

# HIV Knowledge and Attitude and Its Related Factors of Cambodian Adolescents

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## 캄보디아 청소년의 HIV 지식 및 태도와 영향요인

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**Abstract** This describes the level of knowledge and attitudes about HIV and their related factors among Cambodian adolescents. A cross-sectional design was used to examine the knowledge and attitude of 463 Cambodian high school students using HIV-KQ-18 (HIV-Knowledge Questionnaire-18) and HIV/AIDS Behavior Surveillance Survey Index (measuring attitude about HIV). The majority of the adolescents had a relatively low level of overall HIV knowledge ( $6.70 \pm 3.66$  (range: 0-16)) and held a very negative attitude ( $1.92 \pm 0.87$  points (range: 0-4)) toward the disease. Using multiple regression analysis, being male ( $\beta = 0.28$ ,  $p < 0.001$ ) and using YouTube as a social network service ( $\beta = 0.33$ ,  $p = 0.035$ ) were found to be independent factors associated with higher level of HIV knowledge. Study findings suggest the importance of informing policymakers and school nurses about the need to develop a and require a culturally sensitive specific health education program on HIV for Cambodian adolescents.

**Keywords:** Adolescent, HIV, Knowledge, Attitude, Cambodia

**요약** 이 연구는 캄보디아 청소년의 HIV에 대한 지식과 태도를 파악하고 영향요인을 이해하기 위해 수행되었다. 캄보디아 3개 주에 거주 중인 고등학교 3학년생 463명을 대상으로 설문조사를 시행하였으며 HIV-KQ-18 (HIV-Knowledge Questionnaire-18)과 HIV/AIDS Behavior Surveillance Survey Index (measuring attitude about HIV)을 이용하여 HIV 관련 지식과 태도를 측정하였다. 연구결과 캄보디아 청소년은 전반적으로 낮은 수준의 HIV 지식( $6.70 \pm 3.66$  (range: 0-16))을 가지고 있었고 부정적인 태도( $1.92 \pm 0.87$  points (range: 0-4))를 보였다. 남성( $\beta = 0.28$ ,  $p < 0.001$ ), SNS 중 YouTube 사용( $\beta = 0.33$ ,  $p = 0.035$ )이 높은 지식에 영향을 주는 것으로 나타났다. 본 연구 결과는 캄보디아 청소년에게 문화사회적으로 수용 가능한 보건교육프로그램 개발과 운영에 기초자료로 사용될 수 있을 것으로 기대된다.

**주제어 :** 청소년, 인간면역결핍바이러스, 지식, 태도, 캄보디아

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## 1. Introduction

Human immunodeficiency virus infection and acquired immune deficiency syndrome (HIV/AIDS) is a global health problem. By the end of 2019, about 1.7 million people were newly infected, and 38 million people were infected with HIV[1]. Young people are especially vulnerable to the HIV epidemic. More than half of those who are newly infected with HIV worldwide are young people aged 15-24, and more than 6,000 young people are infected with HIV every five minutes[2]. Worldwide, HIV/AIDS-related deaths have declined by 35% since 2005, but the number of HIV/AIDS-related deaths among adolescents has actually increased and is the second leading cause of death among this age group[2]. Given its effect on the young and active population, HIV/AIDS is one of the major barriers in the developmental path of all societies[3].

HIV is particularly problematic in developing countries, and Cambodia was one of the countries with the fastest growing number of HIV cases in Asia in the mid-1990s. Recent Cambodian efforts against HIV have led to a steady decline in the prevalence of HIV, from 2.0% in 1998 to 0.6% in 2016. According to The Joint United Nations Programme on HIV/AIDS (UNAIDS) report in 2019[4], out of the 73,000 HIV-infected people in Cambodia, 3,600 persons aged 10-19 years and 4,300 persons aged 15-24 years were aged 10-24, accounting for 11.2% respectively. On the other hand, in Laos out of the 13,000 HIV-infected people in Laos, less than 500 persons aged 10-19 years and 1,500 persons aged 15-24 years, indicating that Cambodia has more people living with HIV[4].

Cambodia is one of the youngest countries in Southeast Asia, with the population aged 10-24 accounting for 28.4% of the total population[5]. In 2014, about 18.8% of adolescent males aged 18-19 had their first sexual experience, and 10.6% of

adolescent girls had their first sexual experience with a boyfriend, girlfriend, or sweetheart[6]. Cambodian adolescents are exposed to a greater risk of HIV infection because of sexual experiences that are encouraged by peer pressure to become approved members of their peer group[7]. Young males engaging in premarital and unprotected sex become a bridge to HIV transmission by having sexual relations with non-commercial partners such as girlfriends. The sexual risk behaviors of adolescents, such as unprotected sex, multiple partners, and inconsistent use of condoms, adversely affect their health and greatly increase their risk of becoming infected with HIV[8].

The Cambodia Demographic and Health Survey (CDHS) revealed that 97.8% of boys and 97.7% of girls in rural areas had heard about HIV, and 72.4% of female adolescents and 82.0% of male adolescents believed that there is a way to prevent HIV by using condoms or limiting the number of sexual partners. Their attitude toward people living with HIV (PLWH) was negative for girls (22.1%) and positive for boys (27.3%)[9].

Studies have shown that a higher level of HIV knowledge among adolescents leads to safer sexual behavior[10]. For example, adolescents in Burkina Faso with a high level of HIV knowledge were consistent in using condoms when engaging in sexual activities[11]. Young Mexican males with a high knowledge of HIV used condoms frequently[12]. However, misinformed HIV knowledge and a negative attitude toward HIV ultimately cause adolescents to engage in unsafe sexual behaviors, thus putting them at risk of becoming infected with HIV[13].

As adolescence is the stage most people experience sex for the first time in comparison with other age groups, it is an important period in preventing HIV. Preventing new HIV infections in adolescents before their first

sexual activity is vital to help them achieve a healthy sexuality and good reproductive health for both their own sake and the future of the country. This period also provides an opportunity to establish protective health behaviors in adolescents, which can persist until adulthood and change society's approach toward HIV[14]. Therefore, assessing adolescents' knowledge and attitude about HIV is one of the most basic and crucial ways to plan an effective and acceptable strategy for preventing HIV infections. In several countries, there are prior studies on HIV knowledge and attitudes among adolescents. In a study of Nepal, the HIV knowledge was moderate, 78.7% thought that HIV was a big problem and 67.3% were worried about getting HIV[15]. Also, In a study of Iranian high school students, HIV knowledge was moderately high and attitudes toward people infected with HIV were negative[16]. However, little research has been conducted on the knowledge and attitude about HIV among the youth in Cambodia. In addition, between 2005 and 2014, the HIV knowledge of Cambodian female adolescents declined from 51% to 28%, with adolescents having the lowest understanding of HIV risk[17]. Thus, this study aimed to understand the knowledge and attitude about HIV of adolescents to inform public health policymakers and school nurses about developing a culturally sensitive and specific health educational program on HIV/AIDS at the Cambodian national level.

## 2. Methods

### 2.1 Participants and data collection

This cross-sectional study was conducted in three rural provinces, namely, Kampong Cham, Kampong Chhnang, and Koh Kong, which were selected through convenient sampling. Champong

Cham is located 124 km northeast of Phnom Penh, has the largest population at 1.75 million, and has 41 high schools in the region. Champong Chhnang is located 91 km north of Phnom Penh, has 523,000 inhabitants, and has 6 high schools in the region. Koh Kong is located 271 km away from Phnom Penh, has 122,000 inhabitants, and has 21 high schools in the region[18,19].

Before the data collection, the required documents describing the school's name, the school principal's contact details, and the research schedule were submitted to the Ministry of Education, Youth and Sport(MoEYS) of Cambodia. We had several meetings with the MoEYS officials to discuss the purpose and the detailed methods of the study, which included checking each question. The study was eventually approved by the government.

The students were randomly recruited from three high schools, one from each province, from July to August 2017. When we reached out to each school, we explained the research and recruitment process to the principals and staff members and discussed the schedule of the data collection to ensure that it did not interfere with the classes. Two trained Cambodian research assistants, a graduate student and a postdoctoral nursing student, entered the classroom and thoroughly explained their research to the students. We made the gap between where each student was sitting as wide as possible to prevent the students from discussing the topic with each other. Of the 515 eligible students, 499 completed the questionnaire, achieving a response rate of 97%. After excluding the participants whose questionnaires contained errors, 463 students were finally included in the analysis.

### 2.2 Measurement

Age, sex, religion, drinking and smoking

habits, parents' educational level, cohabitants, and use of a social network service (SNS) were selected as the variables that could affect the adolescents' HIV knowledge and attitude.

HIV knowledge was measured using a brief self-report measure of HIV-related knowledge, the HIV-KQ-18 (HIV-Knowledge Questionnaire-18), which was developed by Carey and Schroder[20]. This tool consists of 18 questions: nine questions on HIV transmission, seven questions on prevention, two general questions including one question on test, and one question on symptoms. The participants were asked to answer "Yes," "No," or "I do not know." The total was calculated as the sum of the number of items answered; "I do not know" was treated as an incorrect answer. For each question, the correct answer was measured as 1 point and the incorrect answer was measured as 0 points. And the sum of the correctly answered items was calculated ranging from 0 to 18. The higher the score is, the higher the knowledge of HIV. The HIV-KQ-18 is internally consistent, stable, and sensitive to the change resulting from intervention[20]. Cronbach's alpha was 0.78 in this study.

Attitude toward HIV was measured by four items of the questionnaire used in the 2005 CDHS on the knowledge, attitude, beliefs, and behavior regarding HIV[21]. The CDHS revised and supplemented the HIV/AIDS Behavior Surveillance Survey Index, which was developed by the Joint United Nations Programme on HIV/AIDS(UNAIDS) and the World Health Organization(WHO) to plan and assess the effectiveness of the HIV prevention project. The questions asked were as follows: "Do you think a female teacher with HIV should be allowed to teach? (Yes)," "Would you accept taking care of a family member with HIV? (Yes)," "Would you buy fresh food/vegetables from vendors with

HIV? (Yes)," and "Would you want to keep secret that a family member was infected with HIV? (No)." We asked the participants to answer "Yes," "No," or "I do not know" to each question, calculated the sum of the positively answered items (items answered according to the responses in brackets above), and treated "I do not know" as a negative attitude. The sum of the positively answered items was calculated ranging from 0 to 4. The higher the score is, the better the attitude toward HIV.

### 2.3 Ethical Considerations

The study was approved by the 'X' University Institutional Human Subjects Review Committee (IRB No. 2017-06-013-001).

Once arriving at each school, we had a meeting with the principal of the school. Two trained Cambodian research assistants explained about the study. They asked to students to fill in the self-report questionnaire only after they explained the research and agreed to the study. Before the survey, we assured confidentiality of the responses and informed them that they could refuse any of questions and there were no disadvantages from school.

### 2.4 Statistical Analysis

The data collected were analyzed using SPSS 23.0. First, we calculated the frequency, percentage, mean, and standard deviation of the respondents' answers to the questions about general characteristics, knowledge of HIV, and attitude toward HIV. Second, an independent t-test and a one-way ANOVA of the difference in the knowledge and attitude about HIV according to the general characteristics were performed. Third, correlation analysis between HIV knowledge and attitude. Fourth, a regression analysis was conducted to identify the variables affecting the participants' HIV

knowledge and attitude.

### 3. Results

#### 3.1 General characteristics of the participants

The general characteristics of the participants are shown in Table 1. In total, 191(41.3%) were male, 272 (58.7%) were female, 69.8% were aged 17-18, and 30.2% were aged 19-20. The mean age of the students was  $18.12 \pm 0.92$  years old. Buddhism was the most popular religion at 85.7%; 11.4% of students reported drinking; 1.1% reported smoking; 40.6% of fathers and 41.9% of mothers did not have formal education; and 67.2% of the students lived with their parents. Moreover, 86.8% of the respondents used Facebook.

**Table 1. General characteristics of the respondents (N=463)**

Demographic variables	Categories	n (%)	
Sex	Male	191(41.3)	
	Female	272(58.7)	
Age(years)	17-18y	323(69.8)	
	19-20y	140(30.2)	
	M±SD	18.12±0.92	
Religion	Christian	12(2.6)	
	Buddhism	397(85.7)	
	Muslim	50(10.8)	
	Other	4(0.9)	
Drinking	Yes	53(11.4)	
	No	410(88.6)	
Smoking	Yes	5(1.1)	
	No	458(98.9)	
Father's education(years)	No formal	188(40.6)	
	1-9y	136(29.4)	
	≥10y	139(30.0)	
Mother's education(years)	No formal	194(41.9)	
	≥10y	171(36.9)	
	1-9y	98(21.2)	
Cohabitants	Two parents	311(67.2)	
	Other	152(32.8)	
SNS	Facebook	Yes	402(86.8)
		No	61(13.2)
	Twitter	Yes	39(8.4)
		No	424(91.6)
	YouTube	Yes	267(57.7)
		No	196(42.3)
	Instagram	Yes	143(30.9)
		No	320(69.1)
	Other	Yes	25(5.4)
		No	438(94.6)

#### 3.2 Differences in knowledge and attitude about HIV by general characteristics

**Table 2. Differences of knowledge and attitude about HIV by general characteristics (N=463)**

Variables	Categories	n	Knowledge (Range: 0-16)		Attitude (Range: 0-4)		
			Mean ± SD	t or F(p)	Mean ± SD	t or F(p)	
Overall		463	6.70±3.66(0-16)		1.92±0.87(0-4)		
Gender	M	191	7.90±3.53	6.16 (<.001)	1.94±0.87	0.42 (.675)	
	F	272	5.85±3.52		1.91±0.87		
Age (years)	17~18	323	6.64±3.66	-0.51 (.613)	1.93±0.89	0.13 (.897)	
	19~20	140	6.83±3.66		1.91±0.82		
Religion	Christian	12	7.50±2.28	0.88 (.452)	1.75±0.62	1.89 (.130)	
	Buddhism	397	6.65±3.72		1.92±0.87		
	Muslim	50	7.08±3.43		2.02±0.87		
	Others	4	4.50±3.87		1.00±0.00		
Drinking	Yes	53	7.64±3.35	2.00 (.046)	1.79±0.72	-1.16 (.247)	
	No	410	6.58±3.69		1.94±0.88		
Smoking	Yes	5	4.40±2.70	-1.41 (.158)	1.40±0.89	-1.36 (.176)	
	No	458	6.72±3.66		1.93±0.87		
Father's education	No formal	188	6.48±3.60	0.60 (.552)	1.87±0.83	1.53 (.218)	
	1y-9y	136	6.91±3.59		1.90±0.87		
	≥ 10y	139	6.77±3.82		2.03±0.91		
Mother's education	No formal	194	6.55±3.66	0.33 (.717)	1.86±0.81	1.02 (.360)	
	1y-9y	171	6.86±3.50		1.96±0.90		
	≥ 10y	98	6.71±3.94		1.99±0.92		
Cohabitants	Two parents	311	6.50±3.74	2.64 (.105)	1.93±0.85	0.06 (.804)	
	Other	152	7.09±3.47		1.91±0.90		
SNS	Facebook	Yes	402	6.75±3.72	-0.77 (.441)	1.93±0.86	-0.67 (.500)
		No	61	6.36±3.27		1.85±0.95	
	Twitter	Yes	39	7.67±3.90	-1.73(.084)	2.13±0.86	-1.55 (.121)
		No	424	6.61±3.63		1.90±0.87	
	YouTube	Yes	267	7.03±3.77	-2.29 (.022)	1.94±0.88	-0.41 (.684)
		No	196	6.24±3.47		1.90±0.84	
	Instagram	Yes	143	6.97±3.82	-1.08 (.281)	1.99±0.92	-1.18 (.241)
		No	320	6.58±3.59		1.89±0.84	

The scores for knowledge and attitude about HIV across the participants were  $6.70 \pm 3.66$  (range: 0-16) and  $1.92 \pm 0.87$  points (range: 0-4), respectively. Based on the general characteristics, knowledge of HIV was different according to gender, drinking consumption, and use of an SNS. Knowledge of HIV was significantly higher among male students ( $7.90 \pm 3.53$ ) than female students

(5.85±3.52;  $t = 6.16$ ,  $p < 0.001$ ). The participants who drank alcohol (7.64 ± 3.35) had a higher level of knowledge of HIV than those who did not drink (6.58 ± 3.69;  $t = 2.00$ ,  $p = 0.046$ ). The knowledge of HIV of the participants who used YouTube (7.03 ± 3.77) was significantly higher than those who did not use YouTube (6.24 ± 3.47;  $t = -2.29$ ,  $p = 0.022$ ).

No difference was found in the attitude toward HIV according to the general characteristics of the respondents.

### 3.3 Percentage of correct answers per item on HIV knowledge

The questions on HIV knowledge in the questionnaire included transmission, prevention, and general knowledge. The mean score for all the questions on HIV knowledge was at 6.70 ± 3.66 (range 0-18), and the correctness rate ranged from 68.5% to 10.6%. Table 3 shows the items having the highest percentage of correct answer to the

lowest one. On the questions of transmission, adolescents knew that HIV is not transmitted by sharing a glass of water with someone who has HIV (n=317, 68.5%) but did not know that a woman could get HIV if she has anal sex with a man (n=27, 10.6%). The mean score of all the questions on HIV prevention was 2.22 ± 1.73 (range 0-7). The question with the highest percentage of correct answers was "There is a female condom that can decrease a woman's chance of getting HIV (T)" (51.4%), and "A natural skin condom works better against HIV than a latex condom (F)" was the question with the lowest percentage of correct answers (13.8%). The percentage of correct answers to the symptom question, "People who have been infected with HIV quickly show serious signs of being infected (F)" was 52.1%, and that to the HIV test question, "Taking a test for HIV one week after having sex will tell a person if he or she has HIV (F)" was 30.9%.

**Table 3. Percentage of correct answer per question of HIV knowledge (N=463)**

	Question of HIV Knowledge	M±SD	Correct	Incorrect
			n (%)	
Transmission (range 0-9)		3.65±1.87		
Transmission	A person can get HIV by sharing a glass of water with someone who has HIV(F)		317(68.5)	146(31.5)
	Having sex with more than one partner can increase a person's chance of being infected with HIV(T)		283(61.1)	180(38.9)
	A person can get HIV by sitting in a hot tub swimming pool with a person who has HIV(F)		282(60.9)	181(39.1)
	People are likely to get HIV by deep kissing, putting their tongue in their partner's mouth, if their partner has HIV(F)		276(59.6)	187(40.4)
	Coughing and sneezing DO NOT spread HIV(T)		248(53.6)	215(46.4)
	A woman cannot get HIV if she has sex during her period(F)		115(24.8)	348(75.2)
	All pregnant women infected with HIV will have babies born with AIDS(F)		94(20.3)	369(79.7)
	A woman can get HIV if she has anal sex with a man(T)		49(10.6)	414(89.4)
Prevention (range 0-7)		2.22±1.73		
Prevention	There is a female condom that can decrease a woman's chance of getting HIV(T)		238(51.4)	225(48.6)
	There is a vaccine that can stop adults from getting HIV(F)		218(47.1)	245(52.9)
	A person will NOT get HIV if she or he is taking antibiotics(F)		194(41.9)	269(58.1)
	Showering, or washing one's genital/private parts, after sex keeps a person from getting HIV(F)		165(35.6)	298(64.4)
	Pulling out the penis before a man climaxes/cums keeps a woman from getting HIV during sex(F)		81(17.5)	382(82.5)
	Using Vaseline or baby oil with condoms lowers the chance of getting HIV(F)		66(14.3)	397(85.7)
	A natural skin condom works better against HIV than does a latex condom(F)		64(13.8)	399(86.2)
General knowledge (range 0-2)		0.83±0.77		
General knowledge	People who have been infected with HIV quickly show serious signs of being infected(F)		241(52.1)	222(47.9)
	Taking a test for HIV one week after having sex will tell a person if she or he has HIV(F)		143(30.9)	320(69.1)

### 3.4 Percentages of positive answers per item on attitude toward HIV

The mean score of all the items demonstrating a positive attitude toward HIV was  $1.92 \pm 0.87$  (range: 0-4). About 418 (90.3%) considered that a female teacher with HIV should be allowed to teach, and 46 (9.9%) would not want to keep secret that a family member was infected with HIV. About half of them said that they would accept taking care of a family member with HIV ( $n=236$ , 51%), and 190 (41%) would buy fresh food/vegetables from vendors with HIV.

**Table 4. Percentages of positive answer per attitude toward HIV(N=463)**

Attitude toward HIV	M±SD	Positive	Negative
		n(%)	
Total Score	1.92±0.87		
Do you think a female teacher with HIV should be allowed to teach? (Y)	0.90±0.30	418(90.3)	45(9.7)
Would you accept taking care of a family member with HIV? (Y)	0.51±0.50	236(51.0)	227(49.0)
Would you buy fresh food/vegetables from vendors with HIV? (Y)	0.41±0.49	190(41.0)	273(59.0)
Would you want to keep secret that a family member is infected with HIV? (N)	0.10±0.30	46(9.9)	417(90.1)

### 3.5 Correlation of knowledge and attitude about HIV

Table 5 shows the correlation of the participants' knowledge and attitudes about HIV. Knowledge and attitude about HIV were positively correlated ( $r=.28$ ,  $p<.001$ ).

**Table 5. Correlation of Knowledge and Attitude about HIV**

	knowledge	Attitude
knowledge	1	.28 ( $p<.001$ )
Attitude	.28 ( $p<.001$ )	1

### 3.6 Factors affecting the HIV knowledge

The three variables that had different scores on HIV knowledge (gender, drinking consumption, and YouTube use) in Table 2 were entered in the regression model. The variables affecting HIV knowledge were being male ( $\beta = 0.28$ ,  $p < 0.001$ , reference=female) and YouTube use ( $\beta = 0.33$ ,  $p = 0.035$ , reference=not use of YouTube). YouTube use had a greater influence on HIV knowledge than gender.

**Table 6. Multiple Regression Analysis on factors altering the Knowledge about HIV (N=463)**

	B	$\beta$	t	p	VIF
(constant)	5.46		19.37	<.001	
Gender (Male)	2.05	.28	5.75	<.001	1.150
Drinking (Yes)	-.13	-.01	-.23	.820	1.150
Y o u - t u b e (Yes)	.70	.33	2.12	.035	1.003
	Adj R <sup>2</sup> = 0.079, F=14.21( $p<0.001$ )				

## 4. Discussion

This study was conducted to understand the level of knowledge and related factors and the attitude toward HIV among high school students in Cambodia. The adolescents' knowledge and attitude of HIV are of particular interest because adolescence involves sexual experimentation and may relate to high-risk sexual behaviors. Social cognitive theory predicts that young people will be less likely to engage in risky behaviors if they have knowledge about HIV[22].

The majority of Cambodian adolescents in this study had a low level of HIV knowledge, suggesting the need for a health educational program on HIV in schools. The average score of the 18 questions was 37 points when converted to 100 points. The Cambodian adolescents lacked knowledge in all subcategories, transmission, prevention, symptoms, and test.

The score on HIV knowledge of the male students was significantly higher than that of the female students ( $p = 0.009$ ). This result is

consistent with a previous finding: the score on HIV knowledge was higher among male adolescents than among female adolescents in Nepal[15]. This finding could be due to male students being freer to talk about sexual matters and HIV than female students. Particularly in Cambodia, where men are dominant and women are forced to remain silent, male students are more likely to have knowledge of HIV than female students. A lack of HIV knowledge due to a low level of education among Cambodian females can limit their knowledgeable choices about sex, HIV, and conversations about safer sex relations with their partner[23]. Therefore, more information and education about HIV should be provided to female students.

In this study, the score on HIV knowledge of those who drink was significantly higher than that of those who did not drink ( $p = 0.046$ ). It is considered easier for adolescents to talk about sexual issues and share sexual information while drinking with friends. Drinking behaviors are easily learned and modeled for adolescents[24], and adolescents' drinking behaviors can lead to misperceptions and diminished self-control, increasing risky sexual intercourse behaviors such as unplanned early sexual experiences [25]. Therefore, assessing the students' motivation for drinking and their drinking habits and preventing the factors that cause the bad habit of drinking among adolescents are essential.

In this study, the SNS (YouTube) users showed a higher score on HIV knowledge than the non-users ( $p = 0.022$ ). The recent SNS use by young people has changed the traditional way of communicating and exchanging information. Cambodia's mobile phone usage continues to grow, similar to other countries, with mobile phone users aged 15-19 at 96%, and the rate of

accessing the Internet using mobile phones was 35%[26]. Improved accessibility through mobile devices has enabled adolescents to share photos, exchange ideas, and promote creative expressions and diversity through SNSs[27]. Using various forms of social media in adolescence seems to be a routine activity to communicate with others and to improve social relations[28]. Using YouTube generates a high level of HIV knowledge, as users are able to acquire knowledge through fast and universal Flash-type videos. Therefore, by using easily accessible internet, the youth can be more effectively educated on HIV. A web-based program can be developed to enhance the HIV knowledge of adolescents in Cambodia.

No significant difference was found in the attitude toward HIV in the present study. The lack of HIV knowledge could be a reason why no significant difference in attitude was found in this study. In Thanavanh et al.'s study[10], adolescents with a moderate level of knowledge about AIDS were reported as having a positive attitude toward PLWH. The adolescents whose parents had a high level of education and who lived with them showed a positive attitude toward HIV in Ayranci's study[29], although the same result was not presented in this study. This is probably because parents with a higher education know more about HIV infection and prevention and thus can provide more information to their children. Parents can play an important role in helping their adolescents have a positive attitude toward HIV.

In this study, HIV knowledge, including transmission, prevention, and general knowledge, was low: transmission was  $3.65 \pm 1.87$  (out of 9), prevention was  $2.22 \pm 1.73$  (out of 7), and general knowledge was  $0.83 \pm 0.77$  (out of 2). As to the questions "A person can get HIV from oral sex (T)" and "A woman can get HIV if she



has anal sex with a man (T)," the percentage of correct answers was 5.8% and 10.6%, respectively, which is much lower than the 43.5% and 57.1% of correct answers, respectively, to the same questions among Nigerian youth[30]. This result raises substantial concerns about the future safety of these young people: they did not know this risk. This is extremely unfortunate. We can only speculate on why they did not know these transmission routes. It may be due to the fact that the subjects of the present study, who were from rural schools in Cambodia, had not heard or had not been taught sufficiently about oral or anal sex as it relates to the risk of being infected with HIV. Education about HIV in school is indispensable because a lack of HIV knowledge is highly associated with risky sexual behavior among adolescents[31]. School is a good place to develop self-esteem and a healthy sexual attitude and to conduct peer education programs targeting young people[32]. When educating students about HIV, developing a curriculum based on the survey items of this study, which had a high error rate for the questions about HIV knowledge, would be more effective.

The level of knowledge on HIV prevention was also low in this study. For the item "Using Vaseline or baby oil with condoms lowers the chance of getting HIV (F)," the correct answer rate was 14.3%, and the correct answer rate for "A natural skin condom works better against HIV than a latex condom (F)" was 13.8%, which is very low. These results are extremely unfortunate, suggesting that the ignorance of these young people puts them at substantial risk for potential HIV transmission were they to engage in sex. Condoms are known to be one way to prevent HIV, but accurate knowledge of condom use seems to be lacking. Cambodia has been the country with the highest rate of HIV

prevalence in Asia [33] since the first case of the infection was discovered in 1991, but education on HIV remains lacking. Therefore, providing high school students with education about HIV is recommended to help them lead a healthy sexual life throughout adulthood and their whole lifetime.

For the items on the general knowledge of HIV, the correct answer rate for symptom question was 52.1%, and the rate for right timing of HIV test was 30.9%, which showed that the participants were not well aware of the symptoms of HIV and the incubation period. This finding can affect how HIV infections are managed, and thus accurate education is needed as well.

With regard to HIV-infected people, students in this study held mixed attitudes. In total, 41% said they were willing to buy food/vegetables from vendors with HIV. However, only 9.9% said they would not keep secret any family members who have HIV, showing that the majority of students had a discriminatory attitude. In a study among adolescents in Botswana[34], 31.4% of the respondents said that they would buy food/vegetables from vendors with HIV, and 29.5% wanted not to keep family members who have HIV as a secret, indicating a more positive attitude than Cambodian adolescents. A study on knowledge and attitude about HIV among 1,800 high school and university students in Turkey found that 61.6% of the students had a negative prejudice against HIV-infected people and said that they should not have a job because of their HIV infection[35]. Having a discriminatory attitude toward HIV-infected people could make people reluctant to stay in a relationship with PLWH and could reinforce the idea that they should be isolated from society. In turn, this attitude makes PLWH tend to hide themselves, thus makes treating and managing

their HIV difficult. A discriminatory attitude toward HIV-infected people may reduce the efficiency of education on HIV prevention, and thus this attitude should become less prevalent. To this end, both a strategy to reduce the prejudice against HIV and an HIV prevention education program are needed.

#### 4.1 Study limitations and strength

Study results are limited to the current study sample and may not generalize to other adolescence in other regions of Cambodia or to adolescence who are not attending high school. However, the characteristics of those students who did participate were from three provinces of different regions of Cambodia. This study also was limited by the fact that various factors on the school, teachers, and peer group that could affect knowledge and attitude about HIV were not considered in the model. Study results are limited to self-reported data from close-ended questionnaires. The meaning or understanding of the terms in these survey questions for these students is unknown. Future studies should be designed to overcome these limitations. Despite the limitations, results add to our understanding of attitudes and beliefs about HIV among a random sample of Cambodian adolescence. In spite of those limitations, this study is the first to investigate the knowledge and attitude about HIV among high school students in Cambodia. Future studies should be designed to reflect and overcome these limitations. This study is the first to investigate the knowledge and attitude about HIV among high school students in Cambodia.

### 5. Conclusion

Cambodian youth, although at a very high risk for HIV transmission during sex, are poorly

informed about HIV and hold very negative attitudes toward HIV. Enhancing the level of knowledge in high school students to prevent HIV infections among adolescents in Cambodia is necessary to help prevent HIV infections further into adulthood. The HIV knowledge of males was higher than that of females. Given the lack of knowledge about HIV of females, strategies are needed to improve their HIV knowledge. In addition, devising efficient HIV education methods is necessary by utilizing an SNS (e.g., YouTube) that reflects the characteristics of SNS use in Cambodia, where Internet use is common. This study provides important information for implementing education by school nurses and public health sectors for young people in Cambodia to help them grow into healthy adults without fear of HIV or prejudice toward PLWH.

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