

# Awareness of and Knowledge About STIs Among Nonmedical Students in Iran

**CONTEXT:** Evidence on STI knowledge among Iranian nonmedical university students is limited. Information is needed to inform research and policies to improve the sexual health of university students in Iran.

**METHODS:** A convenience sample of 742 male and female undergraduate and graduate students was recruited from five nonmedical public and private universities in Iran in 2014. Respondents' awareness of and knowledge about STIs were assessed using a validated questionnaire. Chi-square tests, student t tests and one-way analysis of variance were used to compare the percentage of respondents giving correct responses across subgroups of students.

**RESULTS:** Half of the respondents had ever heard of STIs, but most could not correctly identify STIs in a list of diseases. A total of 49%, 42% and 9% of the respondents had low, moderate and high STI knowledge scores, respectively. Respondents reported online sources (62%) and friends (32%) as their main sources of information about STIs, and those who were older, ever-married or more educated were more knowledgeable than other respondents.

**CONCLUSIONS:** Given that the Internet was students' main source of information, increasing the accessibility and visibility of credible Internet sites about sexual health is warranted. Also, key individuals in students' networks (e.g., parents, teachers, peers) should be equipped with required training and knowledge on STI-related topics and be actively involved in sexual health education efforts.

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STIs are a significant and increasing public health concern worldwide. The global number of new cases of chlamydia, gonorrhoea, trichomoniasis and syphilis in women and men aged 15–49 increased from 333 million cases in 1995 to 357 million in 2012.<sup>1</sup> Declining age at first sexual intercourse and inconsistent condom use have been proposed as possible explanations for the increase in STIs.<sup>2</sup> STIs are synergistic, meaning that acquiring one can increase the likelihood of acquiring others, including HIV.<sup>3</sup> Although most STIs can be cured by timely and effective treatment, many are asymptomatic or go undetected.<sup>4</sup> Untreated cases of some STIs may lead to serious complications, including cervical cancer, ectopic pregnancy, sepsis, inflammation of the epididymis or testis, infertility, and penile or anal cancer.<sup>5,6</sup>

Around one-third of new STIs occur among youth (ages 15–24).<sup>7</sup> Young people are often viewed as being too immature to make the right decisions on important sexual health-related aspects of their lives (e.g., timing their first sexual experience, choosing their sexual partners, obtaining contraceptives). Therefore, parents, caretakers, health care providers and teachers are expected to monitor youths' decisions about sexual and reproductive health.<sup>8</sup> These key adults in youths' lives, however, often adhere to socio-cultural norms about sexuality.<sup>8</sup> These norms and expectations regarding sexuality often create barriers to sexual health promotion efforts and limit young people's access to

services. Youth who transgress these norms may experience a high level of stigma, which may lead them to hide their sexual activities and avoid care and treatment for STIs.<sup>8–10</sup>

Given the social, religious and political context of the Middle East and North Africa, discussions about sexuality and STIs can be very challenging.<sup>11,12</sup> Although data on STIs are limited, a growing body of literature points to high rates of STIs across the countries in this region.<sup>7,13,14</sup> In Iran, one of the few countries in the region that have an STI surveillance system that functions relatively well,<sup>15</sup> a study conducted in 2011 suggests that around 57% of people in the general population had symptoms associated with STIs in the previous year, only one-third of whom sought care.<sup>16</sup> Despite the high rates of STIs in Iran, sexual health education remains very limited,<sup>17–19</sup> and studies on STI knowledge in the general population indicate low-to-moderate levels of knowledge.<sup>20</sup>

Although it is unclear whether increasing knowledge about STIs would reduce risky behaviors, such knowledge is still considered an important part of sexual health education.<sup>2,21,22</sup> Considering the decreasing age at sexual debut, the rising age at marriage and the introduction of coeducation (men and women attending classes together) at the university level, Iranian university students should be provided with information about the risks associated with unsafe sexual practices. Sexual health education programs

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tailored to unmarried youth are limited and no training on sexual health-related topics exists in the school curriculum.<sup>19,23,24</sup> Indeed, in keeping with cultural sensitivities, the promotion of abstinence has been the main theme of most sexual health education efforts. Youth's exposure to sexual health information is mainly through mandatory premarital courses; a one-credit, undergraduate-level course on family planning (recently suspended as a result of a shift in policies aimed at increasing the national fertility rate<sup>25</sup>); or the media (e.g., a few documentaries on national television that have discussed HIV and STIs).

Although several studies in Iran have explored young people's knowledge of HIV and AIDS, very few have examined their knowledge of STIs other than HIV.<sup>17,20</sup> Most of these studies are based on small samples and have limited generalizability. For example, a study suggesting that 1% of students at one college had sufficient knowledge on STIs was based on only 114 students.<sup>17</sup> Other studies have reported better knowledge of STIs among university students; however, their samples were limited to medical students.<sup>26,27</sup> Therefore, this study uses a large sample taken from several major universities across the country to assess awareness of and knowledge about STIs among university students studying topics other than medicine. The results of this study could provide insight that would be helpful in developing educational programs to promote sexual health for such students.

## METHODS

### Data Collection

This cross-sectional survey was conducted in five major universities in Iran in October and November 2014. Three public universities (located in Kerman, Khorasan Razavi and Tehran provinces) and two private universities (located in Tehran and Fars provinces) were chosen for data collection to provide a geographically dispersed sample.\* Universities were selected on the basis of their size, willingness to participate, logistics and suggestions from the Ministry of Health.

Using a quota sampling method stratified by gender and level of education, and considering the whole school population as the sampling frame, 765 male and female undergraduate and graduate students were approached by trained interviewers and briefed about the aims and scope of the survey; 742 agreed to participate and were included in the final analytical sample. Respondents were recruited from libraries, cafeterias, classrooms, student unions and dorms on campus and were provided with a self-administered questionnaire; the completed, anonymous questionnaires were collected in a sealed box. All respondents were provided with educational brochures about STI prevention, care and treatment after returning the questionnaires.

\*The public universities were Shahid Bahonar University of Kerman, Ferdowsi University of Mashhad and Sharif University of Technology. The private universities were Azad University of Parand and Azad University of Shiraz.

## Research Instrument

The questionnaire was developed through an extensive review of the literature on HIV and STIs,<sup>26–29</sup> as well as focus group discussions with HIV and STI experts and key informants at the HIV and STI office at the Ministry of Health. The questionnaire consisted of three sections. The first part entailed an introduction to the importance, objectives and confidential nature of the study and a brief guide on how to respond to the questions. The second part consisted of 21 questions on awareness and knowledge of STIs and their associated symptoms, routes of transmission, complications and risk factors. Respondents were first asked whether they had ever heard of STIs. This question was followed by a brief definition of STIs. Respondents were then given a list of diseases and asked to identify the ones that were STIs (i.e., “Which of the following diseases is an STI?”). They were also given a list of signs and symptoms, routes of transmission and complications and were asked to identify those associated with STIs (i.e., “Which of the following symptoms/routes of transmission/complications are related to STIs?”). Respondents were then asked to provide information on their likely care-seeking patterns (i.e., “What would you do if you were diagnosed with an STI?”) and sources of obtaining information regarding STIs (i.e., “What are your main sources of information about STIs?”). The final section consisted of six questions on demographic variables, including age, gender, marital status and level of education.

The questionnaire was pilot-tested with 15 respondents in three provinces across different socioeconomic levels to ensure clarity, relevance and accessibility. Content validity was assessed using item and scale content validity indices and content validity ratio. A panel of 10 experts reviewed the questionnaire for relevance and clarity using a four-point Likert scale with responses ranging from “not relevant/unclear” to “completely relevant/clear.” Items with content validity values of less than 0.78 were removed. The scale content validity was calculated as the fraction of experts rating an item at three or four and was computed as 0.86. The content validity ratio was calculated using Lawshe's approach and was estimated as 0.73 > 0.62.<sup>30</sup>

Internal reliability of the questionnaire, assessed by measuring the Cronbach alpha coefficient, was 0.77. Knowledge questions were scored as “yes,” “no” and “don't know.” Overall knowledge was determined by aggregating correct responses from all questions and transformed to a scale of 0 to 100. Three levels of STI knowledge were specified: low (total score <40), moderate (total score 40–60) and high (total score >60).

## Statistical Analysis

Chi-square tests, student t tests and one-way analysis of variance were used to compare the percentage and mean of correct responses in subgroups of students. Data were presented as relative frequencies and percentages for categorical variables and as means (and standard deviations) for continuous variables. The percentages presented in the

tables correspond to the proportion of respondents who believed specific items were an STI, an STI symptom, a route of transmission for STIs or an STI complication. All p values were two-sided and values lower than 5% were considered statistically significant. We used Stata version 12 to analyze the data.

### Ethical Considerations

Respondents were briefed about the purpose of the study, the anonymity of the survey and the voluntary nature of their participation. Those who were current students of the respective university and who provided verbal consent were interviewed by a gender-matched interviewer. The ethics committee of Kerman University of Medical Sciences reviewed and approved the study protocol.

## RESULTS

### Demographic Characteristics

The sample consisted of 742 university students and the response rate was 97%. The mean age of respondents was 21.8 years (standard deviation,  $\pm 3.3$ ), and 54% of the sample was male (Table 1). Most respondents were undergraduates (78%) and single (88%). Fifty-seven percent of the sample was recruited from public universities and 43% from private universities.

### STI Awareness and Knowledge

Half of the respondents had ever heard of STIs other than HIV, and the proportion who could correctly identify any given STI from a list of diseases and medical conditions rarely exceeded 50% (Table 2). Around half of the respondents correctly identified hepatitis B (53%), genital herpes (49%), gonorrhoea (45%) and genital warts (46%) as STIs. Conversely, around 90% of the respondents could correctly identify each of the non-STIs on the list (87–94%). Women were more likely than men to have ever heard of STIs (56% vs. 46%), and to correctly identify genital herpes as an STI (55% vs. 43%) and prostate enlargement as a non-STI (95% vs. 90%). Men were more likely than women to correctly identify gonorrhoea as an STI (54% vs. 35%).

At most, slightly more than half of all respondents could correctly identify STI-associated symptoms (Table 3). Painful urination and genital ulcers were the items most commonly identified correctly as STI symptoms (53% and 50%), and frequent urination was identified correctly least commonly (13%). Success in identifying STI symptoms differed significantly between men and women. Women were more likely than men to correctly identify frequent urination (15% vs. 10%), lower abdominal pain (34% vs. 20%), painful sexual intercourse (36% vs. 23%), anal discharge (42% vs. 29%) and vaginal discharge (52% vs. 30%) as symptoms of STIs; men were more likely than women to correctly identify painful testicles (25% vs. 18%) and blood in urine (29% vs. 20%) as STI symptoms. Similar

proportions of men and women knew that STIs can be asymptomatic (33% and 32%).

Most respondents knew that STIs can be transmitted via unprotected vaginal sex (87%) and unprotected anal sex (65%) with an infected individual. However, smaller subsets of the respondents knew that STIs cannot be transmitted by sharing a bathroom (26%) or swimming pools (31%); in both cases, women were more likely than men to have this

**TABLE 1. Percentage distribution of nonmedical students at five Iranian universities, by selected social and demographic characteristics, 2014**

Characteristic	% (N=742)
<b>Age (mean <math>\pm</math> sd)</b>	21.8 $\pm$ 3.3
<b>Gender</b>	
Female	336 (46.3)
Male	389 (53.7)
<b>Degree pursued</b>	
Associate	32 (4.4)
Bachelor's	566 (78.4)
Master's or beyond	124 (17.2)
<b>Relationship status</b>	
Married/ever-married	88 (12.2)
Single	633 (87.8)
<b>University type</b>	
Private	322 (43.4)
Public	420 (56.6)
<b>City</b>	
Mashhad	100 (13.5)
Parand	122 (16.4)
Tehran	122 (16.4)
Kerman	198 (26.7)
Shiraz	200 (27.0)
Total	100.0

Notes: Unless otherwise noted, figures are percentages. Variations in Ns are due to missing data for individual variables. sd=standard deviation.

**TABLE 2. Percentages of nonmedical students who were aware of STIs and who correctly identified STIs and non-STIs from a list of diseases and conditions, according to gender**

Disease	All N (%)	Males N (%)	Females N (%)
<b>Ever heard of STIs (except HIV)**</b>	362 (50.1)	174 (45.9)	182 (55.7)
<b>STIs</b>			
Scabies	44 (6.4)	21 (5.8)	23 (7.3)
Chlamydia	67 (9.7)	30 (8.3)	37 (11.7)
Hepatitis C	152 (22.0)	81 (22.4)	65 (20.6)
Syphilis	204 (29.5)	104 (28.7)	96 (30.4)
Genital herpes**	336 (48.6)	157 (43.4)	174 (55.1)
Genital warts	315 (45.5)	164 (45.3)	145 (45.9)
Gonorrhoea***	309 (44.7)	194 (53.6)	112 (35.4)
Hepatitis B	363 (52.5)	197 (54.4)	159 (50.3)
<b>Non-STIs</b>			
Ovarian cyst	604 (87.3)	309 (85.4)	282 (89.2)
Prostate enlargement*	641 (92.6)	327 (90.3)	301 (95.2)
Tuberculosis	637 (92.1)	330 (91.2)	293 (92.7)
Cholera	636 (91.9)	330 (91.2)	292 (92.4)
Tetanus	647 (93.6)	338 (93.4)	295 (93.7)

\*Difference between men and women significant at  $p \leq 0.05$ . \*\*Difference between men and women significant at  $p \leq 0.01$  \*\*\*Difference between men and women significant at  $p \leq 0.001$ . Note: Variations in Ns are due to missing data for individual variables.

**TABLE 3. Percentage of nonmedical students correctly identifying STI symptoms, routes of transmission and complications, according to gender**

Measure	All N (%)	Males N (%)	Females N (%)
<b>Symptom</b>			
Frequent urination*	85 (12.6)	35 (10.0)	47 (15.1)
Lower abdominal pain***	180 (26.6)	71 (20.3)	105 (33.7)
Painful sexual intercourse***	195 (28.9)	82 (23.4)	112 (35.9)
Painful, swollen testicles*	144 (21.3)	86 (24.6)	56 (17.9)
Blood in urine**	166 (24.6)	101 (28.9)	61 (19.6)
Anal discharge***	232 (34.3)	101 (28.9)	130 (41.7)
Vaginal discharge***	274 (40.5)	104 (29.7)	162 (51.9)
Penile discharge	200 (29.6)	111 (31.7)	83 (26.6)
Asymptomatic	235 (32.7)	125 (33.2)	105 (32.1)
Genital ulcers	335 (49.6)	176 (50.3)	152 (48.7)
Painful urination	352 (52.7)	186 (53.1)	159 (51.0)
<b>Route of transmission</b>			
Sharing bathroom with infected person**	182 (25.6)	80 (21.5)	100 (30.8)
Sharing swimming pool with infected person***	222 (31.2)	88 (23.6)	131 (40.3)
Mother-to-child transmission during pregnancy/delivery/breast-feeding	274 (38.5)	152 (40.8)	118 (36.3)
Oral sex with infected person	343 (48.7)	180 (49.1)	158 (49.1)
Unprotected anal sex with infected person	455 (64.5)	246 (66.7)	201 (62.4)
Unprotected vaginal sex with infected person	618 (86.9)	329 (88.2)	278 (85.8)
<b>Complication</b>			
Eye infection in neonates	46 (6.8)	23 (6.6)	22 (7.1)
Preterm labor	86 (13.1)	37 (10.7)	46 (15.4)
Ectopic pregnancy	132 (20.1)	63 (18.3)	68 (22.8)
Death*	100 (15.2)	64 (18.6)	36 (12.1)
Prostate cancer***	127 (19.4)	83 (24.1)	41 (13.8)
Stillbirth	171 (26.1)	88 (25.5)	82 (27.5)
Miscarriage*	198 (30.2)	92 (26.7)	105 (35.2)
Cervical cancer***	290 (44.2)	133 (38.6)	153 (51.3)
Infertility	281 (42.8)	136 (39.4)	139 (46.6)
Impotence***	249 (38.0)	150 (43.5)	91 (30.5)

\*Difference between men and women significant at  $p \leq 0.05$ . \*\*Difference between men and women significant at  $p \leq 0.01$ . \*\*\*Difference between men and women significant at  $p \leq 0.001$ . Note: Variations in Ns are due to missing data for individual variables.

knowledge—31% versus 22% for sharing a bathroom and 40% versus 24% for sharing a swimming pool. In addition, only 39% correctly reported that some STIs can be transmitted to babies during delivery or through breast-feeding.

The respondents' knowledge on the complications of STIs was poor and fewer than half could correctly identify STI complications from a list (7–44%). Men were significantly more knowledgeable than women about STI complications among men (prostate cancer, 24% vs. 14%; and impotence, 44% vs. 31%). Likewise, women knew more than men about STI complications among women (miscarriage, 35% vs. 27%; and cervical cancer, 51% vs. 39%). Only 15% of all respondents correctly indicated that some STIs could lead to death; men were more likely than women to know this (19% vs. 12%).

Most respondents correctly identified the presence of an STI as a risk factor for HIV transmission (67%), and multiple sexual partnerships as a risk factor for STI transmission (79%); more women than men identified multiple partners as a risk factor (86% vs. 73%—Table 4). Fewer respondents correctly reported alcohol (26%) and illicit drug use (37%) as risk factors for STIs. Moreover, 27% of the respondents correctly identified nonuse of condoms as a risk factor for STI transmission, and women were more likely than men to do so (31% vs. 22%).

Only 34% of respondents knew that most STIs are curable, but three-quarters (74%) correctly indicated that treatment is necessary for infected individuals' sexual partners. Neither of these proportions differed by gender.

Most respondents said that they would visit a physician in case of an infection (62%), and only 2% said they would not seek any treatment. Women were more likely than men to say they would consult a physician (72% vs. 55%), and men were more likely than women to say that they would seek information on care online if they had an STI (27% vs. 15%).

The Internet (62%) and friends (32%) were reported as principal sources for obtaining information about STIs. Men were more likely than women to use the Internet as a source of STI knowledge (66% vs. 57%), while women were more likely than men to seek information from their family members (35% vs. 9%). Around 80% of the respondents thought they needed to learn more about STIs, and 74% supported the delivery of sexual health education at schools (not shown).

A total of 49%, 42% and 9% of the respondents had low, moderate and high STI knowledge scores, respectively (not shown). The level of knowledge varied by age, degree pursued and relationship status (Table 5). Students who were older than 22 and those who had ever been married were more knowledgeable about STIs than those who were 22 or younger and those who were single, and the level of knowledge rose with education.

## DISCUSSION

The majority of the nonmedical university students in our study had a low-to-moderate knowledge about STIs. Because only one-half had heard of STIs other than HIV, only a small subset could correctly identify STIs and their complications. Given their limited knowledge of STIs, most were also unable to identify STI-associated symptoms; however, consistent with the literature,<sup>28</sup> women were significantly more knowledgeable than men about symptoms. Although most respondents did not know that STIs cannot be transmitted through casual contacts, a majority of them knew that unprotected sex is a route of STI transmission. In addition, respondents' knowledge of risk factors and treatments of STIs were relatively low; most did not know that use of alcohol or illicit drugs is associated with an elevated risk of STI transmission, and only one-third knew that most STIs are curable. Overall, older, married and more-educated respondents were more knowledgeable than others about STIs, which is reasonable, given their greater exposure to sexual health education and potential sexual experience. However, respondents' knowledge did not differ according to their enrollment in public or private universities, which could be attributed to their similar experience with or exposure to sexual health education within schools.

Respondents' lack of knowledge about STIs may be attributed to their lack of access to sexual health information.<sup>28,31</sup> Students' traditional exposure to sexual health information has been through very limited topics in school

curricula, mandatory premarital courses, a recently suspended undergraduate course on family planning or the media. However, considering the decreasing age at first sexual intercourse and increasing age at marriage in Iran,<sup>18,31</sup> young people's exposure to risky sexual practices often precedes the limited sexual health education they receive. Although education provided at school and through the media could potentially target a large proportion of youth before they begin having sex, these sources provide limited information and take a conservative attitude.<sup>18,31,32</sup> This is an understandable approach given the social and political context of several Islamic countries, including Iran, where open discussions of sexual topics could be challenging.<sup>19,33</sup> Therefore, youth are likely to seek information from other sources; as in other contexts, online resources<sup>31</sup> were reported as our respondents' main sources of sexual health information.

Although the validity and quality of information on the Web could be a matter of concern, seeking information online offers a level of convenience and anonymity for obtaining information about sensitive health-related topics.<sup>34-36</sup> In addition, the Web is a medium very familiar to today's young people; many are estimated to be Internet users across differing settings.<sup>35,37</sup> Although an estimated 95% of North American adolescents and youth use the Internet on a daily basis,<sup>37</sup> this proportion is lower in settings with limited resources and cultural and structural barriers. For example, although official statistics for Iran indicate a great surge in Internet usage and that more than 65% of the population has access to the Internet,<sup>38</sup> censorship limits access to sexual content on the Web; however, most content is available via virtual private networks.<sup>39</sup> Fortunately, the Ministry of Health has recently recognized the importance of online interventions to improve and promote sexual health in the general population, and among youth in particular, and has established online environments (e.g., [www.hivpositiveclub.ir](http://www.hivpositiveclub.ir), [www.hiv-sti.ir](http://www.hiv-sti.ir)) that provide users with reliable sexual health information.

Although most respondents sought sexual health information online, some also turned to their family and friends, who are often the first people to whom they reach out.<sup>40</sup> Worldwide, young people's readiness to make appropriate decisions for their sexual lives has been questioned, and their parents have been expected to monitor and inform their sexual health decisions.<sup>8</sup> However, in the context of Iran and several other settings, parents often try to adhere to sociocultural norms regarding sexuality that promote abstinence until marriage, particularly for females.<sup>8,9,19,31,33</sup> Previous studies have suggested that young people's discussions about sexuality within the Iranian familial context are often accompanied by embarrassment and discomfort.<sup>31</sup> Iranian parents have been reported to believe that informing their adolescents and young adults about sexual issues will lead to increased sexual activity and promiscuity.<sup>31</sup> Many parents are not equipped with sufficient knowledge to provide their children with sexual health education and seem to be reluctant to have such

**TABLE 4. Percentage of nonmedical students who correctly identified STI risk factors, held accurate treatment perceptions and reported specific care-seeking patterns and sources of STI knowledge**

Measure	All N (%)	Males N (%)	Females N (%)
<b>Risk factors</b>			
Condom nonuse**	200 (27.0)	87 (22.4)	105 (31.4)
Consumption of alcohol	18 (26.3)	103 (27.5)	84 (25.8)
First sexual contact before age 22	301 (42.2)	150 (40.3)	146 (44.9)
Illicit drug use	267 (37.3)	152 (40.6)	113 (34.7)
Sex with a sex worker	365 (51.3)	199 (53.5)	159 (49.1)
Presence of an STI (increased risk of HIV)	478 (67.4)	259 (69.8)	212 (65.8)
Multiple sexual partners***	568 (78.9)	275 (73.3)	284 (86.3)
<b>Treatment perception</b>			
Most STIs are curable	242 (34.2)	126 (33.9)	111 (34.8)
Treatment necessary for partners of an infected person	532 (74.4)	283 (75.9)	239 (73.3)
<b>Care-seeking patterns</b>			
Self-medication using over-the-counter drugs	14 (2.3)	5 (1.5)	9 (3.1)
Do nothing	13 (2.1)	8 (2.4)	5 (1.7)
Consult friends	32 (5.1)	22 (6.5)	10 (3.5)
Visit a clinic or hospital	38 (6.1)	26 (7.7)	12 (4.2)
Search the Internet***	134 (21.5)	90 (26.8)	44 (15.3)
Consult a physician***	389 (62.4)	184 (54.8)	205 (71.5)
Other reactions	3 (0.5)	1 (0.3)	2 (0.7)
<b>Sources of STI knowledge†</b>			
Teachers	60 (8.8)	32 (8.7)	28 (9.0)
Family***	143 (21.0)	33 (9.0)	110 (35.1)
Magazine and newspapers	86 (12.6)	46 (12.5)	40 (12.8)
I don't have enough information	88 (12.9)	47 (12.8)	41 (13.1)
Radio and TV	118 (17.3)	61 (16.6)	57 (18.2)
Health sector	170 (25.0)	81 (22.0)	89 (28.4)
Friends	216 (31.7)	128 (34.8)	88 (28.1)
Internet*	422 (62.0)	244 (66.3)	178 (56.9)
Other sources (medical literature)	4 (0.6)	1 (0.3)	3 (1.0)

\*Difference between men and women significant at  $p \leq .05$ . \*\*Difference between men and women significant at  $p \leq .01$ . \*\*\*Difference between men and women significant at  $p \leq .001$ . †Participants could select up to three sources of knowledge. Note: Variations in Ns are due to missing data for individual variables.

**TABLE 5. Percentage distribution of nonmedical students, by level of STI knowledge, according to selected characteristics**

Characteristic	N	Level of knowledge			Total
		Low	Medium	High	
<b>Gender</b>					
Male	389	49.1	44.0	6.9	100.0
Female	336	49.1	39.9	11.0	100.0
<b>Age**</b>					
≤22	464	51.1	42.6	6.3	100.0
>22	256	44.9	41.8	13.3	100.0
<b>Degree pursued**</b>					
Associate	32	59.4	40.6	0.0	100.0
Bachelor's	566	50.9	41.3	7.8	100.0
Master's or beyond	124	39.5	44.4	16.1	100.0
<b>Relationship status***</b>					
Single	633	51.0	41.4	7.6	100.0
Ever-married	88	35.2	46.6	18.2	100.0
<b>University type</b>					
Public	420	50.7	41.7	7.6	100.0
Private	322	47.5	42.2	10.3	100.0

\*\* $p \leq .01$ . \*\*\* $p \leq .001$ . Note: Variations in Ns are due to missing data for individual variables.

discussions with them; this speaks to the need for culturally sensitive training programs designed for parents.<sup>31,41,42</sup>

More than 70% of the respondents wanted to know more about STIs and thought STI-related topics should be taught in schools. This could be of utmost importance to policy-makers and points to the existing gap in the current educational curricula. Our finding that fewer than 10% of the respondents sought information from their teachers could also highlight the missed potential of the educational system in addressing these gaps. Although arguments are made that sexual health education at schools might lead to an increase in youth's risky sexual practices and have negative health outcomes, a large body of evidence has proven these ideas to be wrong.<sup>43,44</sup> A comprehensive systematic review of 83 studies of curriculum-based sexual health education programs reported that 72% of these interventions had a positive impact on changing youth's risky sexual behavior and delaying sex debut.<sup>43</sup> A more recent systematic review and meta-analysis demonstrated the effectiveness of school-based sex education programs in reducing HIV-related risk.<sup>44</sup>

### Limitations

Although a large sample of students from both private and public nonmedical schools was recruited, the nonrandom nature of the sample at the university level does not allow us to generalize our findings to all Iranian nonmedical students. A random sample was not drawn mainly because of the structural and organizational barriers encountered by the research team in trying to obtain the full list of students. In addition, although students in different disciplines (e.g., arts vs. basic sciences) might have varied in their sexual practices and might have had different attitudes toward sexual behaviors, we did not stratify our findings by major because all nonmedical students have similar exposures to sexual health education. Social desirability bias could not be ruled out because of the self-administered nature of the questionnaire; however, the anonymity of the questionnaires may have encouraged the respondents to provide honest responses. Finally, no causal inferences can be drawn because of the cross-sectional design of the study. Overall, we believe, given the scope of the study and the dearth of literature on non-medical students' sexual health, our findings have value for both research and policy.

### Conclusion

Our study indicates low-to-moderate knowledge about STIs among nonmedical university students in five public and private universities in Iran. Given that the Internet was reported as the biggest source of sexual health information, it may be useful to provide parents and teachers with accurate information to counteract any incorrect information young people may get on the Internet. Future research and interventions should prioritize involving the key individuals in youths' networks (e.g., parents, teachers, peers) in sexual health education programs. Schools and universities are of the utmost importance in reaching this goal

and should be able to take a more prominent and proactive role in educating youth on sexual health. Teachers in particular should be provided with training and knowledge on STI-related topics and should take an active role in providing high-quality sexual health education to youth.

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## RESUMEN

**Contexto:** La evidencia sobre los conocimientos acerca de las ITS entre los estudiantes universitarios iraníes que no estudian medicina es limitada. Se necesita información para dar sustento a las investigaciones y políticas dirigidas a mejorar la salud sexual de los estudiantes universitarios en Irán.

**Métodos:** En 2014 se reclutó en Irán una muestra por conveniencia de 742 hombres y mujeres cursando estudios de licenciatura y posgrado de cinco universidades públicas y privadas donde no se estudia medicina. Se evaluaron la concientización y los conocimientos sobre las ITS de las personas entrevistadas mediante la aplicación de un cuestionario validado. Para comparar el porcentaje de personas entrevistadas que respondió correctamente a lo largo de subgrupos de estudiantes, se usaron pruebas Chi cuadrado, pruebas t de Student y análisis de varianza de una vía.

**Resultados:** La mitad de los entrevistados había escuchado acerca de las ITS alguna vez, pero la mayoría no pudo identificar correctamente las ITS en una lista de enfermedades. Un total de 49%, 42% y 9% de los entrevistados obtuvieron calificaciones bajas, moderadas y altas en su conocimiento de las ITS, respectivamente. Las personas entrevistadas reportaron que sus principales fuentes para obtener información sobre las ITS son las fuentes provenientes de Internet (62%) y las amistades (32%), y las personas de mayor edad, que alguna vez estuvieron casadas o que tenían niveles más altos de educación estuvieron mejor informadas que las otras personas entrevistadas.

**Conclusiones:** Dado que Internet fue la principal fuente de información de los estudiantes, se justifica el aumento de la accesibilidad y la visibilidad de sitios de Internet confiables sobre salud sexual. Además, deberían equiparse a las personas clave que conforman las redes de los estudiantes (p. ej., padres, maestros, pares) con la capacitación y conocimientos requeridos sobre temas relacionados con las ITS e involucrarlos activamente en los esfuerzos de educación en salud sexual.

## RÉSUMÉ

**Contexte:** La connaissance des IST parmi les étudiants universitaires des facultés non médicales d'Iran n'est guère

documentée. Il convient de le faire pour éclairer la recherche et les politiques d'amélioration de la santé sexuelle des étudiants universitaires du pays.

**Méthodes:** Un échantillon de commodité de 742 étudiants et étudiantes de premier et deuxième cycles a été recruté dans cinq facultés non médicales d'universités iraniennes publiques et privées en 2014. La sensibilisation et la connaissance des répondants au sujet des IST ont été évaluées sur la base d'un questionnaire validé. Le pourcentage de participants répondant correctement dans les sous-groupes d'étudiants a été comparé par tests chi carré, tests t de Student et analyse de variance simple.

**Résultats:** La moitié des répondants avaient entendu parler des IST mais la plupart ne pouvaient pas les identifier correctement dans une liste de maladies. Un total de 49%, 42% et 9% des répondants a atteint, respectivement, une cote de connaissance des IST faible, moyenne et élevée. Les répondants ont déclaré les sources en ligne (62%) et leurs amis (32%) comme principales sources de leur information sur les IST. Ceux plus

âgés, qui avaient déjà été mariés ou davantage instruits se sont avérés plus informés que les autres sur la question.

**Conclusions:** Internet étant la principale source d'information des étudiants, il conviendrait d'accroître l'accessibilité et la visibilité de sites crédibles sur la santé sexuelle. Il serait par ailleurs utile de doter les personnes clés, au sein des réseaux des étudiants (parents, enseignants et pairs, par exemple), de la formation et des connaissances requises au sujet des IST et de les engager activement dans des efforts d'éducation à la santé sexuelle.

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