ORIGINAL ARTICLE

KNOWLEDGE ON SEXUALLY TRANSMITTED INFECTIONS (STIS) AND ITS DETERMINING FACTORS AMONG PUBLIC SECONDARY SCHOOL STUDENTS IN KOTA BHARU DISTRICT OF KELANTAN, MALAYSIA

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ABSTRACT

Sexually transmitted infections (STIs) remain a significant health concern for adolescents in Malaysia. Limited knowledge, misconceptions, and stigma surrounding reproductive health place young people at risk of infection. This study explored how much secondary school students in Kelantan know about STIs and what factors influence their understanding. A cross-sectional study was conducted from March to May 2025 involving 220 students aged 13-16 years from public secondary schools in Kota Bharu. A validated self-administered questionnaire in Bahasa Malaysia assessed student's sociodemographic backgrounds, knowledge of STI types, transmission, symptoms, prevention and their source of information. Data were analysed using descriptive statistics and linear regression. Overall, students showed low levels of STI knowledge, with mean score of 13.75 (SD=8.11) out of 38. HIV was the only widely recognized STI (69.5%), while awareness of infections such as gonorrhoea, chlamydia, and trichomoniasis was very limited. Misconceptions were common, where almost half believed tuberculosis is an STI, and more than half thought infection could spread through handshakes. Many students were unaware of common symptoms, and most did not know that STIs can be asymptomatic. Only 44.1% identified condom use as a preventive measure. Schools and the internet were the main information sources, while parents played a much smaller role. Academic form, gender, and household income were significant predictors of knowledge. These findings highlight the need to strengthen sexual health education in schools and to encourage more open, supportive communication at home to improve STI awareness among adolescents.

Keywords*: *sexually transmitted infections, knowledge, adolescents, students, Malaysia, health education

INTRODUCTION

Sexually transmitted infections (STIs) continue to pose a major public health challenge for adolescents worldwide, including in Malaysia. Globally, about one million people acquire one of the four common curable STIs such as chlamydia, gonorrhoea, syphilis, or trichomoniasis every day[1] and an estimated 333 million curable STIs occur each year which large number occurring in less than 25 years old [2]. This reported cases highlights the growing vulnerability of adolescents.

Adolescence, typically defined as 10–19 years of age, is a period characterised by exploration, rapid development, and increased curiosity about identity and relationships[3]. During this stage, some adolescents engage in risk-taking behaviours, including experimenting with substances and becoming sexually active. These behaviours place them at greater risk of contracting STIs. At the same time, many adolescents feel uncomfortable discussing personal or sensitive issues and may avoid seeking help due to embarrassment or fear of being judged[3-5]. This silence creates missed opportunities for early education, prevention, and care.

Studies across Southeast Asia have consistently reported inadequate knowledge and awareness of sexually transmitted infections (STIs) among adolescents and secondary school students. In Thailand and Indonesia, studies among adolescents and secondary school students showed variable knowledge of STIs, STIs prevention and persistent misconceptions[6,7]. Similarly, a Southeast Asian scoping review including studies from Indonesia, Thailand, Vietnam, Malaysia, and Myanmar reported overall low STI knowledge among adolescents which influencing risky behaviours and health awareness[8].Collectively, these findings highlight that insufficient STI knowledge remains a persistent issue among adolescents in the region.

Despite the increasing need, comprehensive sexual education in Malaysia remains limited. Cultural norms, religious beliefs, and societal expectations often restrict open conversations about sexual and reproductive health[9]. Consequently, many young people lack reliable information, hold misconceptions about STI transmission, and may delay seeking treatment due to stigma. Data showed that less than half of Malaysian youth can correctly identify HIV prevention methods[10]. Malaysia has made efforts to improve sexual health education, beginning with its introduction into primary and secondary school curricula more than three decades ago[11]. The current PEERS programme aims to provide more participatory and respectful sexuality education, but its effectiveness has yet to be evaluated[11]. Strengthening these initiatives remains crucial to protect adolescents' health and well-being.

To address this urgent public health concern, this study aimed to evaluate adolescents' knowledge of sexually transmitted infections (STIs) and explore the factors that influence their understanding. Most existing data on STI knowledge among Malaysian adolescents are several years old and may not accurately reflect current trends or gaps in awareness. By providing updated information, the findings of this study may offer valuable evidence to guide the restructuring and strengthening of school-based sexual and reproductive health education programs, ensuring that they are relevant, comprehensive, and effective in addressing adolescents' needs.

METHODS

Study Design and Population

This cross-sectional study was conducted among public secondary school students in Kota Bharu, Kelantan, Malaysia, between March and May 2025. Kelantan, located in northeastern Peninsular Malaysia, is predominantly Malay. Secondary schooling comprises Forms 1 to 5 (ages 13–17). In this study, only students from Form 1 to Form 4 were included, as Form 5 students were excluded in line with Ministry of Education regulations. Students were eligible if they could read and write in Bahasa Malaysia and agreed to participate with parental consent. Those who were absent during data collection or unable to read were excluded.

The minimum sample size required was 218, calculated using a 95% confidence interval, 80% power, and a standard deviation previous research[12]. To allow for non-response, a target of 312 students was estimated and for practical allocation across three schools and four academic form, 360 students was planned. A multistage sampling method was used for school and participant selection. In the first stage, four public secondary schools in Kota Bharu were randomly selected, of which one school was used exclusively for pilot study. For the main study, 120 students were targeted from each of the remaining three schools, with 30 students allocated to each academic form. In the second stage, eligible students within each form were recruited using convenience sampling.

Approval was obtained from the school administrations before data collection began. Students were selected through convenience sampling, ensuring proportional representation from Forms 1–4. Information sheets, written parental consent and student assent were obtained before participation. Students were informed that participation was voluntary and that they could withdraw at any stage.
On the scheduled data collection days, students completed the questionnaire in their classrooms or school halls. They were reminded that their responses would remain anonymous and confidential. To protect privacy, completed questionnaires were folded and placed into a sealed box without being checked for completeness. A teacher and a member of the research team were present during the sessions to clarify any questions. All questionnaires and documents were securely stored and will be disposed of according to institutional policy. Small tokens of appreciation were provided to students and the schools to acknowledge their cooperation.

Measures

Data were collected using a previously validated, self-administered questionnaire in Bahasa Malaysia[12]. The instrument had three sections. Part, one contained 16 items on students' sociodemographic characteristics and personal background. Part two assessed knowledge of sexually transmitted infections (STIs) across five domains: types of STIs (10 items), modes of transmission (7), risk factors (7), signs and symptoms (8), and prevention and control (6). Each item offered three response options ("Yes," "No," and "Don't know"). Correct answers were scored as 1, while incorrect and "Don't know" responses were scored as 0, giving a total possible score of 0–38. Part three asked about students' sources of STI information, with multiple responses allowed.

A pilot study involving 32 students (10% of the estimated sample size) was conducted to assess reliability, yielding a Cronbach's alpha of 0.86, indicating good internal consistency. Pilot data were not included in the main analysis.

Variables

The primary outcome was the overall STI knowledge score. Independent variables included sociodemographic factors (age, gender, ethnicity, religion), parental characteristics (education, employment, and marital status), and personal background (household income,

participation in STI programmes, sexual activity, smoking, relationship status, and exposure to pornography). Academic form served as a proxy for age and was grouped into lower form (Forms 1–3) and upper form (Form 4). Ethnicity was categorised as Malay or others; religion as Islam or others. Parental education was grouped into attending or not attending college and household income was classified as < RM3000 or > RM3000.

Statistical Analysis

Data were anonymous with no identifying details. Analyses were conducted using IBM SPSS version 29. Descriptive statistics summarised the population. Numerical variables were presented as means and standard deviations when normally distributed or as medians and interquartile ranges when non-normal, with visual inspection of histograms to assess normality. Categorical variables were summarised as frequencies and percentages.

Factors associated with STI knowledge were examined using simple and multiple linear regression. Variables with a p-value ≤ 0.25 in simple regression or identified as clinically relevant were entered into the multiple regression model. Forward selection and backward elimination approaches were used to build the final model. Crude and adjusted coefficients (B), 95% confidence intervals, and p-values were reported. Statistical significance was set at $p < 0.05$.

Ethical Approval

Ethical approval was obtained from the Human Research Ethics Committee of Universiti Sains Malaysia (JEPeM)(USM/JEPeM/KK/24100875). The Ministry of Education's Education Policy Planning and Research Division (KPM.600-3/2/3-eras(23433)) and participating school administrations also granted permission.

RESULTS

Of the 360 students invited, 235 returned parental consent forms, and 220 completed the questionnaire, resulting in a 93.6% response rate among consented participants. Table 1 showed the sociodemographic and personal background of the respondents. The mean age of respondents was 14.39 years (SD = 1.10). All students were Malay and Muslim, reflecting the local demographics, with 62.3% female and 37.7% male. Approximately half of the students reported that their mother (50.9%) and father (50.0%) had attended college or university. Most fathers (83.6%) and over half of mothers (55.9%) were employed, and 86.4% of parents were married. Around 64.1% of households earned less than RM 3000 monthly, placing them below the M40 income category. Most students (79.1%) had not participated in STI-related programmes outside school. About 8.6% reported previous sexual activity, 3.6% were current smokers, 12.3% were in a romantic relationship, and 24.1% had viewed or read pornographic materials.

Table 1a: Sociodemographic and personal background of the respondents.

Characteristics	N (%)
Age (Form)	
13 (Form 1)	60 (27.3)
14 (Form 2)	61 (27.7)
15 (Form 3)	53 (24.1)
16 (Form 4)	46 (20.9)
Gender	
Male	83 (37.7)
Female	137 (62.3)
Mother Education	
No formal education	5 (2.3)
Primary education	7 (3.2)
Secondary education	96 (43.6)
College/University	112 (50.9)
Father Education	
No formal education	5 (2.3)
Primary education	2 (0.9)
Secondary education	103 (46.8)
College/University	110 (50.0)
Mother Working Status	
Working	123 (55.9)
Not Working	97 (44.1)
Father Working Status	
Working	184 (83.6)
Not Working	36 (16.4)

Table 1b: Sociodemographic and personal background of the respondents.

Parent Marital Status	
Married	190 (86.4)
Divorced	19 (8.6)
Widow/Widower	11 (5.0)
Family Income	
<RM 3000	141 (64.1)
>RM 3000	79 (35.9)
STI Programme	
Yes	46 (20.9)
No	174 (79.1)
Sexual Activity	
Yes	19 (8.6)
No	201 (91.4)
Smoking Status	
Yes	8 (3.6)
No	212 (96.4)
Relationship Status	
In a relationship	27 (12.3)
Not in a relationship	193 (87.7)
Pornographic Materials	
Yes	53 (24.1)
No	167 (75.9)

Note:
STI: Sexually transmitted infections; RM: Ringgit Malaysia.

Table 2a: Knowledge of STIs.

Knowledge of STIs	Correct Answer N (%)	Incorrect Answer N (%)
Type of STIs		
Syphilis	28 (12.7)	192 (87.3)
Pneumonia*	115 (52.3)	105 (47.7)
HIV	153 (69.5)	67 (30.5)
Tuberculosis	114 (51.8)	106 (48.2)
Trichomoniasis*	9 (4.1)	211 (95.9)
Genital Herpes	33 (15.0)	187 (85.0)
Hepatitis B	21 (9.5)	199 (90.5)
Gonorrhoea	13 (5.9)	207 (94.1)
Chlamydia	8 (3.6)	212 (96.4)
Measles*	74 (33.6)	146 (66.4)
Mode of Transmission		
Vaginal intercourse	106 (48.2)	114 (51.8)
Anal intercourse	114 (51.8)	106 (48.2)
Oral intercourse	73 (33.2)	147 (66.8)
Using public toilet*	113 (51.4)	107 (48.6)
Blood transfusion	49 (22.3)	171 (77.7)
Vertical transmission	65 (29.5)	155 (70.5)
Hand shaking*	101 (45.9)	119 (54.1)
Risk factors		
Sexual activity with condom*	71 (32.3)	149 (67.7)
Multiple sexual partner	117 (53.2)	103 (46.8)
Same sex relationship	86 (39.1)	134 (60.9)
Not having sex with sexual worker*	83 (37.7)	137 (62.3)
Early sexual debut	96 (43.6)	124 (56.4)
Circumcised male*	82 (37.3)	138 (62.7)
Smoking *	95 (43.2)	125 (56.8)

Table 2b: Knowledge of STIs.

Sign and symptoms		
Itchiness at genitalia	80 (36.4)	140 (63.6)
Abnormal vaginal/urethral discharges	88 (40.0)	132 (60.0)
Vomiting*	80 (36.4)	140 (63.6)
Pain during sexual intercourse	83 (37.7)	137 (62.3)
Ulcer at genitalia	41 (18.6)	179 (81.4)
Headache*	93 (42.3)	127 (57.7)
Prolonged cough more than 2 weeks*	83(37.7)	137 (62.3)
Showing no sign and symptoms	9 (4.1)	211 (95.9)
Control and prevention		
Not using condom during sex*	97 (44.1)	123 (55.9)
Avoid premarital sexual intercourse	145 (65.9)	75 (34.1)
Not faithful in intimate relationship*	99 (45.0)	121 (55.0)
Do screening test	111 (50.5)	109 (49.5)
Not get early treatment*	91 (41.4)	129 (58.6)
Vaccinated against certain type of STIs	106 (48.2)	114 (51.8)

Note:
STIs: Sexually transmitted infection; HIV: Human immunodeficiency virus
**Negative statement*

As shown in Table 2, participants' knowledge of STIs varied across different domains. The mean STI knowledge score was 13.75 (SD = 8.11). HIV was the most recognized STI (69.5%), followed by genital herpes (15%) and syphilis (12.7%), while gonorrhoea (5.9%), trichomoniasis (4.1%), and chlamydia (3.6%) were least known. Misconceptions were common: nearly half of students incorrectly identified pneumonia (47.7%) and tuberculosis (48.2%) as STIs.

Regarding transmission, just over half recognized anal intercourse (51.8%) and vaginal intercourse (48.2%) as risky, and only 33.2% identified oral sex. Most were unaware that blood transfusion (77.7%) or vertical transmission (70.5%) could spread STIs, and misconceptions included handshaking (54.1%) and public toilet use (48.6%). Knowledge of risk factors and symptoms was limited. While 53.2% acknowledged multiple sexual partners as a risk factor, fewer recognized condom uses (32.3%) or avoiding sex with sex workers (37.3%) as protective. Less than half correctly identified symptoms, with abnormal genital discharge recognized by 40%, genital pain 37.7%, and ulcers only 18.6%. Nearly all (95.9%) were unaware that STIs can be asymptomatic. For prevention, 65.9% cited avoiding premarital sex, 50.5% acknowledged screening, 48.2% vaccination, and 44.1% correctly identified condoms.

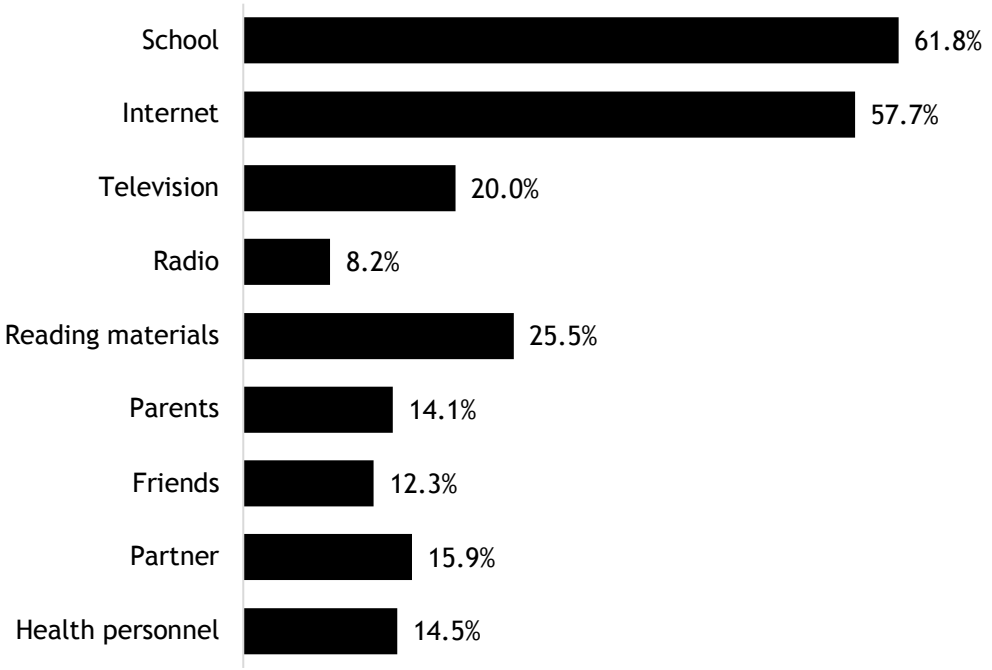

Figure 1: Sources of information.

Figure 1 showed that school lessons (61.8%), the internet (57.7%), and reading materials (25.5%) were the main sources of information, while parents (14.1%) and friends (12.3%) contributed less.

Table 3: Association between sociodemographic and personal factors with knowledge of STIs.

Factors	Mean(SD)	Crude B(95% CI)	P-Value
Form			
Lower Form	12.28(7.92)		
Upper Form**	19.30(6.25)	7.02(4.54,9.51)	<0.001*
Gender			
Boy	11.87(8.55)		
Girl**	14.89(7.65)	3.02(0.83,5.22)	0.007*
Family Income			
<RM 3000	12.89(8.07)		
>RM 3000**	15.28(8.02)	2.39(0.16,4.61)	0.036*
Parental Marital			
Previously Married	14.00(8.67)		
Married**	13.71(8.04)	-0.29(-3.44,2.86)	0.856
Mother Working			
Not Working	13.45(7.59)		
Working**	13.98(8.52)	0.53(-1.65,2.71)	0.631
Father Working			
Not Working	15.42(8.29)		
Working**	13.42(8.06)	-1.99(-4.90,0.92)	0.178
Mother Education			
Not Attending College	13.52(8.39)		
Attending College**	13.97(7.86)	0.46(-1.71,2.62)	0.679
Father Education			
Not Attending College	14.32(8.42)		
Attending College**	13.18(7.79)	-1.14(-3.29,1.02)	0.300
STI Programme Exposure			
No	14.13(8.04)		
Yes**	12.33(8.32)	-1.80(-4.45,0.85)	0.181
Sexual Activity			
Yes	16.53(9.32)		
No**	13.49(7.96)	-3.04(-6.86,0.79)	0.119
Smoking Status			
Yes	13.50(10.46)		
No**	13.76(8.04)	0.26(-5.51,6.03)	0.929
Relationship Status			
Yes	15.85(7.32)		
No**	13.46(8.19)	-2.40(-5.67,0.88)	0.151
Pornographic Exposure			
Yes	15.08(9.29)		
No**	13.33(7.69)	-1.75(-4.26,0.77)	0.173

Note:
**Significant at p < 0.05.*
***Reference group.*
STI: Sexually transmitted infections; RM: Ringgit Malaysia.

Table 4: Determining Factors Affecting Knowledge of STIs.

Factors	Adjusted B(95% CI)	P-Value
Form		
Lower Form		
Upper Form**	7.55(5.15,9.96)	<0.001*
Gender		
Boy		
Girl**	3.42(1.41,5.43)	<0.001*
Income		
<RM3000		
>RM3000**	2.92(0.89,4.96)	0.005*

Note:
*Significant at p <0.05, R^2 = 0.196
** Reference group
No multicollinearity or interaction were detected.

Table 3 and 4 illustrated how sociodemographic and personal characteristics relate to STI knowledge. Linear regression analysis identified academic form, gender, and household income as significant predictors of STI knowledge. Higher-form students scored 7.55 points more than lower-form students, females scored 3.42 points higher than males, and students from higher-income households scored 2.93 points higher, explaining 19.6% of the variance in knowledge.

DISCUSSION

This study revealed that secondary school students in Kelantan had generally low levels of knowledge about sexually transmitted infections (STIs). The mean knowledge score was 13.75 out of 38, and even students in the highest quartile did not reach a high level of understanding. This mirrors findings from other Malaysian studies, where adolescents and even university students demonstrated limited STI literacy. For instance, studies have shown that adolescents in Penang had a mean STI knowledge of 11.6, and overall knowledge continued to be suboptimal among university students[12,13]. Together, these findings suggest a consistent pattern of inadequate STI knowledge among young people across Malaysia.

One of the most striking observations from this study was the extremely skewed awareness of STIs. Almost all students recognized HIV, reflecting the long-standing public health emphasis on HIV/AIDS. Similar patterns have been observed in other regions of Malaysia and among university students, where awareness of HIV far exceeds that of other sexually transmitted infections[12-15]. Awareness of other common STIs—such as gonorrhoea, chlamydia, syphilis, trichomoniasis and genital herpes—was exceptionally low in our cohort. This imbalance highlights a critical gap in how sexual health information is delivered in Malaysia: HIV receives substantial attention, while other infections, although common and clinically important, remain largely invisible to adolescents.

Knowledge of transmission routes also showed substantial gaps. While about half of the students correctly identified vaginal and anal sex as modes of transmission, fewer understood the risks associated with oral sex, blood transfusion, or vertical transmission. This pattern is consistent with earlier Malaysian findings[12] and international studies[16], where sexual routes are more widely recognized than non-sexual routes. Misconceptions also persisted as many students mistakenly believed that handshaking, public toilets or casual contact could spread STIs, reflecting common myths among adolescents[16]. These misunderstandings may contribute to stigma while simultaneously failing to highlight genuine risks.

When examining risk factors, slightly more than half recognized that having multiple sexual partners increases STI risk. However, many believed that smoking and male circumcision were also risk factors, reflecting confusion between lifestyle behaviours and biological transmission mechanisms. Consistent with past studies, a significant proportion of students did not recognize same-sex relationships or early sexual debut as risk-enhancing behaviours[12,17]. Despite misconceptions, the proportion of students who reported ever engaging in any form of sexual activity (8.6%) aligns with national data from the Malaysian Adolescent Health Survey 2022 (7.6%)[18], suggesting that sexual exploration among adolescents remains a reality, though frequently under-reported.

Students also demonstrated limited awareness of STI symptoms. Recognition of common symptoms such as genital discharge, itching or genital pain was low, while non-specific symptoms like vomiting or chronic cough were incorrectly associated with STIs. Notably, almost all students were unaware that STIs may present without symptoms, and similar trends have been reported in previous research[12]. The inability to recognize asymptomatic infections is concerning because many STIs are silent but transmissible, leading to delayed diagnosis and increased risk of complications.

Similarly, knowledge relating to prevention and control remained modest. While most students acknowledged abstinence as a preventive measure, fewer recognized the roles of screening, vaccination, condom use, or early treatment. These levels were considerably lower than those reported among Malaysian undergraduates[12] and other regional studies[16,19]. Such results underscore the disparity between information available at secondary school versus tertiary levels, reflecting disparities in curriculum exposure and maturity of discussion.

Misconceptions emerged as a recurring theme throughout the study. Confusion around symptoms, causes, and risk factors indicates that many students lack foundational STI knowledge. Misbeliefs such as believing tuberculosis and pneumonia are STIs was similar from previous Malaysian research[13] and signal that students often rely on incomplete or inaccurate information sources. These misconceptions carry important implications: they may lead adolescents to underestimate real risks, overestimate irrelevant risks, and avoid necessary care due to stigma or fear.

Exposure to STI education programmes was limited, and students primarily reported learning about STIs from school lessons and the internet. This finding may reflect the incorporation of reproductive and sexual health topics into the

Malaysian school curriculum through programmes implemented by the Ministry of Education. Parental involvement was notably low, which is consistent with cultural norms in Malaysia, where discussions about sexual health are often considered sensitive as some parents perceive that sexual education could encourage sexual experimentation or inappropriate behaviour among adolescents[6,9]. Previous studies have shown that young people frequently rely on friends or media for sexual information[13,20] although our study found lower peer influence in comparison. Cultural conservatism may further restrict open conversations among both families and educators, reinforcing the need for structured, evidence-based, and culturally sensitive educational approaches.

Finally, academic form, gender, and household income emerged as significant predictors of STI knowledge. Older students, females, and those from higher-income households tended to have better knowledge. These findings are consistent with multiple Malaysian studies[13,20], which have similarly reported that age, gender, and socioeconomic status influence sexual health literacy. Older students likely benefit from cumulative school exposure, while socioeconomic factors may reflect access to learning resources. Gender differences may be influenced by varying comfort levels, social expectations, or learning engagement regarding sexual health topics.

This study addresses an important gap in the current evidence on STI knowledge among Malaysian adolescents. Previous Malaysian studies on STI knowledge among secondary school students were conducted more than a decade ago, including studies in Penang and Kelantan[13,20]. More recent Malaysian studies involved older populations, including students in higher education institutions[12,16].
Thus, recent evidence focusing on secondary school students remains limited, hence, the present findings provide updated information on specific areas of knowledge deficiency and persistent misconceptions among younger adolescents, while also identifying sociodemographic factors associated with STI knowledge. Evidence points to the need for strengthening and modernizing school-based STI education beyond HIV/AIDS, signs and symptoms, risk factors, mode of transmission and effective prevention measure while addressing misconceptions directly and creating safe avenues for adolescents to seek accurate and non-judgmental information. Improving STI literacy is not only a preventive measure, but also essential for empowering young Malaysians to make informed, and responsible decisions about their sexual health.

Several limitations for this study include its cross-sectional design limits the ability to establish causal relationships, while convenience sampling and recruitment from public schools in Kota Bharu may limit the generalisability of the findings as all participants were Malay and Muslim, thus, the finding may not represent Malaysia's diverse adolescent population. Additionally, sensitive behaviours were self-reported and may be subject to social desirability bias.

CONCLUSIONS

In summary, our study concludes low level of knowledge of STIs although common theme emerges as almost all youths know HIV/AIDS, but few understand other STIs, persistent misconceptions, and older, female, higher income students tend to fare better. These parallels suggest that the issues are not unique to Kelantan but reflect national educational and cultural influences. Addressing them will require targeted interventions particularly school-based sexuality education, parental and community engagement and targeted awareness programs that goes beyond HIV to cover a wider range of STIs and correct persistent myths.

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Conflicts of Interest
The author declares no conflict of interest.

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