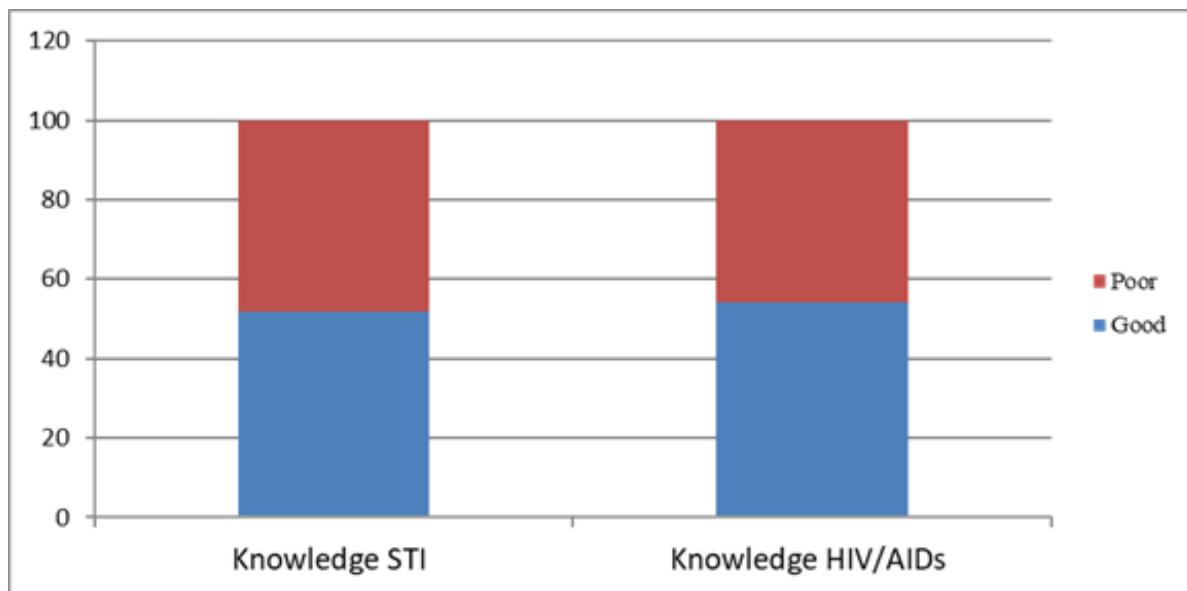
### 3.3 Respondent's history of sexually transmitted infections

One hundred ninety-seven participants (47.5%) reported a history of STIs. Among those with a history, 103 (52.3%) had one episode of exposure, while 94 (47.7%) reported two or more episodes

of exposure.

### 3.4 Barriers to seeking treatment for sexually transmitted infections

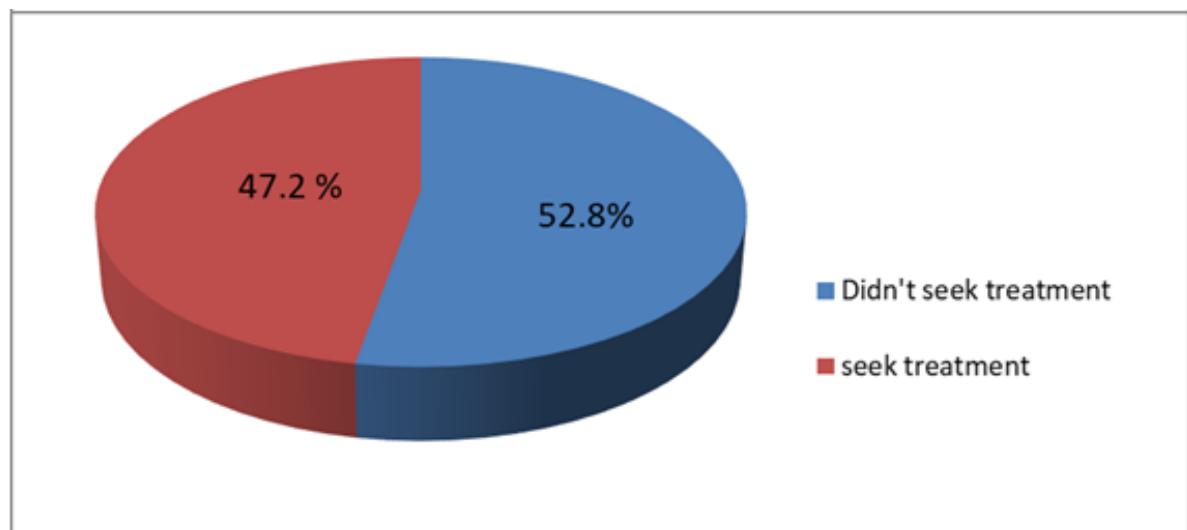
Three hundred fifteen participants (75.9%) reported that the cost of services influenced their treatment-seeking behavior. Additionally, 214 participants (51.6%) indicated that the approach of healthcare professionals negatively impacted their treatment-seeking behavior, while 189 participants (45.5%) expressed concerns about the confidentiality of information shared with health professionals.



**Figure 2** Knowledge level of respondents on sexually transmitted infections and HIV/AIDS among college students in Hawassa teachers education college students, 2021(n = 415)

### 3.5 Treatment seeking behaviour

In this study, treatment-seeking behavior was below 50%. This was determined by assessing whether participants sought care at any formal healthcare facility for one or more symptoms of STIs (see Figure 3).



**Figure 3** Treatment-seeking behaviour for Sexual Transmitted Infections among students in Hawassa of teacher education College 2021 (n =415)

Several variables remained significantly associated with treatment-seeking behavior in the multivariable logistic regression, including starting sexual contact, episodes of STIs, drug retail without a prescription, concerns about confidentiality, pocket money, self-treatment, and knowledge

of STIs and HIV.

Female students were 84% less likely to seek treatment for STIs compared to male students [AOR: 0.16; 95% CI (0.06-0.46)]. The odds of seeking treatment were six times higher among

students who had two or more episodes of STIs compared to those with only one episode [AOR: 5.88; 95% CI (2.11-16.42)]. Students who did not easily access medication without a prescription were 3 times more likely to seek treatment than their counterparts [AOR: 2.97; 95% CI (1.02-8.66)]. Additionally, students who were not concerned about confidentiality were 17.9 times more likely to seek treatment than those who were [AOR: 17.91; 95% CI (6.22-51.61)].

Students earning pocket money between 1501-2000 birr were 3 times more likely to seek treatment compared to those earning 1000-1500 birr [AOR: 3.22; 95% CI (1.19-8.66)]. Furthermore, students who preferred self-treatment were 80% less likely to seek treatment compared to their counterparts [AOR: 0.20; 95% CI (0.07-0.61)]. Those unembarrassed to express their symptoms to health professionals had 2.8 times higher odds of seeking treatment compared to embarrassed students [AOR: 2.76; 95% CI (1.01-7.59)].

**Table 2** Factors associated with treatment-seeking behaviour for sexually transmitted infections among students at Hawassa teachers' education college, Hawassa, southern, Ethiopia, 2021 (n=415)

Variables	Treatment seeking behaviour		COR(95%CI)	AOR (95%CI)
	Yes	No		
Sex of the respondent				
Male	147(63%)	86(36.9%)	1	1*
Female	49(26.9%)	133(73.1%)	4.64 (3.04-7.07)	0.16(0.06-0.46)
Prefer-self treatment				
Yes	86(42.0%)	119(58.9%)	1	1*
No	110(52.4%)	100(47.6%)	1.52 (1.03-2.24)	0.20 (0.06-0.60)
STI history				
Yes	102(51.8%)	95(48.2%)	1	1
No	94(43.1%)	124(56.9%)	0.78 (0.53-1.15)	0.48 (0.44-1.32)
Ashamed to express Symptoms				
Yes	75(37.7%)	124(62.3%)	1	1*
No	121(56.0%)	219(52.8%)	2.11 (1.42-3.12)	2.76 (1.01-7.59)
Discussing RH problems				
Yes	124(49.6%)	126(50.4%)	1	1
No	72(43.6%)	93(56.4%)	0.78 (0.53-1.17)	0.43 (0.14-1.28)
Worried about Information Confidentiality				
Yes	74(39.2%)	115(60.8%)	1	1*
No	122(54.0%)	104(46.0%)	1.82 (1.23-2.69)	17.91 (6.22-51.62)
Pocket money				
1000-1500	89(39.0%)	139(61.0%)	1	1*
1501-2000	107(57.2%)	80(42.8%)	2.08 (1.41-3.09)	3.22(1.19-8.67)
Episode of STIs				
1 episode	38(36.9%)	65(63.1%)	1	1*
≥2 episode	64(68.1%)	30(31.9%)	3.65 (2.02-6.58)	5.88(2.11-16.42)
Retailed medication without prescription				
Yes	60(30.2%)	139(69.8%)	1	1*
No	136(63.0%)	80(37.0%)	3.94 (2.61-5.93)	2.97 (1.02-8.66)
Knowledge on STIs				
Good	135 (62.8%)	80(37.2%)	1	1*
Poor	61 (30.5%)	139(69.5%)	0.26 (0.17-0.39)	0.32 (0.11-0.91)
Knowledge on HIV				
Good	131 (58.2%)	94(41.8%)	1	1*
Poor	65(34.2%)	125(65.8%)	2.68 (0.25-0.56)	0.18 (0.07-0.46)

Note: 1= indicates the reference group; \* = indicates significantly associated variables in multivariable regression

Students with poor knowledge of sexually transmitted infections were 68% less likely to seek treatment compared to those with good knowledge [AOR: 0.32; 95% CI (0.11-0.92)], and the odds of seeking treatment for STIs were 82% lower among students with poor knowledge of HIV compared to those with good knowledge [AOR: 0.18; 95% CI (0.07-0.46)] (see Table 3).

#### 4 Discussions

This study aimed to assess treatment-seeking behavior and associated factors among students at Hawassa Teachers Education College. Variables such as sex, episodes of STIs, drug retail without prescriptions, concerns about information confidentiality, pocket money, self-treatment, and knowledge of STIs and HIV were significantly associated with treatment-seeking behavior. The findings revealed that STIs-related treatment-seeking behavior was present in 47.2% of participants [95% CI (42.3-52.2)]. This rate is lower than that reported in studies conducted in Laos (32), the Nkomazi East area of Mpumalanga (33), Kenya (34), and Nigeria (35). A possible reason for these discrepancies may be differences in exposure; female sex workers often experience the disease and its symptoms more frequently and may be more likely to seek treatment.

In contrast, this study's findings were higher than those from the Gambella region of Ethiopia (31) and relatively higher compared to a study on reproductive-age women in Ethiopia, where STIs-related care-seeking behavior was reported at 33.3% (36). This difference may be attributed to variations in service accessibility, socio-demographic factors, and study populations.

The study found that female students were 84% less likely to seek treatment for STIs compared to male students. This finding is consistent with research indicating that factors such as marital status, sex, economic status, and educational status significantly influence treatment-seeking behavior [32-38]. Additionally, the odds of treatment-seeking behavior for STIs were three times higher among students who received more pocket money compared to those with less.

This aligns with findings from Jamaica, where educational status and higher socio-economic class were found to be significantly associated with treatment-seeking behavior [39]. A possible explanation for this trend is that participants with higher education and income levels may have a better understanding of the importance of seeking treatment and are more likely to afford the necessary services than their counterparts.

This study found that the odds of treatment-seeking behavior for STIs were 2.8 times higher among students who were not embarrassed to express their symptoms to health professionals compared to those who were embarrassed. This finding is supported by research from the Gambella region of Ethiopia, which indicated that respondents who perceived stigma related to STIs were less likely to seek treatment than their counterparts [31]. This may be because individuals who feel stigma or embarrassment lack the motivation to seek treatment.

In the current study, the rate of self-treatment among students was found to be 49.4%. In contrast, a study among female sex workers in 20 cities of Peru reported a self-treatment rate of 32% for STIs [40], which is relatively lower than that observed in this study. The difference may stem from variations in educational levels and socio-economic status. A study conducted in Kenya found that 30.0% of female sex workers who experienced STI symptoms did not seek treatment due to unfriendly health professionals, while 27.7% of respondents in the current study cited the unapproachable demeanor of healthcare providers as a reason for not seeking treatment.

These findings have significant implications for STI prevention strategies among young students. Notably, the results indicate the need to tailor STI treatment services differently for males and females. Additionally, the majority of self-treatment appears to involve obtaining medications from pharmacies without prescriptions, which poses serious risks by potentially exacerbating drug-resistant STIs. Therefore, it is crucial to enforce regulations on pharmacies to prevent the dispensing of medications without a

physician's prescription.

### Limitations of the study

The study did not use laboratory tests to rule out the symptoms, it relies based on study participant self-report, and there might be a classification or information bias.

## 5 Conclusion

The study identified that many symptomatic students with STIs did not seek treatment at formal health facilities. It revealed that factors such as sex (male/female), pocket money, self-treatment, using drugs without a prescription, underestimating the burden of disease, privacy concerns, confidentiality, the number of STI episodes, and knowledge of STIs and HIV were statistically associated with students' treatment-seeking behavior regarding STIs.

### Recommendations

It is recommended to prepare health education sessions focused on sexually transmitted infections to enhance students' knowledge and strengthen health clubs that promote sexual and reproductive health. Collaborating with pharmacies to curb non-prescription sales of medications is essential. Additionally, treatment strategies should consider gender differences, such as establishing female-friendly clinics and male-targeted awareness campaigns. Finally, further studies employing mixed methods are encouraged.

### Acronyms

AOR	Adjusted Odd Ratio
BRHP	Butajira Rural Health Program
CI	Confidence Interval
CDC	Centers for Disease Control and Prevention
COR	Crude Odd Ratio
EDHS	Ethiopia Demographic and Health Survey
FGD	Focus Group Discussion
FSWs	Female Sex Workers
HCPs	Health Care Professionals
HIV	Human Immunodeficiency Virus
HPV	Human Papilloma Virus
IDI	In-depth Interview
OR	Odd Ratio
SRS	Simple Random Sampling
SPSS	Statistical Package for Social Science

UNAIDS	Joint United Nations Program on HIV/AIDS
STDs	Sexually Transmitted Diseases
STIs	Sexually Transmitted Infections
WHO	World Health Organization

### Declaration

#### Ethical consideration

Ethical approval was obtained from the Institutional Review Board (IRB) of Dilla University College of Health Science and Medicine, after describing the purpose and objective of the study. A support letter was secured from the Department of Reproductive Health and Submitted to Hawassa College of Teacher Education to conduct the study. Written consent was obtained from each study participant. Participants were also informed that participation is voluntary and that they can withdraw at any time if they are not satisfied with the questionnaire. To maintain confidentiality, information was collected through separate interviews throughout, excluding names as identifying data.

#### Consent for publication

Not applicable

#### Data availability statement

The datasets used in this study can be available from the corresponding author upon reasonable request.

#### Competing interest

The authors declare no conflict of interest.

#### Author contribution

All authors made a significant contribution to the work reported; BB, GN, RH, and MM participated in the conception, study design, execution, and acquisition of data. BB, GN, RH, and MM contributed to the analysis and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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