

# Sexually transmitted infections and associated factors among Wollo University students, Northeast Ethiopia

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## Abstract

**Introduction:** Sexually transmitted infections (STIs) represent a large burden worldwide, with an annual incidence of about 333 million cases. In Ethiopia, studies on STIs among youths are very few. Investigating STIs in general and particularly among youths, is an important input to designing policies and strategies aimed at preventing and controlling infections. Therefore, the aim of this study was to determine the prevalence and associated factors of STIs among Wollo University students, in Northeast Ethiopia.

**Material and methods:** An institution-based cross-sectional study was conducted among Wollo University students. Sample size included 598 participants. A simple random sampling technique was employed, and data were collected by pre-tested self-administered questionnaire. Epi Data version 4.6 was applied for data entry, and statistical package for social science version 25 was used for statistical analysis. Descriptive statistical analysis and binary logistic regression were utilized to identify factors associated with STIs. Adjusted odds ratio with 95% CI was employed to show the strength and direction of the association, and *p*-value was used to indicate statistical significance.

**Results:** Self-reported STIs prevalence in the last 12 months prior to the study was 59 (21.5%; 95% CI: 16.5-26.5%) among students who were sexually active. Non-dormitory students (adjusted odds ratio (AOR) = 4.56, 95% CI: 1.21-17.21%), having sex with a casual partner (AOR = 2.98, 95% CI: 1.14-7.81%), and poor knowledge on STIs (AOR = 2.95, 95% CI: 1.28-6.81%) were found significantly associated with a history of STIs in the past 12 months among Wollo University students.

**Conclusions:** The prevalence of STIs is high among Wollo University students. Non-dormitory students, having sex with a casual partner, and poor knowledge on STIs are positively associated factors in students' reporting on STIs in the last 12 months. Improving the level of knowledge and awareness of students about STIs may decrease the prevalence of STIs among students.

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**Key words:** sexually transmitted infections, associated factors, university students, Ethiopia.

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## Introduction

Sexually transmitted infections (STIs) are a variety of clinical conditions caused by pathogens, which can be acquired and transmitted through sexual contacts [1, 2]. The main mode of transmission of STIs is through unprotected sexual intercourse, but it can also be transmitted through mother-to-child, blood transfusions, or other contact with blood or blood products [3]. World Health Organization (WHO) estimates that more than one million people acquire an STI every day, affecting quality of life, sexual and reproductive health, and health of newborns and children [4]. STIs are a major public health concern worldwide, because of their magnitude, lack of access to adequate treatment, and being a cause of acute illnesses and long-term complications [5, 6].

In developing countries, STIs are among 10 diseases, which are most likely to cause people to seek healthcare services and have serious health, social, and economic consequences [7]. Lack of access to effective and reliable healthcare services has led to an increase in STIs in several countries [8], which is particularly worrying, because these infections account for up to 17% of economic loss due to ill health [9, 10]. Furthermore, increasing risk of human immunodeficiency virus (HIV) transmission [11, 12] and lack of effective treatments for STIs may also lead to complications, such as pelvic inflammatory disease (PID), ectopic pregnancy, male and female infertility, cancer, miscarriage, premature birth, stillbirth, neonatal mortality, and congenital infections [13, 14]. Among sub-Saharan African countries, the burden of STIs is very high, with 108 million STIs occurring every day. It is estimated that 80 to 90% of the global burden of STIs occurs in these low-income countries [7].

In Ethiopia, about 35% of the population includes young people between 15 and 24 years of age, and this largest category is highly vulnerable to STIs [15, 16]. According to Ethiopian Demographic Health Survey (EDHS) 2016, about 4% of sexually active men and women reported a history of a STI in twelve months before the survey. A STIs surveillance conducted in eight health facilities in various regions of Ethiopia indicated that younger people (range, 19-33 years old) are highly affected compared with other age groups [2].

There are several factors in acquiring and transmission of STIs in developing countries. Limited access to diagnostic facilities, poor awareness, and risky sexual practices have been described as the most common reasons for the transmission and acquisition of STIs [7].

University students are considered the most at-risk population due to their inclination to engage in risky sexual behaviors (early sexual initiation, multiple sexual partners, unprotected sex, having sexual intercourse with the same sex, substances usage, having sex with older age partners, and non-regular partners) [17].

There are various strategies and interventions to prevent and treat STIs. Promoting safer sexual behaviors, early healthcare-seeking behaviors, and condom promotion are some of the key interventions [18].

There are few studies about the prevalence and risk factors of STIs in Ethiopia. In order to design appropriate interventions in reducing the impact of STIs, there is a need to know the magnitude of STIs and their factors. Therefore, this study was designed to determine the prevalence of STIs and identify factors associated with the diseases among Wollo University students.

## Material and methods

### Study design and setting

An institution-based cross-sectional study was conducted at Wollo University from February 9, 2021 to March 21, 2021. Wollo University is among the second-generation universities in Ethiopia, and includes seven colleges, school, and department structures. Within the University, there is a student clinic, gender and youth sexual and reproductive center that delivers treatment and counseling services for students.

Ethical clearance was obtained from the Ethical Review Committee of Wollo University, College of Medicine and Health Sciences. Written informed consent was obtained from all participants before data collection. They were informed that participating in the study was voluntary, and their right to withdraw from the study at any time during data collection was assured. All information collected from the respondents were kept strictly confidential, and names of the participants were not included in the questionnaires. During data collection, health education was provided to remind that a student who has a symptom of STIs included in this study should be clinically evaluated at the student clinic or gender and youth sexual and reproductive center, and receive treatment and counseling.

### Study population

All regular Wollo University students at Dessie and Kombolcha campuses who were attending their classes during the study period were included in the study.

### Sample size determination and sampling procedure

Final maximum sample size was determined using Epi Info version 7.2.4.0 by taking the assumption of proportion of STIs among students who presented good knowledge as 5.6%, ratio of exposed-to-unexposed as 1 : 1, adjusted odds ratio (AOR) as 0.177, power 80%, and 95% confidence level according to a study done in Bahirdar, Ethiopia [19]. Therefore, the required sample size after adding 5% non-response rate was 598 participants.

A stratified sampling technique was employed to classify students based on their campus and sex. Accordingly, students were classified into four strata (i.e., Dessie campus male students, Dessie campus female students, Kombolcha campus male students, and Kombolcha campus female students). The sample was allocated to each stratum based on propor-

tionality to the population size in each campus. A simple random sampling technique by computer generated random sampling was used to select study subjects on each campus. The list of active students was obtained from the respective campus registrar's office.

## Variables

Dependent variable – STIs: female students were asked if they had a history of vaginal discharge, and/or genital ulcer or sore, and/or lower abdominal pain in the last 12 months before the survey, and a student was considered as having a STI if she reported one or more of these conditions [13]. Similarly, male students were considered to have a STI if they reported having genital ulcer or sore, and/or urethral discharge, and/or inguinal bubo, and/or scrotal swelling in the past 12 months before the survey [13].

Independent variables: socio-demographic factors, psychosocial, cognitive, and behavioral-related factors.

## Operational definitions

Student was considered to have good knowledge on STIs if he/she had a knowledge score greater than or equal to a mean, and poor knowledge if he/she had a knowledge score below a mean [20]. Students were considered as having multiple sexual partners if they reported a history of sexual intercourse with two or more sexual partners in the last 12 months before the survey [21]. Student was considered as having casual sex if he/she reported a history of a one-night stand engagement having sex with people who had very little or no history of knowing each other in the last 12 months before the survey [13].

Students were considered as having a history of urethral discharge syndrome if they reported abnormal secretion from the distal part of the urethra, and may/may not be accompanied by a burning sensation during urination and frequent urination [3].

Male participants were considered as having a history of genital ulcer syndrome if they reported an open sore or break in the continuity of the skin or mucous membrane of the glans penis, prepuce, and penile shaft. The ulcer should be accompanied by recurrent pain or painless full or shallow vesicles, or may/may not by fever, headache, or muscle pain [3].

Female students were considered as having a history of genital ulcer syndrome if they reported an open sore or breaks in the continuity of the skin or mucous membrane of the vulva, perineum, and vagina. The ulcer should be accompanied by recurrent pain or painless full or shallow vesicles, and may/may not be fever, headache, or muscle pain [3].

Female students were considered as having a history of vaginal discharge syndrome if they reported a discharge from the vagina abnormal in color, odor, and amount. The discharge should be whitish/yellow-green, thin/thick,

profuse/purulent, odorless/fishy odor, and it may/may not be accompanied by irritation of the vulva, pain during urination, back pain, and frequent urination [3].

Student was considered as having lower abdominal pain syndrome (PID) if he/she reported pain in the lower part of the abdomen, pain during urination, and back pain. Females additionally reporting abnormal vaginal discharge, inter-menstrual pain, or pain after sexual intercourse [3].

Male students were considered with a history of scrotal swelling syndrome if reported painful swelling of the scrotum and pain during urination, which may be accompanied by frequent urination and urethral discharge [3]. Student was considered with a history of inguinal bubo syndrome if painful unilateral or bilateral swelling of the inguinal lymph nodes were reported [3].

## Data collection procedure and quality control

Data were collected using a structured self-administered questionnaire developed in English, then translated into the Amharic language, and translated back into English to ensure consistency. Four nurses trained on national guidelines for the management of STIs using a syndromic approach facilitated data collection. Two public health officers supervised data collection. A one-day training was provided for data collectors and supervisors before the initiation of data collection. A pre-test was done, and based on feedback from the pre-test, a necessary modification was performed. During data collection, selected study participants were selected by their identification number from their respective departments classrooms and year of the study. Data collectors provided brief information about the symptoms of STIs before the selected students filled out the questionnaire. During the study period, the collected data were checked continuously on daily basis for completeness.

## Data processing and analysis

Data were checked, coded, and entered using EPI Data version 4.6, then exported to statistical package for social sciences (SPSS) version 25.0 for analysis. Descriptive statistics, such as percentage, mean, and standard deviation were computed and presented in tables and figures. Multicollinearity was checked, and no collinearity was detected. Knowledge status of respondents on STIs was identified by a composite analysis, and internal consistency of knowledge items was verified using Cronbach's  $\alpha$  value of 0.87. Model fitness was confirmed using Hosmer-Lemeshow test. Bivariable logistic regression was conducted to identify eligible variables for the final model, and a variable with a  $p$ -value  $\leq 0.25$  would be entered into a multivariable logistic regression model to identify predictor variables.  $P$ -value of less than 0.05 and AOR with a 95% confidence interval (CI) were applied to indicate the presence of statistical significance.

## Results

### Socio-demographic characteristics

This study was conducted among 398 (67.1%) male and 195 (32.8%) female students, with response rate of 99%. The mean age of the students was  $22 \pm 2.3$  years. About 15% of the participants were from the College of Medicine and Health Science (Table 1).

**Table 1.** Socio-demographic characteristics of Wollo University students, 2021 ( $N = 593$ )

Variable	n (%)
Sex	
Male	398 (67.1)
Female	195 (32.8)
Age	
< 20 years old	34 (5.7)
$\geq 20$ years old	559 (94.3)
Marital status	
Single	563 (95.0)
Married	20 (3.3)
Constant sexual partner	10 (1.7)
Ethnicity	
Amhara	423 (71.3)
Oromo	94 (15.9)
Tigray	49 (8.2)
Other*	27 (4.6)
Religion	
Orthodox	397 (67.0)
Muslim	126 (21.2)
Protestant	50 (8.4)
Catholic	20 (3.4)
Living area	
Urban	402 (67.8)
Rural	191 (32.2)
Year of study	
First year	117 (19.7)
Second year	170 (28.7)
Third year	193 (32.5)
Fourth year and above	113 (19.1)
Current accommodations	
University dormitory	566 (95.4)
Living with family	16 (2.7)
Renting	11 (1.9)
Constant monthly allowance	
Yes	477 (80.4)
No	116 (19.6)

Other\* – Somalia, Afar, and Gambella.

### Psycho-social, cognitive, and behavioral characteristics

Regarding sexual history, 274 (46.2%) students reported having a history of sexual intercourse. The mean age for the reported initiation of sexual intercourse was  $19 \pm 2.7$  years. Among those who reported a history of sexual intercourse, 71.9% started sexual contacts before they joined the University. Three hundred fifty-one (59.2%) students scored below the mean value for the knowledge questions. Regarding the participants' source of information about STI, 327 (54.7%) reported mass media, 317 (53%) health professionals, 122 (20.4%) health institutions, 169 (28.3%) teachers, 93 (15.6%) magazines, and 174 (29) reported social media (Table 2).

### Prevalence of sexually transmitted infections

Of the total participants who reported having sexual history, 59 (21.5%; 95% CI: 16.5-26.5%) had a history of STIs. Regarding symptoms of STIs, 10 (1.7%) students reported genital ulcer, 29 (7.3%) males reported urethral discharge, 11 (2.8%) stated scrotal swelling, 4 (1%) reported inguinal bubo, 13 (6.7%) female students had vaginal discharge, and 9 (4.6%) reported lower abdominal pain (Table 3).

### Factors associated with sexually transmitted infections

Bivariable and multivariable logistic regression were utilized to identify factors associated with STIs. Model adequacy was verified using Hosmer-Lemeshow goodness-of-fit test. The model was adequate with a  $p$ -value of 0.937. In multivariable logistic regression, current accommodation, having sex with a casual partner, and knowledge on STIs had a statistically significant association with STIs, with a  $p$ -value  $\leq 0.05$ . The odds of STIs were 4.56 (95% CI AOR: 1.21-17.21%) times higher among non-dormitory students compared with students who were living in university's dormitories. The odds of STIs among students having sex with a casual partner were 2.98 (95% CI AOR: 1.14-7.81%) times higher than those who did not have sex with a casual partner. The odds of STIs among students with poor knowledge was 2.95 (95% CI AOR: 1.28-6.81%) times higher compared with students with good knowledge on STIs (Table 4).

## Discussion

The present study estimated the prevalence of STIs and identified factors associated with STIs among Wollo University students. Self-reported STIs prevalence in the last 12 months prior to the survey was 21.5% (95% CI: 15.0-24.5%) among Wollo University students. This finding is in line with a study done among Jimma University students (14.3%) [22], Wolayta Sodo University students (19.5%) [18], and studies done in Gondar (18.2%) [1]. This implies that the STIs burden among university students remains high,

**Table 2.** Psycho-social, cognitive, and behavioral characteristics of Wollo University students, 2021 (*N* = 593)

Variable	<i>n</i> (%)
Ever had sex	
Yes	274 (46.2)
No	53.8 (53.8)
Time of starting sexual contacts	
Before joining University	197 (71.9)
After joining University	77 (28.1)
Reason for first sexual contact	
Fall in love	168 (61.3)
Sexual desire	69 (25.2)
Peer pressure	24 (8.7)
Other*	13 (4.8)
Ever used condoms	
Yes	130 (47.4)
No	144 (52.6)
Regularly using condoms	
Yes	56 (43.0)
No	74 (57.0)
Sexual experience in the last 12 months	
Yes	165 (60.2)
No	109 (39.8)
Using condoms in the last 12 months	
Yes	79 (60.7)
No	51 (39.3)
Number of sexual partners	
One	102 (37.2)
More than one	172 (62.7)
Number of sexual partners in last 12 months	
One	105 (63.6)
More than one	60 (36.4)
Sex with causal partners	
Yes	32 (11.6)
No	242 (88.4)
Causal sex in the last 12 months	
Yes	11 (34.4)
No	21 (65.6)
Sex with commercial sex workers	
Yes	14 (5.1)
No	260 (94.9)
Sex with commercial sex workers in the last 12 months	
Yes	4 (28.6)
No	10 (71.4)

**Table 2.** Cont.

Variable	<i>n</i> (%)
Ever drunk alcohol	
Yes	259 (43.6)
No	334 (56.4)
Alcohol drinking in the last 12 months	
Yes	247 (95.4)
No	12 (4.6)
Reading and watching pornographic materials	
Yes	86 (14.5)
No	507 (85.5)
Watching pornographic materials in the last 12 months	
Yes	78 (90.7)
No	8 (9.3)
Cigarette smoking	
Yes	10 (1.7)
No	583 (98.3)
Frequency of cigarette smoking	
One	4 (40.0)
≥ Two	6 (60.0)
Shisha smoking	
Yes	3 (0.5)
No	590 (99.5)
Sex under the influence of shisha	
Yes	2 (66.6)
No	1 (33.4)
Knowledge on STIs	
Good	242 (40.8)
Poor	351 (59.2)

*Other\** – married, raped, or drunk.

*STIs* – sexually transmitted infections

because students join university at relatively similar age, they are out of family control and take decisions independently, and they all have the same level of exposure to STIs.

In this study, current accommodation of the students was positively associated with STIs in the last 12 months. Students who were living outside the University (non-dormitory) had higher odds of STIs compared with students who resided within the University's dormitory. This finding is consistent with a study done at Wolayta Sodo and Jimma Universities [18, 22]. The possible explanation for this finding might be non-dormitory students might present an increased exposure to risky sexual behaviors and acquisition of STIs [23].

**Table 3.** Prevalence of symptoms of sexually transmitted infections (STIs) in the last 12 months among Wollo University students, 2021 (N = 593)

STIs symptoms in the last 12 months	n (%)
Genital ulcer in both males and females (n = 593)	10 (1.7)
Urethral discharge in males (n = 398)	29 (7.3)
Scrotal swelling in males (n = 398)	11 (2.8)
Inguinal bubo in males (n = 398)	4 (1.0)
Vaginal discharge in females (n = 195)	13 (6.7)
Lower abdominal pain (n = 195)	9 (4.6)

**Table 4.** Bivariable and multivariable binary logistic regression models of factors associated with sexually transmitted infections (STIs) in the last 12 months among Wollo University students, 2021 (N = 593)

Variables	Sexually transmitted infections			
	Yes, n (%)	No, n (%)	COR (95% CI)	AOR (95% CI)
<b>Religion</b>				
Orthodox	45 (16.4)	145 (52.9)	1	1
Muslim	6 (2.1)	52 (19.0)	0.38 (0.16-0.95%)	0.34 (0.10-1.12%)
Other	8 (2.9)	18 (6.7)	1.4 (0.53-3.02%)	1.77 (0.53-5.95%)
<b>Year of study</b>				
≤ Second year	17 (6.2)	91 (33.2)	1	1
≥ Third year	42 (15.3)	124 (45.3)	1.8 (1.01-3.46%)	1.69 (0.74-3.88%)
<b>Current accommodation</b>				
Dormitory	51 (18.6)	206 (75.2)	1	1
Non-dormitory	8 (2.9)	9 (3.3)	3.6 (1.51-11.13%)	4.56 (1.21-17.21%)
<b>Sexual experience within the last 12 months</b>				
Yes	46 (16.8)	119 (43.4)	2.9 (1.75-9.58%)	1.62 (0.55-4.73%)
No	13 (4.8)	96 (35.0)	1	1
<b>Sex with a causal partner</b>				
Yes	22 (8.0)	10 (3.6)	12.2 (2.58-12.99%)	2.98 (1.14-7.81%)
No	37 (13.6)	205 (74.8)	1	1
<b>Ever drunk alcohol</b>				
Yes	28 (10.2)	120 (43.8)	0.72 (0.41-1.27%)	0.52 (0.22-1.25%)
No	31 (11.3)	95 (34.7)	1	1
<b>Watching pornographic materials</b>				
Yes	22 (8.0)	41 (15.0)	2.52 (1.25-4.26%)	1.77 (0.77-4.08%)
No	37 (15.3)	174 (63.5)	1	1
<b>Visiting night clubs</b>				
Yes	24 (8.8)	55 (20.0)	1.99 (1.05-3.41%)	1.19 (0.53-2.67%)
No	35 (12.8)	160 (58.4)	1	1
<b>Knowledge on STIs</b>				
Poor	41 (15.0)	126 (46.0)	1.61 (0.83-2.82%)	2.95 (1.28-6.81%)
Good	18 (6.6)	89 (32.4)	1	1

Having causal sex was significantly and positively associated with STIs in this study. This finding is congruent with a study done among Wolayta Sodo and Meda Walabu Universities students [11, 17]. This might be because casual sex has a direct enhancing effect on the transmission of STIs. Moreover, it has an important role in the spread and persistence of STIs, which are characterized by high prevalence [24]. This implies that avoiding any unsafe sexual contact with strange people could reduce the risk of acquiring STIs [25].

Students having poor knowledge on STIs were positively associated with STIs in the last 12 months. This finding is in line with a study done at the University of Gondar and Wolayta Sodo University [1, 18]. This is because students having poor knowledge on STIs could not be aware of the ways of transmission, prevention methods, and complications to prevent acquisition of STIs.

## Conclusions

The prevalence of STIs is high among Wollo University students. Non-dormitory participants, having a history of sexual contact with casual partners, and poor knowledge about STIs are independent predictors of STIs in the last 12 months. Improving the level of knowledge and awareness regarding STIs can decrease the prevalence of STIs among students. Students should avoid unprotected sexual contacts with strangers, and it is better to reside within university dormitory to minimize their STIs exposure. We also recommend conducting further qualitative studies to explore students' risky sexual behaviors.

## Disclosures

1. Institutional review board statement: The study was approved by the the Ethical Review Committee of Wollo University, College of Medicine and Health Sciences, with approval number: CMHS/167/01/2021.
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