



Assessing knowledge and awareness about syphilis among undergraduate students in the faculty of engineering at Mangosuthu University of Technology (MUT).

Sanelisiwe Portia Thwala*, S. Shangase
Mangosuthu University of Technology

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Abstract

Background

Syphilis is a genital ulcerative condition caused by the bacterium called *Treponema pallidum*. It can cause multiple organ and system failure, which can lead to death if left untreated. The main risk factors of syphilis transmission are inconsistent condom use, having several sex partners, and sharing needles during injection of medication. Syphilis is emerging as a public health problem in sexually transmitted Infections, and research has shown a rise in infections among adults at KwaZulu-Natal universities.

Aim and Objective: This research aimed to assess the knowledge and awareness of syphilis among undergraduate students in the Faculty of Engineering at MUT, and the objective was to evaluate the incidence of syphilis infection among male and female students in the Faculty.

Methodology

This study was conducted at MUT, targeting a population of 210 undergraduate students in the Faculty of Engineering. The data was collected by use of an online survey using Google Forms, and responses were imported to an Excel spreadsheet.

Research findings

The results showed 44% of the study participants had basic awareness of syphilis infection, 40% had advanced knowledge, and 16% had no understanding of syphilis. Females were shown to have higher levels of awareness and knowledge about syphilis infection (55% vs. 45% for males). 85% of the study participants had never been exposed to syphilis, 11% had been previously infected, and 4% had no known exposure.

Conclusion

Most MUT engineering undergraduate students know of the existence of syphilis infection; however, there is still a need to do more awareness campaigns.

Recommendations

Health Education Programs and Modules: Incorporating sexual health education, including information on syphilis and STIs, into academic curricula or general university modules makes health education programs compulsory.

Keywords: Syphilis, *Treponema pallidum*, sexually transmitted infections

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Corresponding author: Sanelisiwe Portia Thwala*

Email: sanelisiwep2@gmail.com

Mangosuthu University of Technology



Background

Sexually transmitted infections (STIs) constitute a significant public health challenge globally, with syphilis being one of the oldest and most consequential infections (Herbert, Middleton, and Herbert, 2012). *Treponema pallidum*, the bacterium responsible for syphilis, has been a persistent threat to human health for centuries (Ricco and Westby, 2020). The transmission of syphilis occurs primarily through sexual contact, encompassing anal, vaginal, or oral intercourse. (Williams et al., 1999). The early symptoms of syphilis include, but are not limited to, chancroid and syphilis rash. (Arando Lasagabaster and Otero Guerra, 2019), due to specific TP antibodies developing as positive reactions (Satyaputra et al., 2021). Furthermore, congenital syphilis can occur when the infection is passed from mother to unborn child during pregnancy or childbirth, leading to a range of adverse outcomes, including birth defects, cognitive impairment, hearing loss, and stillbirth. (Lee, Siek, and Hirst, 2021).

Sexual contact has been identified as the primary mode of syphilis transmission, emphasizing the need for comprehensive prevention strategies targeting high-risk populations (Lee, Siek, and Hirst, 2021). Additionally, the study on congenital syphilis has underscored the critical importance of early detection and treatment to mitigate adverse outcomes for newborns (CDPH, 2023). According to the World Health Organization (WHO), an estimated 7.1 million adults between the ages of 15 and 49 acquired syphilis globally in 2020, which serves as a reminder of the persistent difficulties associated with syphilis and the vital significance of giving priority to early detection, effective treatment, and preventive measures to lessen the disease's impact on people and communities around the globe. Furthermore, certain populations, such as men who have sex with men (MSM), have reported a considerable increase in syphilis incidence rates. (Tao et al., 2023). This trend underscores the importance of targeted interventions to address the specific needs of vulnerable populations.

Syphilis presents a wide range of symptoms, depending on the stage of infection. In the primary stage, individuals may develop painless sores or ulcers on the genitals, anus, or mouth within 10 to 90 days after exposure to the bacterium (Guzel, 2018). If left untreated, syphilis progresses to the secondary stage, characterized by symptoms such as rash, fever, lethargy, and swollen lymph nodes (Chaudhry et al., 2023). In the tertiary stage, syphilis can lead to severe health

complications, including damage to the brain, heart, nerves, eyes, blood vessels, liver, bones, and joints (Hicks et al., 2023).

The burden of syphilis extends beyond physical health, affecting individuals' social and psychological well-being. (Singh and Singh, 2021). Syphilis has been associated with sexual dysfunction, urinary incontinence, and other intimate health concerns, leading to significant distress and stigma among affected individuals (Radolf et al., 2016). Despite being a preventable and curable disease, syphilis continues to pose substantial public health challenges globally. One major concern is that syphilis can cause blindness, neurological problems, and serious complications for pregnant women and their babies, and even death if left untreated (Tsuboi et al., 2021). One of the most significant challenges in South Africa is a lack of understanding of syphilis, particularly in underprivileged areas. As a result, pregnant women in South Africa are at increased risk of contracting syphilis (Hoque et al., 2021). Syphilis spreads due to a lack of understanding and awareness, resulting in delayed diagnosis and inadequate treatment. As a result, there is an urgent need for extensive research to determine the level of knowledge and awareness among risk populations, including but not limited to university or college students.

Despite all efforts to educate teens about risky behaviours, adolescents aged 15-24 account for half of the 20 million new sexually transmitted diseases (STDs) diagnosed every year in the United States, with a prevalence of gonorrhoea, chlamydia, and syphilis greater than 1.5 million among college students (Inside Higher Education, 2016). These efforts are hampered by the fact that most university students are unable to correctly prevent, identify, and treat syphilis (Cassidy et al., 2018). (Carvalho and de Araújo, 2020) discovered that while the majority of students at the university in the Northeast had heard of syphilis, their knowledge was insufficient to follow appropriate sexual behaviors for disease prevention. This suggests a need for further study at universities to establish the level of knowledge and comprehension within these groups, as well as to develop targeted therapies to address the fundamental causes of syphilis transmission and related health disparities.

The literature on syphilis emphasizes the disease's complexity as well as the intricate interactions between biological, social, and behavioral elements that facilitate the disease's transmission. (Fajemiroye et al., 2023). To



encourage safer sexual behaviours and lessen the stigma attached to syphilis and other STDs, education and awareness efforts are essential (Ong *et al.*, 2020). Public health campaigns have the potential to dispel myths and misconceptions about syphilis and encourage proactive engagement in preventive and screening activities by providing individuals with accurate information and fostering an open discourse about sexual health.

In light of these considerations, this study aims to evaluate the knowledge and awareness of syphilis among undergraduate students in the Faculty of Engineering at Mangosuthu University of Technology (MUT). The lack of knowledge and awareness about syphilis contributes to its spread, delayed diagnosis, and insufficient treatment (Bonnewell *et al.*, 2020).

Treponema pallidum (*T. pallidum*) is a spirochete known for its exceptional ability to elude the human immune response and cause systemic infection. It is the causative agent of syphilis (Hicks *et al.*, 2023). There are multiple phases in the pathogenesis of syphilis, each distinguished by unique clinical symptoms and tissue involvement (Loscalzo *et al.*, 2022). *T. pallidum* spreads throughout the bloodstream, lymphatic system, and local tissues after entering the body through mucous membranes or skin tears, causing a broad infection (Gavazzoni Dias *et al.*, 2023). Furthermore, *T. pallidum* can spread and invade numerous organs, including the central nervous system, cardiovascular system, and mucocutaneous tissues, thanks to its affinity for endothelial cells and fibronectin molecules (Lithgow *et al.*, 2021).

As of 2011, the prevalence of syphilis stood at 0.4% in KwaZulu-Natal (KZN) and 1.6% nationally in South Africa (National Department of Health, 2012). Despite being a preventable and treatable illness, syphilis poses serious problems for global public health, partly due to a lack of awareness and education among affected populations (Whiting, Schwartzman, and Khachemoune, 2023). The study has repeatedly revealed gaps in understanding syphilis symptoms, prevention, treatment, and transmission among various demographic groups, including college students (Halford, 2021). Misconceptions and the stigma associated with syphilis can hinder efforts to raise awareness and motivate preventive actions (Alomair *et al.*, 2020).

University students are particularly vulnerable to contracting and spreading STIs, making it crucial to increase their understanding and awareness of syphilis (Subbarao and Akhilesh, 2017). Engaging students in comprehensive sexual health education programs that cover syphilis

alongside other STIs can empower them to make informed decisions about their sexual health and seek appropriate care when necessary (CDC, 2021). A study conducted by Mthembu *et al.* (2022) revealed that the students have high awareness of STIs but still have low risk perceptions, especially towards condom use, alcohol consumption, and age-disparate relationships.

Assessing the level of knowledge and awareness about syphilis among undergraduate students will contribute to the development of effective strategies to reduce syphilis transmission and improve health outcomes, particularly among high-risk individuals. Attitudes and behaviours regarding syphilis significantly impact an individual's risk of infection, willingness to seek medical attention, and treatment outcomes. The study by Ong (2020) identified several variables contributing to high-risk sexual behaviours and syphilis transmission. These included drug abuse, unprotected intercourse, multiple partners, and misconceptions about STIs.

Aim and objective

This study aimed to assess the knowledge and awareness of syphilis among undergraduate students in the Faculty of Engineering at MUT, and the objective was to evaluate the incidence of syphilis infection among male and female students in the Faculty.

Research Methodology

Study design

The study assessed knowledge and awareness about syphilis among undergraduate students, and also assessed if there are students who had a syphilis infection by means of a survey. Students were randomly selected, and participation in the study was on a voluntary basis. A surveillance form was developed and was distributed electronically and physically. The forms were physically distributed during tea breaks and lunch breaks in the student dining areas. The consent forms were signed before student participation.

Study setting and population

This study took place at Mangosuthu University of Technology in Durban, South Africa. The target population



was undergraduate students enrolled in the Faculty of Engineering. The study was conducted across the Faculty of Engineering.

Sampling and sample size

The sample involved 210 undergraduate students, comprised of 105 males and 105 females from different departments under the Faculty of Engineering, where participants were randomly selected. The population size of the study was determined by the number of students registered in the Faculty of Engineering, as well as the students who were willing to volunteer. An equal number of survey forms was distributed to all the Faculty of Engineering Departments. The electronic survey only allowed the student to fill out the form once. Physical survey forms were given a special code unique to every student to avoid duplication. There were no names and surnames assigned to the survey forms.

Inclusion criteria

The student must be registered with Mangosuthu University Faculty of Engineering; therefore, the student's card was revealed as proof.

Exclusion criteria

The student must be willing to voluntarily fill out the entire survey form to be part of the study.

Bias

40% of the participants were in their first year, 30% were in their second year, and 30% were in their third year.

Data collection

The data was collected by using surveys. The study included a printed and online questionnaire that consisted of 13 questions. The printed questionnaires were distributed to participants, and data from completed questionnaires were entered into Microsoft Excel for analysis. Participants who chose to complete the survey online used Google Forms, and their responses were automatically imported into the Excel spreadsheet. A unique survey serial number was used for

each questionnaire to obtain efficient data collection and matching of responses, ensuring the right analysis.

Data extraction

Data was extracted based on the scoring method; students were categorized according to their total score to help in assessing their knowledge level of Syphilis comprehensively. To categorize undergraduates' knowledge levels about syphilis as *No Knowledge*, *Basic Knowledge*, and *Advanced Knowledge*, the following scoring system based on students' answers to the survey questions was used:

Assigned points based on responses

For each question that assessed factual knowledge about syphilis, 1 point for each correct or positive response was allocated (indicating knowledge or awareness) and 0 points for incorrect or negative responses. Some questions, like those on attitudes (e.g., willingness to test or encourage others), can also contribute to advanced knowledge if they show a deeper understanding or engagement with the topic.

Questions scored for knowledge:

-Basic Knowledge Questions: Questions 1, 2, 3, 4, and 5 directly assessed essential knowledge about syphilis (e.g., transmission, prevention, symptoms).

Advanced Knowledge Questions: Questions 8, 9, and 10 assessed knowledge and attitudes beyond basic facts, such as understanding medical risks and attitudes toward testing.

Categories based on total score

-No Knowledge (0-2 points): Limited awareness, with little understanding of syphilis transmission, symptoms, or prevention. A score of 0 to 2 points indicated no foundational knowledge.

-Basic Knowledge (3-5 points): recognized basic information about syphilis (e.g., transmission, symptoms, prevention) but lacks a deeper understanding of medical risks or motivation toward testing. Counted from question 1 to question 5, 1 point was awarded for each correct answer, indicating knowledge.



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-Advanced Knowledge (6-9 points): understood key details about syphilis and demonstrated awareness of the medical risks and prevention strategies, and encouraged testing behaviours. Counted from questions 8 to 10, an award of 1 point was given for answers that indicated understanding of medical risks and willingness to test or encourage others.

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Statistical analysis

Statistical analysis of the quantitative and qualitative data was conducted using Microsoft Excel 365 and Statistical Package for the Social Sciences (SPSS).

Ethical considerations

The study approval was granted by the MUT Research Ethics Committee with reference number RD5/36/2024 from 19 February 2024 to 19 February 2026.

Ethics authorization was obtained from the MUT Ethics Committee. Participants were informed of the purpose of the study and signed a consent form before participation in the study. Participation was voluntary, and participants were allowed to withdraw anytime they wanted to. Anonymity was ensured by not requiring any personal identification, and Google Forms did not have access to participants' email addresses. Confidentiality has been maintained as the Microsoft account has a protected password. Please add that no names were used, but a unique code or reference code to protect the identity of a participant.

Research Results/ findings

A comprehensive analysis of the findings from the study assessing the knowledge levels of syphilis among undergraduates in the Faculty of Engineering at the Mangosuthu University of Technology (MUT). This study explores the extent of awareness and understanding that engineering students have regarding syphilis infection, particularly focusing on their knowledge of transmission modes. Ethical guidelines were strictly followed in collecting and analyzing survey data from a representative sample of students within the faculty.

Knowledge level of syphilis among engineering undergraduates

This study assessed the knowledge level of syphilis and its transmission among undergraduates in the Faculty of Engineering. Initially, an overall evaluation of the students' understanding of syphilis was conducted, classifying knowledge into three categories: no knowledge, basic knowledge, and advanced knowledge, based on specific scoring criteria outlined in the methods section (see Data Extraction). Responses to key questions regarding syphilis awareness, transmission methods, and preventive measures were used to assign knowledge levels, as illustrated in Figure 1.

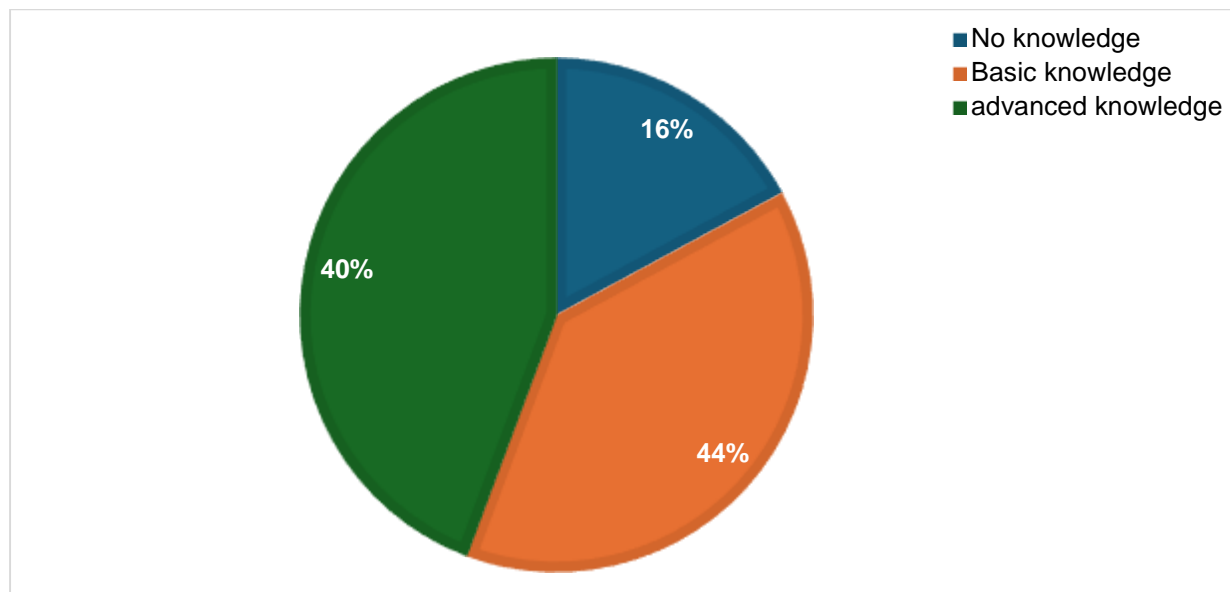


Figure 1: Knowledge level of syphilis among engineering undergraduates

The survey revealed varying levels of knowledge regarding syphilis among the respondents. 16% of respondents demonstrated no understanding of syphilis, indicating a critical knowledge gap. 44% displayed a basic understanding of syphilis, suggesting some familiarity with the disease, and 40% showed in-depth knowledge of syphilis, indicating a strong foundation for awareness and prevention.

Table (1-12) Syphilis awareness survey results

This presents an overview of the survey responses based on the knowledge and awareness about syphilis. The analysis is based on a total of 210 responses collected from 105 females and 105 males.

Table 1. Have you ever heard about syphilis infection?

	Female	Male
<i>Yes</i>	49	28
<i>No</i>	56	77
Total	105	105

Table 1 shows that 49 females have heard about Syphilis infection, while only 28 males have heard about it, which identifies the gap in awareness about syphilis.

Table 2. Do you know how syphilis or any STI can be transmitted from one person to another?

	Female	Male
<i>Yes</i>	69	66
<i>No</i>	36	39
Total	105	105

66 Males know how syphilis or any STI is transmitted, vs 28 who have heard about syphilis, this shows that males know about STIs, not STI type. (Table 2)

Table 3. Do you know the symptoms of a person with syphilis?

	Female	Male
<i>Yes</i>	27	29
<i>No</i>	78	76
Total	105	105

More males (29) than females (27) know the symptoms of a person with syphilis, which reveals that females have basic knowledge about syphilis. (Table 3)

Table 4. Do you think unsafe sex can increase the chances of getting syphilis and HIV?

	Female	Male
<i>Yes</i>	98	90
<i>No</i>	7	15
Total	105	105

Both females and males are aware of the fact that unsafe sex can increase the chances of getting syphilis and HIV, although a few said no, which still indicates a significant need for raising awareness in the university. (Table 4)

Table 5. Do you think condoms can prevent the spread of syphilis and other STIs?

	Female	Male
<i>Yes</i>	70	68
<i>No</i>	4	7
<i>Maybe</i>	31	30
Total	105	105

Table 5 shows that over 60% both females (67%) and males (65%) know how to protect themselves from syphilis and other STIs. Less than 30% are not certain, and 5% lack the knowledge.

Table 6. Have you ever received any form of sex education at the university?

	Female	Male
<i>Yes</i>	37	46
<i>No</i>	58	54
<i>I don't know</i>	10	5
Total	105	105



Out of 105 females, only 37 have received sex education at the University, while 46 males have received education.

This highlights the gap in sex education in the University as both genders scored less than 50%. (Table 6)

Table 7. Are you willing to learn more about syphilis and other STIs?

	Female	Male
<i>Yes</i>	86	84
<i>No</i>	5	5
<i>I don't know</i>	14	16
Total	105	105

Both females (86) and males (84) are showing an interest in learning more about syphilis and other STIs; only 5% are not willing.

Table 8. Do you know any medical risks of syphilis?

	Female	Male
<i>Yes</i>	21	15
<i>No</i>	84	90
Total	105	105

Few females (21) and males (15) know any medical risks for syphilis, which highlights the gap based on the lack of knowledge.

Table 9. Would you voluntarily test for syphilis or any other STIs?

	Female	Male
<i>Yes</i>	71	67
<i>No</i>	16	23
<i>I don't know</i>	18	15
Total	105	105

In Table 9, 71 females vs 67 males would volunteer to test for syphilis or any other STIs, which shows that females want to be cautious about the infection.

Table 10. Would you encourage your friends/family members to do voluntary tests for syphilis?

	Female	Male
<i>Yes</i>	87	75
<i>No</i>	1	15
<i>I don't know</i>	17	15
Total	105	105

Both genders (over 50%) are willing to learn more about syphilis or other STIs and would volunteer to test for the infection, including encouraging their friends or family

members. This shows willingness to know and share knowledge with others.

Table 11. Would you like the researcher to send you more information on syphilis?

	Female	Male
<i>Yes</i>	74	84
<i>No</i>	31	21
Total	105	105

Table 11 indicates that males are more willing (84) than females (74) to receive more information on syphilis from a researcher. This suggests that more ways must be

implemented to raise awareness of syphilis, as more females showed in Table 7 that they are willing to learn more about syphilis and other STIs.

Table 12. Have you ever tested positive for syphilis/STIs before?

	Female	Male
<i>Yes</i>	15	9
<i>No</i>	87	90
<i>I don't know</i>	3	6
Total	105	105

More females (15) have tested positive for syphilis than males (9). This is due to the basic knowledge they have. 6

Males vs 3 females don't know if they had syphilis before; this may be because they never tested for STIs before.

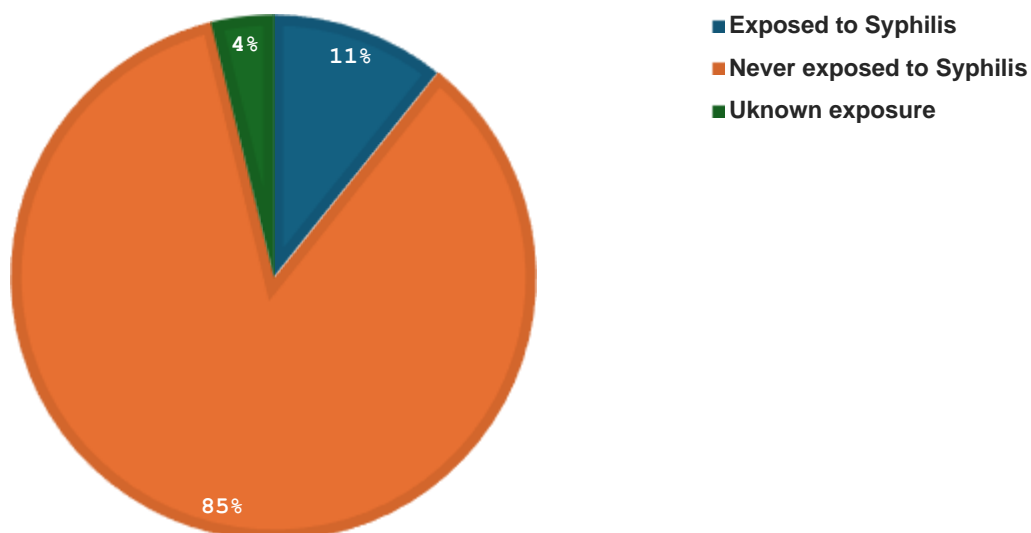


Figure 2: A report on the percentage of students who have been exposed to syphilis

The results indicate a relatively low prevalence of self-reported syphilis exposure. The majority of participants (85%) have never been exposed, suggesting effective

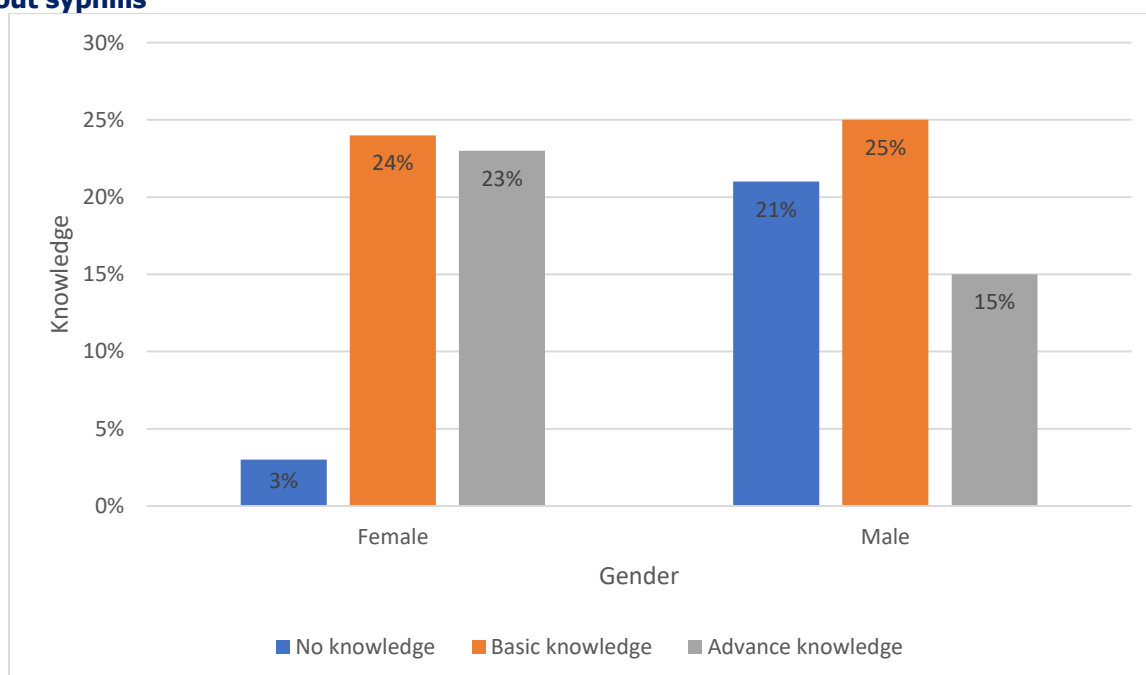
prevention efforts. However, the 11% exposure rate and 4% uncertainty rate highlight the need for continued education and awareness.

Table 13: A comparative analysis of females and males based on the knowledge about syphilis

Gender	No knowledge	Basic knowledge	Advanced Knowledge
Female	7	50	48
Male	21	52	32

Females had fewer individuals with no knowledge (7 vs. 21). Males had fewer individuals with advanced knowledge (32 vs. 48), which shows that there is a gap in knowledge among males.

Figure 3: A comparative analysis of female and male percentages based on the knowledge about syphilis



Females have lower or no knowledge rates (3% vs. 10%). Males have slightly higher basic knowledge rates (25% vs. 24%), but females have higher advanced knowledge rates (23% vs. 15%). The results indicate that knowledge gaps exist, particularly among males; education efforts should target males, focusing on both basic and advanced knowledge.

Discussion

This study assessed the knowledge and awareness about syphilis among Faculty of Engineering undergraduate students. The data was collected by means of surveys, and the results from this study suggest that syphilis remains a sexually transmitted infection that threatens public health control. 44% of study participants have basic knowledge about syphilis infection, and 40% have advanced knowledge, which includes but is not limited to the level of syphilis infection, how it is transmitted, and the



consequences of syphilis. Females were shown to have more awareness and knowledge about syphilis infection, with 47% vs. 40% of males. Despite the availability of MUT sexual health services provided at campus clinics, 13% of study participants did not know about syphilis. Carroll *et al.* (2021) found similar results in a systematic review of the important use of university sexual health services for knowledge about sexually transmitted diseases and other health-related issues. From the results of this study regarding the lack of knowledge about syphilis, it is necessary to raise awareness about syphilis infection among the rest of the MUT students. From this study, although 85% of study participants have never been exposed to syphilis, it can be highlighted that indeed university students do get exposed to sexually transmitted diseases, for instance, syphilis. From this study, about 11% of study participants have been previously exposed to syphilis; these results correlate with previous studies by Ophori *et al.* (2010), which highlighted 15.4% of the prevalence of syphilis among students from a tertiary institution in Benin City, Nigeria.

The findings from this show answered all research questions and objectives; therefore, it can be concluded that most MUT engineering undergraduate students know of the existence of syphilis infection; however, there is still a need to raise awareness about syphilis infection and balance the fact that females are more aware than males, meaning that males need to be more involved in the syphilis awareness campaigns.

Generalizability

Syphilis, caused by the bacterium *Treponema pallidum*, is a serious infection transmitted mainly through sexual contact. Factors such as inconsistent condom use, having multiple sexual partners, and sharing needles increase the risk of transmission. Globally, syphilis is recognized as an emerging public health problem among sexually transmitted infections. However, there is a notable lack of comprehensive studies examining the prevalence of syphilis specifically among young adults in the university environment within KwaZulu-Natal, highlighting a critical gap in understanding this health issue in a vulnerable population. The lack of awareness of Syphilis infection in the university setup may very well indicate that the risks of acquiring HIV infection are higher among students. This is because Syphilis and HIV are both sexually transmitted

infections (STIs), and individuals with Syphilis are more likely to contract HIV due to the presence of open sores that facilitate the transmission of the virus. This study aims to influence the implementation of comprehensive sexual health education programs and provide access to STI testing and treatment services to ensure that students are aware of the risks associated with STIs like Syphilis and HIV, and can take appropriate steps to protect themselves and their partners.

Conclusion

This study assessed knowledge and awareness of syphilis among undergraduate students in the Faculty of Engineering at Mangosuthu University of Technology. The findings revealed that while a significant proportion of students (44%) possessed basic awareness of syphilis, only 40% had advanced knowledge, leaving 16% with no understanding of the infection. These findings align with studies conducted at other institutions, which show gaps in STI awareness among university students. The recommendations from this study suggest several measures, such as educational campaigns, integration of health education into curricula, peer-led initiatives, and enhanced access to testing and counselling services. Leveraging social media, interactive events, and residence-based programs to further strengthen awareness and encourage behaviour change.

Limitations

The study's target population was 358 students; however, only 210 were sampled because there was only one week per month (college week) to recruit participants. Students ignore the Google Form link when no one is present to explain or demonstrate the value of participation. Some participants left blank sections while filling out the form, which resulted in disqualification.

Recommendations

The purpose of this study was to assess the knowledge and awareness of syphilis among undergraduate students in the faculty of engineering at MUT, determining the extent of the exposure of undergraduate students to syphilis, and also comparing the level of knowledge among female and male students.



The students suggested ways to be involved to raise knowledge and awareness of syphilis and other STIs in the university, which are:

Educational campaigns for syphilis and STIs awareness: organizing regular awareness campaigns using diverse media (posters, pamphlets, videos, social media) that clearly communicate the risks, symptoms, and prevention methods for syphilis and other STIs.

Health Education Programs and Modules: Incorporating sexual health education, including information on syphilis and STIs, into academic curricula or general university modules makes health education programs compulsory, ensuring that all students attend and are well-informed.

Peer education and engagement: training students as peer educators to spread awareness about STIs in a more relatable and accessible manner, empowering them to lead discussions, distribute materials, and hold interactive sessions in campus residences and common areas.

Regular workshops and seminars: hosting workshops with healthcare professionals to discuss symptoms, prevention, and treatment options for syphilis and STIs.

Increased access to health services: Partnering with campus health services to offer accessible STI testing, counselling, and treatment options for students.

Utilizing social media and technology, leverage social media platforms to share educational content, raise awareness, and promote safe sex practices. Creating short, informative videos, infographics, or memes that can be easily shared by students to spread the message.

Sexual health support group: Establishing support groups for students affected by STIs to create a non-judgmental space for them to share experiences and receive emotional support.

Incorporation of STIs awareness in residence programs: holding regular sessions in student residences to ensure that students living on campus are consistently exposed to sexual health education.

Feedback and evaluation mechanisms- Implementing systems to gather feedback from students on their awareness levels and the effectiveness of educational initiatives using surveys, focus groups, and interviews.

Offer incentives for participation—you must consider incentives, such as free condoms, food, or small prizes, to encourage students to attend educational events, workshops, and testing programs.

Interactive and Engaging Events: Organizing interactive events, such as STI awareness days or health fairs.

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Finally, I acknowledge the faculty of engineering students for their participation and my classmates who generously donated their time in recruiting and distributing the survey.

Acronyms and abbreviations

CDC:	Centers for Disease Control and Prevention
CDPH:	California Department of Public Health
CNS:	Central Nervous System
ECDC:	Eastern Cape Development Corporation
FTA-ABS:	Fluorescent Treponemal Antibody Absorption test
HIV:	Human Immunodeficiency Virus
KZN:	KwaZulu-Natal
MSM:	Men Who Have Sex with Men
MUT:	Mangosuthu University of Technology
NAAT:	Nucleic Acid Amplification Tests
PCR:	Polymerase Chain Reaction
RPR:	Rapid Plasma Reagin test
STDs:	Sexually Transmitted Diseases
STIs:	Sexually Transmitted Infections
<i>T. pallidum:</i>	<i>Treponema pallidum</i>
TP-PA:	Treponema pallidum Particle Agglutination test
VDRL:	Venereal Disease Research Laboratory test
WHO:	World Health Organization

Conflict of interest

This research project was conducted by a 4th-year student as a final year module for the completion of a Bachelor of Health Science degree (BHSc). Both the student and the



Supervisor have had no conflict of interest in all activities performed in the completion of this research project.

Source of funding

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This was a research project conducted by a student to complete her BHSc degree. There was no research funding except the student financial aid for University registration.

Data availability

The memorandum of understanding was established between the University and NHLS. The data was accessed from the Academic Affairs and Research Office, which is an NHLS research arm.

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