



# Effects of HIV knowledge on accepting attitudes toward people living with HIV: The case of Southern Vietnam

[Efectos de los conocimientos sobre el VIH en las actitudes de aceptación hacia las personas que viven con el VIH: El caso del sur de Vietnam]

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## Abstract

**Context:** Increasing thorough knowledge and adopting a positive outlook are crucial intervention strategies in the campaign against HIV transmission. However, the stigma associated with the disease frequently causes discrimination and other human rights violations that affect the well-being of people living with HIV (PLWH).

**Aims:** To evaluate the effects of HIV knowledge on accepting attitudes among the Vietnamese population toward PLWH.

**Methods:** A cross-sectional, self-administered, paper-based survey was conducted. Participants who provided correct answers to 13 out of the 18 questions were considered to have good knowledge, and those who chose "yes" as the response to the first three attitude questions and "no" to the last one were regarded as exhibiting appropriate attitudes. A logistic regression model was used to identify the association between knowledge and attitudes.

**Results:** Among the participants (average age:  $23.7 \pm 6.4$ ), 90.9% believed they were not at risk of HIV infection, and only 488 (39.8%) had good HIV knowledge. A low proportion (less than 20%) of them exhibited appropriate attitudes. A favorable attitude toward PLWH was significantly correlated with being male and having extensive HIV knowledge.

**Conclusions:** While almost half of Vietnamese adults had good knowledge about HIV transmission, a significant proportion still lacked HIV knowledge and stigmatized people living with HIV. These findings suggest a need for targeted public health interventions, such as a national health education program that emphasizes family life and HIV/AIDS education, to improve knowledge and reduce stigmatization toward PLWH in Vietnam.

**Keywords:** attitude; awareness; HIV/AIDS; social discrimination; social stigma; Vietnam.

## Resumen

**Contexto:** Aumentar los conocimientos exhaustivos y adoptar una actitud positiva son estrategias de intervención cruciales en la campaña contra la transmisión del VIH. Sin embargo, el estigma asociado a la enfermedad provoca con frecuencia discriminación y otras violaciones de los derechos humanos que afectan al bienestar de las personas que viven con el VIH (PVVS).

**Objetivos:** Evaluar los efectos de los conocimientos sobre el VIH en las actitudes de aceptación de la población vietnamita hacia las PVVS.

**Métodos:** Se realizó una encuesta transversal autoadministrada en papel. Se consideró que los participantes que respondieron correctamente a 13 de las 18 preguntas tenían buenos conocimientos, y que los que eligieron "sí" como respuesta a las tres primeras preguntas sobre actitudes y "no" a la última mostraban actitudes adecuadas. Se utilizó un modelo de regresión logística para identificar la asociación entre conocimientos y actitudes.

**Resultados:** Entre los participantes (edad media:  $23,7 \pm 6,4$ ), el 90,9% creía que no corría riesgo de infección por VIH, y sólo 488 (39,8%) tenían buenos conocimientos sobre el VIH. Una baja proporción (menos del 20%) mostraba actitudes adecuadas. Una actitud favorable hacia las PVVS se correlacionó significativamente con el hecho de ser varón y tener amplios conocimientos sobre el VIH.

**Conclusiones:** Aunque casi la mitad de los adultos vietnamitas tenían buenos conocimientos sobre la transmisión del VIH, una proporción significativa aún carecía de conocimientos sobre el VIH y estigmatizaba a las personas que viven con el VIH. Estos resultados sugieren la necesidad de intervenciones de salud pública específicas, como un programa nacional de educación sanitaria que haga hincapié en la vida familiar y la educación sobre el VIH/SIDA, para mejorar los conocimientos y reducir la estigmatización hacia las PVVS en Vietnam.

**Palabras Clave:** actitud; discriminación social; estigma social; sensibilización; Vietnam; VIH/SIDA.

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**Abbreviations:** AIDS: acquired immunodeficiency syndrome; FSW: female sex worker; HIV: human immunodeficiency virus; KAP: knowledge, attitude, practice; MSM: men who have sex with men; PLWH: people living with HIV.

## INTRODUCTION

In 2019, the HIV/AIDS epidemic in Vietnam was described as having affected 230,000 individuals (MOH, 2012). From 2010 to 2019, the number of deaths due to AIDS decreased from 8,500 to 5,000, and the number of new HIV infections dropped from 16,000 to 5,200 (MOH, 2012). Pharmaceutical science has played a critical role in the development of antiretroviral therapy (ART) and other medications for the management of HIV. The availability of effective treatments has significantly improved the health outcomes and quality of life for people living with HIV. Reaching the 90-90-90 treatment targets in Vietnam entails that 81% of all HIV-positive individuals receive treatment and that 73% of such patients register undetectable viral loads (MOH, 2012). In 2019, 65% of all HIV-positive people worldwide achieved viral suppression, and 70% of HIV-positive Vietnamese patients were receiving treatment (MOH, 2012).

In Vietnam, people who inject drugs (PWID), female sex workers (FSWs), and men who have sex with men (MSM) are the groups most severely affected by the HIV/AIDS epidemic (MOH, 2012). Data from the country showed that numerous FSWs and their male clients are potential agents of HIV transmission to the general population or other sex workers (MOH, 2012). In Haiphong province in 2008, there were approximately 31% of sexually active 18- to 29-year-old young men who had engaged the services of FSWs in their lifetime (Duong et al., 2008), and in 2010, HIV prevalence among male clients of FSWs was 31% (MOH, 2012). Around 13 million PWIDs accounted for approximately 10% of HIV infections globally (Esparza, 2013). In Vietnam, drug use is a leading cause of the HIV epidemic (UNAIDS, 2020). HIV prevalence among PWIDs is high because they share needles, syringes, and other equipment for injecting drugs (Esparza, 2013; Vietnam Ministry of Labor, Invalids, and Social Affairs, 2010). Such prevalence is also rising among MSM given contagious habits, including anal intercourse without a condom or the use of HIV prevention or treatment drugs. In particular, HIV incidence increased from 4% in 2011 to 7.4% in 2016, with Ho Chi Minh City registering the highest HIV incidence (13%) (MOH, 2016).

One of the cornerstones of the fight against the disease is comprehending people's knowledge, attitudes, and practices (KAP) regarding HIV/AIDS. The general population's lack of information or miseducation regarding HIV/AIDS is the most prevalent issue faced by people living with HIV (PLWH), which pri-

marily results in discrimination (Herek et al., 2002) that causes or aggravates problems of disclosure, loneliness in society, access to antiretroviral medicine, and obtaining psychological help (Parker, 2012; Turan et al., 2011; Zhang et al., 2016). This also negatively affects the health, quality of life, social support, and overall well-being of persons who live with PLWH. Although these issues have been minimally investigated in Vietnam, we assume that similar matters arise in this country. Additionally, a number of variables, mainly attitudes regarding HIV and education, are linked to HIV knowledge and considerably affect perceptions of how stigmatizing HIV is. Stigmatization can be reduced by raising HIV education and awareness, among many other highly effective measures. As education levels rise, so does the amount of information that people have about HIV, thereby reducing unfavorable attitudes toward PLWH and HIV stigmatization (Farotimi et al., 2015; Sohn and Park, 2012). This argument is supported by numerous quasi-experimental studies that examined how HIV stigmatization is altered by educational and awareness campaigns (Li et al., 2018; Lohiniva et al., 2016). For instance, a Canadian study found that educating participants about HIV helped them become influencers in their communities, which in turn reduced stigmatization (Li et al., 2018). An educational and awareness campaign underlain by cultural sensitivity and implemented in an Egyptian hospital minimized HIV stigmatization and discrimination (Lohiniva et al., 2016).

Stigmatization and discrimination have long hampered access to prevention, treatment, and care services for PLWH. Stigmatization frequently causes discrimination and other human rights abuses that affect the well-being of PLWH. Studies in several regions of the world have demonstrated that because PLWH are stigmatized, unknown cases help conceal the issue and allow the stigmatization to spread unchecked. When people adopt positive attitudes about PLWH, this fundamental understanding plays a critical role in assisting them in overcoming their fears, ignorance, and biases, as well as reducing the spread of HIV/AIDS. As a result, attitudes toward people living with HIV have evolved, with increased recognition that HIV is a medical condition that can be effectively managed rather than a moral judgment and the full benefits of ART and other medications for the management of HIV can be realized. One of the potential obstacles to HIV/AIDS prevention is a lack of awareness about the virus (Chela and Mensah, 1996). Increasing comprehensive information about the illness and adopting a positive outlook are crucial

intervention techniques in the prevention of HIV transmission, according to numerous earlier studies. Therefore, identifying HIV knowledge and attitudes toward PLWH is an essential requirement.

To the best of our knowledge, no study has documented the effects of HIV knowledge on accepting attitudes toward PLWH in Vietnam. In consideration of this deficiency, the current study shed new light on knowledge among the Vietnamese regarding HIV prevention. In the wake of coordinated HIV prevention programs planned among Vietnamese healthy community members, our study also evaluated the effects of HIV knowledge on accepting attitudes among the Vietnamese population toward PLWH.

## MATERIAL AND METHODS

### Study design and study site

A community-based cross-sectional study was carried out in the southern cities or provinces of Vietnam in January 2023.

### Ethical considerations

This study's protocols were granted approval by the Ethical Committee of Hanoi University of Public Health (No. 445/2022/YTCC-HD3) and the Ethical Committee of Mahidol University (No. 78.0319/EC.003). The research conformed to ethical norms by acquiring informed consent from the participants, protecting respondent autonomy, and ensuring confidentiality. The ethics committee granted a waiver for express written individual consent for the questionnaire administration. Structured interviews were conducted after consent was secured, and the participants were told that they could end the interviews at any point. No inducement for participation was offered, and involvement was entirely voluntary.

### Sampling and data collection

The subjects targeted for participation in this study were individuals 18 years old or older. The minimum sample size was calculated using the following formula [1], which is underlain by the assumption of simple random sampling.

$$n = \left( \frac{\text{precision}^2}{CV^2 \times Z_{1-\frac{\alpha}{2}}^2} \right)^{-1} \quad [1]$$

In this equation, precision is assumed to be 0.05, normal distribution at a 95% confidence level is  $Z = 1.96$ , and the coefficient of variation is assumed to be 0.9. The calculation yielded a minimum sample size of 983 (see the "Questionnaire development" section). For this research, a size approximately 20% higher

was selected in case of elimination due to missing values or ineligible questionnaires. The minimum number of observations required was 1180, but the number of actual valid interviews conducted in this study was 1226.

Study sites were selected using two-stage sampling. The first stage involved cluster sampling, wherein three provinces/cities were randomly chosen, and the second stage was convenience sampling, during which data were collected via face-to-face interviews in each province/city. Participants were recruited via stratified random sampling conducted on main thoroughfares, neighboring parks, marketplaces, and coffee shops. They were given an invitation to voluntarily take part in the study if they met eligibility criteria. The criteria were set for potential participants, including being of Vietnamese nationality and able to communicate in Vietnamese, being 18 years or older, having lived in the selected study areas for at least a year, and expressing a willingness to participate in the research. Individuals with mental health issues or medical conditions that prevented them from being interviewed were excluded from the study.

### Questionnaire development

A literature review was performed to determine the elements that should be included in the questionnaire. It comprised three sections: (1) sociodemographic information, such as age, gender, educational attainment, marital status, employment position, and perception of health status; (2) HIV knowledge based on HIV-KQ-18 knowledge measure (18 items with response options: "true"/ "false"/ "do not know") (Wagenaar et al., 2012); and (3) attitudes toward PLWH (four items) (Estifanos et al., 2021), rated on a binary scale of "yes" or "no". Experts in the social and health sciences were engaged to evaluate the questionnaire in terms of various requirements, including clarity, language fit for the community, comprehensibility, and the relevance of items to the issue under consideration. The assessment reduced the number of variables for refinement or introduction. The questionnaire was then tested for accuracy and readability by 10 members of the general public. No further adjustments were made to the instrument.

The questions were written in English and were translated into Vietnamese by a qualified translator, after which bilingual researchers carefully reviewed the translations. To verify that all the concepts and questions were clear and simple for a layperson to grasp, 30 people were recruited for participation in a pilot study (but were excluded from the main research). The pretest findings were used to improve

interview length, the introduction script, transitions, response categories, and question wording.

We evaluated the content validity of the knowledge section using the Item-Objective Congruence (IOC) method, which measures the extent to which each item relates to its respective domain. The average IOC score across all knowledge items was 0.95, indicating that the items were important and relevant to the domain. To assess the reliability of the attitudes section, we calculated Cronbach's alpha for the four items. The resulting value was 0.85, indicating good internal consistency among the items.

The variable list comprised eleven variables for sociodemographic characteristics (age, gender, orientation, residency, education, occupation, marital status, religion, monthly income, financial vulnerability, and perception of health status), nineteen variables related HIV knowledge; five variables for attitudes toward PLWH. All variables were categorized as nominal variables, except for age as a continuous variable.

### Data analyses

Two logistic regression models were performed to identify determinants of HIV knowledge and attitudes toward PLWH. In model 1, the independent variables were demographic characteristics, and the dependent variable was knowledge regarding HIV (i.e., good versus poor knowledge). Participants who provided correct answers to 13 out of the 18 questions were considered to have good knowledge (i.e., comprehensive knowledge about HIV/AIDS). In model 2, the independent variables were demographic characteristics and HIV knowledge, and the dependent variable was attitude toward PLWH (i.e., appropriate *versus* inappropriate attitude). Participants who chose "yes" as the response to the first three questions and "no" to the last one were regarded as exhibiting appropriate attitudes (i.e., accepting attitudes).

To determine the difference between the adjusted odds ratio and the crude odds ratio (cOR), confounding variables were examined via a univariate analysis of two independent variables. Variables with a screening significance of  $p=0.25$  were then investigated through multivariate analysis (Koenraadt et al., 2006). The model was incorporated with all the potential bidirectional correlations of the variables chosen from the univariate analysis. The layout of the model was simplified in a step-by-step process. In the first step, all two-way relationships were eliminated, and a probability ratio check contrasted a reduced model with the complete model. If the omission induced a negligible difference in deviance, the reduced model was selected; otherwise, an upgrade feature was used to re-incorporate interface terminology into the code.

We then deleted the least relevant words from the specification until the minimally acceptable standard was reached. We used the Akaike information criterion (AIC) to select the final model using an automatic process feature. When matching between the two models was achieved, the smaller AIC was acknowledged as suggesting better fit (Crawley, 2012).

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## RESULTS

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Of the 1226 respondents, 1020 (83.2%) lived in urban areas (Table 1). The average age of the participants was  $23.7 \pm 6.4$  years (range = 18 to 69 years). A higher percentage of respondents were female (64.8%), heterosexual (82.6%), single (91.4%), and irreligious (67.0%). University and post-graduate education was the most prevalent educational attainment (84.2%). Among the respondents, 66.6% earned a monthly income of <4.5 million VND, and more than half of the surveyed participants (55.6%) stated that they had moderate financial vulnerability. In terms of the self-evaluated risk of HIV infection, a large proportion (90.9%) believed that they were not at risk.

Fig. 1 indicates that the number of participants who gave the correct answers to the 18 questions about HIV knowledge varied substantially. The three questions to which the highest number of correct answers were provided were K14 "Having sex with more than one partner can increase a person's chance of becoming infected with HIV" ( $n = 1055$ ), K1 "Coughing and sneezing do not spread HIV" ( $n = 959$ ), and K10 "A woman cannot get HIV if she has sex during her period" ( $n = 953$ ). In contrast, the three questions with the lowest number of correct answers were K15 "Taking a test for HIV one week after having sex will tell a person if she or he has HIV" ( $n = 319$ ), K12 "A natural skin condom works better against HIV than a latex condom" ( $n = 402$ ), and K8 "There is a vaccine that can stop adults from getting HIV" ( $n = 470$ ). Generally, only 488 (39.8%) respondents had good knowledge of HIV (i.e., achieved 13 correct answers out of 18).

Fig. 2 illustrates that most of the respondents had positive perceptions in relation to each question about attitudes toward PLWH. However, the number of people who displayed appropriate attitudes overall (the average of four scenarios) was minimal (lower than 20%). The participants expressed the most positive attitude toward the third scenario, with 75% of them viewing this situation favorably. Most of them expressed a desire for an HIV-positive but healthy female teacher to be allowed to continue teaching. The least positive attitudes arose with respect to keeping HIV infection within a family a secret ( $n = 548$ , 44.7%).

Table 2 shows the results of the logistic regression, which was intended to explore the association between demographic variables and HIV knowledge. In the univariate logistic regression, the relevant factors examined were gender, residence, occupation, marital status, and monthly income. In the multivariate logistic regression, gender, residence, occupation, and monthly income were significantly associated with HIV knowledge. Table 3 presents the demographic

variables related to attitudes toward PLWH. The univariate analysis conducted for scenario 1 indicated that gender was significantly associated with attitudes toward PLWH (cOR = 0.647, 95% CI: 0.506-0.827). Knowledge was also a relevant factor in scenarios 2 to 4. The multivariate analyses showed that general attitudes were related to gender (aOR = 0.625, 96% CI: 0.471-0.829) and knowledge (aOR = 0.62, 95% CI: 0.469-0.821).

**Table 1.** Demographic characteristics of the sample (N = 1226).

Characteristics	N (%)	Characteristics	N (%)
<b>Age</b>		<b>Marital status</b>	
Mean (SD)	23.7 (6.4)	Single/Widowed/Divorced	1120 (91.4)
Median (Q1-Q3)	22 (20-23)	Married/Co-habitated	106 (8.6)
Min-Max	18-69	<b>Religion</b>	
<b>Gender</b>		Religious	404 (33.0)
Male	431 (35.2)	Irreligious	822 (67.0)
Female	795 (64.8)	<b>Monthly income (million VND)</b>	
<b>Orientation</b>		<4.5	817 (66.6)
Heterosexual	1013 (82.6)	4.5-10.5	218 (17.8)
Lesbian/Gay/Bisexual/Transgender (LGBT)	213 (17.4)	≥10.5	191 (15.6)
<b>Residency</b>		<b>Financial vulnerability*</b>	
Urban	1020 (83.2)	Low	279 (22.8)
Rural	206 (16.8)	Medium	682 (55.6)
<b>Education</b>		High	265 (21.6)
High school and lower	194 (15.8)	<b>Self-evaluated risk of HIV infection</b>	
University and post-graduate	1032 (84.2)	No risk	1114 (90.9)
<b>Occupation</b>		Risk	112 (9.1)
Blue collar	46 (3.8)		
White collar	329 (26.8)		
Students/Housewife/Retired/Unemployed	851 (69.4)		

SD: standard deviation; Q1-Q3: 25<sup>th</sup>-75<sup>th</sup> quartile; VND: Vietnam Dong. 1 United States dollar = 23,700 VND (Source: Vietnamese Ministry of Finance - exchange rate for foreign currencies in January 2023). \*Participants were asked "How much do you think that you could afford an unexpected expense?" to explore their financial vulnerability (FV). Their answers were converted: "cannot afford at all" = high FV; "maybe" = medium FV; "can afford all expense" = low FV

## DISCUSSION

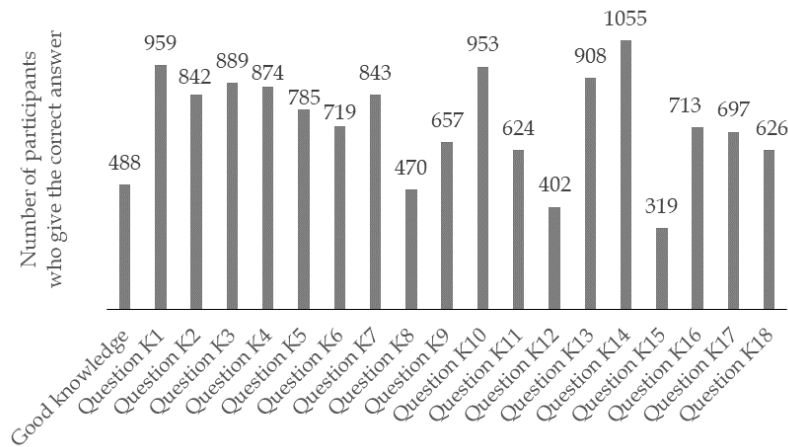
In this study, Vietnamese individuals were asked about their awareness of HIV and their attitudes toward PLWH. Overall, the findings indicated that the respondents knew little about the virus and that they continued to subscribe to certain myths, particularly those linked to natural skin condoms (K12) and HIV testing after intercourse (K15). The results of the current work differ from those of recent studies conducted in both rich and developing nations (Al-Rabeei et al., 1995; Ball and Mazarurwi, 2003; Linguissi et al., 2018; Maswanya et al., 2000; Tavoosi et al., 2004). For instance, research conducted in Europe indicated a

high level of knowledge about HIV/AIDS (Shokoohi et al., 2016), whereas those in Asia and Africa found little awareness of the virus and illness (Gebremedhin et al., 2017; Tsala Dimbuene and Kuate Defo, 2011; Varni et al., 2012). Such ignorance may be attributed to the lack of information about sexual and reproductive health in the latter regions (Shokoohi et al., 2016). The current findings also indicated a substantial variation in the overall grasp of HIV/AIDS between the male and female respondents. Earlier studies likewise discovered gender inequalities in students' understanding of HIV/AIDS (Nwaorgu et al., 2008; Ugoji and Agokei, 2012). Gender disparities and harmful

conventional norms relating to sexual health and sexuality may be responsible for the lack of information available to women (UNAIDS, 2016).

Commitment to a single healthy partner and routine condom use throughout sexual activity are two strategies for minimizing HIV/AIDS transmission. The participants in this study had a moderately high awareness of prevention strategies, so there is still an

opportunity for improvement. The strategies that they were fairly aware of were those related to sexual behaviors (K3-4-5) and establishing a relationship with an honest partner to prevent infection (K14). By contrast, similar research in Iran and Ethiopia revealed a sizable knowledge gap in this respect (Zarei et al., 2018).



K1: Coughing and sneezing DO NOT spread HIV

K2: A person can get HIV by sharing a glass of water with someone who has HIV

K3: Pulling the penis out before a man climaxes/cums keeps his partner from getting HIV during sex

K4: A woman can get HIV if she has anal sex with a man

K5: Showering or washing one's genitals / private parts after sex keeps a person from getting HIV

K6: All pregnant women infected with HIV will have babies born with AIDS

K7: People who have been infected with HIV quickly show serious signs of being infected

K8: There is a vaccine that can stop adults from getting HIV

K9: People are likely to get HIV by deep kissing / putting their tongue in their partner's mouth

K10: A woman cannot get HIV if she has sex during her period

K11: There is a female condom that can help decrease a woman's chance of getting HIV

K12: A natural skin condom works better against HIV than a latex condom

K13: A person will NOT get HIV if they are taking antibiotics

K14: Having sex with more than one partner can increase a person's chance of becoming infected with HIV

K15: Taking a test for HIV one week after having sex will tell a person if she or he has HIV

K16: A person can get HIV by sitting in a hot tub or a swimming pool with a person who has HIV

K17: A person can get HIV from oral sex

K18: Using Vaseline or baby oil with condoms lowers the chance of getting HIV

Figure 1. Correct answers to questions regarding knowledge of HIV (N = 1226).

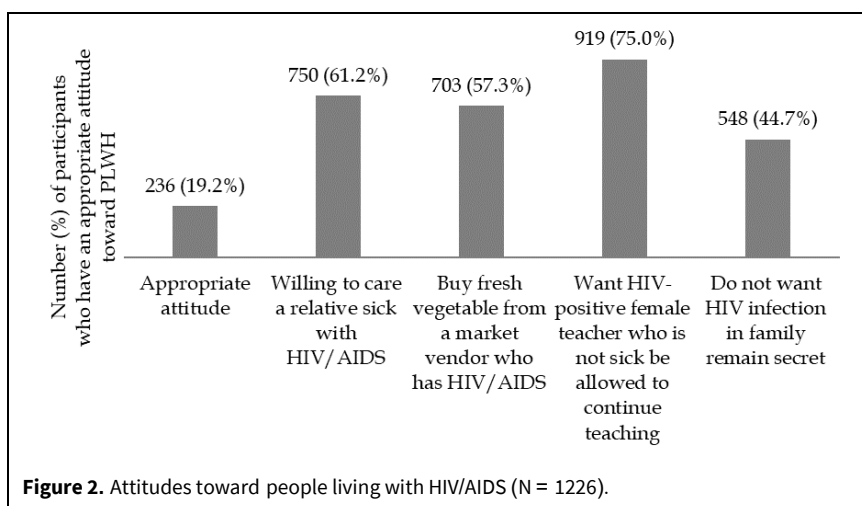


Figure 2. Attitudes toward people living with HIV/AIDS (N = 1226).

**Table 2.** Logistics analysis of the association between demographic variables and HIV knowledge (N = 1226).

Variable	Univariate regression		Multivariate regression	
	cOR (95% CI)	P-value	aOR (95% CI)	P-value
<b>Gender</b>				
Male	1			
Female	0.676 (0.533 - 0.858)	<b>0.001</b>	0.688 (0.538 - 0.879)	<b>0.003</b>
<b>Orientation</b>				
Heterosexual	1			
LGBT	1.157 (0.858 - 1.561)	0.339		
<b>Residency</b>				
Urban	1		1	
Rural	0.600 (0.435 - 0.829)	<b>0.002</b>	0.704 (0.504 - 0.981)	<b>0.038</b>
<b>Education</b>				
High school and lower	1			
University and post-graduate	1.272 (0.923 - 0.175)	0.141		
<b>Occupation</b>				
Blue collar	1		1	
White collar	2.834 (1.306 - 6.151)	<b>0.008</b>	3.376 (1.487 - 7.666)	<b>0.004</b>
Students/Housewife/Retired/Unemployed	0.615 (0.476 - 0.795)	<b>&lt;0.001</b>	0.864 (0.612 - 1.219)	0.405
<b>Marital status</b>				
Single/Widowed/Divorced	1			
Married/Co-habituated	2.022 (1.353 - 3.002)	<b>0.001</b>		
<b>Religion</b>				
Religious	1			
Irreligious	1.128 (0.884 - 1.441)	0.332		
<b>Monthly income (million VND)</b>				
<4.5	1		1	
4.5 - 10.5	2.701 (1.506 - 2.847)	<b>&lt;0.001</b>	1.844 (1.219 - 2.790)	<b>0.004</b>
≥10.5	1.870 (1.261 - 2.773)	<b>0.002</b>	1.643 (1.087 - 2.485)	<b>0.019</b>
<b>Financial vulnerability</b>				
Low	1			
Medium	1.414 (1.003 - 1.994)	<b>0.048</b>		
High	1.267 (0.951 - 1.688)	0.106		
<b>Self-evaluated risk of HIV infection</b>				
No risk	1			
Risk	0.826 (0.551 - 1.238)	0.354		

CI: Confidence Interval; LGBT: Lesbian/Gay/Bisexual/Transgender; VND: Vietnam Dong, cOR: crude odd ratio; aOR: adjusted odd ratio.

**Table 3.** Logistics analysis of the association between demographic variables and attitudes toward PLWH (N = 1226).

Variable		Willing to care a relative sick with HIV/AIDS	Buy fresh vegetable from a market vendor who has HIV/AIDS	Want HIV-positive female teacher who is not sick be allowed to continue teaching	Do not want HIV infection in family remain secret	Appropriate attitude			
		Univariate regression				Univariate regression	Multivariate regression		
		cOR (95% CI)				cOR (95% CI)	P - value	aOR (95% CI)	P - value
Gender		<b>0.647</b>	<b>0.662</b>	0.793	0.912	<b>0.600</b>	<0.001*	<b>0.625</b>	0.001*
	(ref: male)	(0.506 - 0.827)	(0.520 - 0.842)	(0.602 - 1.045)	(0.721 - 1.155)	(0.453 - 0.794)		(0.471 - 0.829)	
Orientation		0.969	0.997	1.010	1.042	1.289	0.154		
	(ref: heterosexual)	(0.716 - 1.312)	(0.739 - 1.344)	(0.718 - 1.422)	(0.774 - 1.402)	(0.910 - 1.826)			
Residency		0.975	0.974	<b>0.694</b>	0.845	0.805	0.272		
	(ref: urban)	(0.718 - 1.325)	(0.720 - 1.317)	(0.500 - 0.964)	(0.624 - 1.145)	(0.548 - 1.185)			
Education		1.311	1.084	<b>1.692</b>	1.213	1.052	0.795		
	(ref: high school and lower)	(0.961 - 1.787)	(0.796 - 1.477)	(1.216 - 2.354)	(0.888 - 1.656)	(0.718 - 1.541)			
Occupation	White collar	1.214	1.439	<b>1.938</b>	1.141	1.212	0.629		
	(ref: blue collar)	(0.667 - 2.211)	(0.794 - 2.606)	(1.051 - 3.574)	(0.625 - 2.084)	(0.555 - 2.645)			
	Students/Housewife/ Retired/Unemployed	0.980	0.884	0.921	0.958	0.879	0.413		
		(0.754 - 1.273)	(0.682 - 1.145)	(0.683 - 1.242)	(0.742 - 1.237)	(0.646 - 1.196)			
Marital status		0.687	1.009	0.683	1.490	1.337	0.216		
	(ref: single/widowed/divorced)	(0.461 - 1.026)	(0.675 - 1.51)	(0.444 - 1.049)	(1.000 - 2.222)	(0.844 - 2.119)			
Religion		1.083	1.105	1.233	0.882	0.957	0.768		
	(ref: religious)	(0.849 - 1.382)	(0.896 - 1.406)	(0.941 - 1.617)	(0.694 - 1.120)	(0.715 - 1.282)			
Monthly income	4.5 - 10.5	<b>0.665</b>	0.835	0.855	1.105	1.057	0.776		
	(ref: <4.5 million VND)	(0.484 - 0.914)	(0.608 - 1.147)	(0.597 - 1.224)	(0.806 - 1.515)	(0.722 - 1.548)			
	≥ 10.5	0.855	1.013	1.091	1.344	1.217	0.425		
		(0.578 - 1.264)	(0.686 - 1.496)	(0.706 - 1.686)	(0.908 - 1.990)	(0.751 - 1.971)			



**Table 3.** Logistics analysis of the association between demographic variables and attitudes toward PLWH (N = 1226).

Variable		Willing to care a relative sick with HIV/AIDS	Buy fresh vegetable from a market vendor who has HIV/AIDS	Want HIV-positive female teacher who is not sick be allowed to continue teaching	Do not want HIV infection in family remain secret	Appropriate attitude			
		Univariate regression				Univariate regression		Multivariate regression	
		cOR (95% CI)				cOR (95% CI)	P - value	aOR (95% CI)	P - value
Financial vulnerability (ref: low)	Medium	1.074 (0.760 - 1.517)	1.123 (0.800 - 1.575)	1.412 (0.970 - 2.056)	1.081 (0.771 - 1.516)	1.142 (0.752 - 1.733)	0.533		
	High	1.055 (0.788 - 1.413)	0.928 (0.697 - 1.237)	0.865 (0.621 - 1.205)	1.039 (0.781 - 1.381)	1.024 (0.724 - 1.447)	0.894		
Self-evaluated risk of HIV infection (ref: no risk)		0.768 (0.519 - 1.136)	1.032 (0.696 - 1.529)	0.745 (0.487 - 1.139)	1.315 (0.891 - 1.940)	1.678 (1.090 - 2.585)	<b>0.019</b>		
Knowledge (ref: good)		0.898 (0.710 - 1.137)	<b>0.489</b> (0.386 - 0.621)	<b>0.346</b> (0.257 - 0.466)	<b>0.610</b> (0.484 - 0.768)	0.596 (0.452 - 0.787)	<b>&lt;0.001</b>	0.620 (0.469 - 0.821)	<b>0.001</b>

CI: Confidence Interval; LGBT: Lesbian/Gay/Bisexual/Transgender; VND: Vietnam Dong, cOR: crude odd ratio; aOR: adjusted odd ratio.

The spread of HIV has caused fear, prejudice, and worry among PLWH. In this work, only 19.2% of the participants exhibited accepting attitudes regarding such individuals. Previously published findings substantiate the unfavorable perspectives discovered in the present study (Bassey et al., 2007). Discrimination against PLWH is widespread around the world (Teshome et al., 2016) and is seen as a major obstacle in the fight against HIV (Gebremedhin et al., 2017). However, HIV/AIDS programs place little importance on initiatives for combating negative attitudes (Mahajan et al., 2008). According to a study carried out in Iran, the majority of participants (61.2%) expressed a readiness to care for an HIV-positive relative (Shokoohi et al., 2016). In the present research, a little over 44.7% of the participants said that they would not want a family's HIV status to remain a secret. The low disclosure rate in Vietnam demonstrates how the burden of HIV/AIDS is growing according to unfavorable attitudes. Nearly 40% of the respondents held negative opinions about purchasing fresh vegetables from an HIV-positive seller. Such attitudes can hinder the effective deployment of enlightenment campaigns and voluntary HIV counseling and testing (Nubed and Akoachere, 2016).

The male and female respondents showed a statistically significant difference in attitudes ( $p=0.001$ ), with the latter displaying less favorable attitudes than the former. Similarly, earlier research found notable gender disparities in attitudes toward PLWH (Maimaiti et al., 2010; Norman and Carr, 2005). Additionally, out-of-school teenage girls may miss out on the opportunity to learn about HIV/AIDS (Ankunda, 2017). In the current study, no correlation was found between educational attainment and a supportive viewpoint on PLWH. Urban inhabitants may have easier access to health-related information or services through the media, which may help them increasingly develop their knowledge of HIV/AIDS and cultivate more receptive attitudes than those harbored by rural residents. Nevertheless, the differences in accepting attitudes across residences (rural and urban) were not significant in this work. This result conflicts with those of previous investigations (Deribew et al., 2010; Majelantle et al., 2014; Shokoohi et al., 2016; Terán Calderón et al., 2015; Zarei et al., 2018).

The interviewees' pessimistic demeanor suggested support for the fact that the respondents had access to incomprehensible information about HIV. Another study also implied that a lack of access to pertinent and correct information on HIV fosters unfavorable attitudes (Maughan-Brown, 2006). Our findings showed that, compared with the reference group, persons with extensive knowledge of HIV/AIDS

were far more likely to have accepting attitudes. This result is consistent with numerous studies published in the past (Ashur, 1977; Linguissi et al., 2018; Okafor, 1997; Oyewale, 2008; Tang et al., 2016). Moreover, previous research suggested that the high degree of the stigma associated with the infection/disease may be related to false beliefs about the virus and a lack of understanding about preventing HIV transmission (Ashur, 1977; Okafor, 1997; Tee and Huang, 2009). Knowledge has been identified in a number of studies as a primary driver of favorable attitudes toward PLWH. Efforts to educate the public about HIV/AIDS have played a vital role in changing attitudes. Increased knowledge about the modes of transmission, prevention strategies, and in particular treatment options has helped reduce fear and discrimination. The advancements in pharmaceutical science have greatly improved the treatment options for people living with HIV. ART drugs can effectively suppress the virus, reduce the risk of transmission, and help individuals lead healthy lives. This has contributed to a more positive attitude towards HIV-positive individuals, as they can now live longer, productive lives with the appropriate treatment and care.

As with any other research, the present study was encumbered by a few limitations. First, our findings are not generalizable to the entire Vietnamese population given our use of convenience sampling. Second, misclassification may have also resulted from the underreporting of HIV status, male sexual partners, or unprotected contact, as well as from sample selection, recall, and/or social desirability biases. Nonetheless, we believed that if such biases did exist, they were not significantly different between cohorts or among those who scored highly or poorly on HIV awareness. Third, further investigation is required to describe epidemiologically important critical levels of HIV/AIDS knowledge; our decision to dichotomize the knowledge data was based on the original publication (Wagenaar et al., 2012). Finally, several of the items on the HIV-KQ-18 knowledge measure, such as that on natural skin condoms, are somewhat outdated and were not developed or validated for use with Vietnamese speakers.

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## CONCLUSION

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The Vietnamese adults participating in this work showed a significant lack of HIV knowledge and a high level of stigmatization toward PLWH. White collar work, high monthly income, urban residence, and being male were related to sufficient depth of knowledge. Additionally, a favorable attitude toward PLWH was significantly correlated with being male, having extensive HIV knowledge, and having posi-

tive attitude. The data led to the conclusion that closing the knowledge gap about HIV transmission in Vietnam necessitates a national health awareness program that emphasizes HIV/AIDS education.

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## CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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## REFERENCES

- Al-Rabeei N, Dallak A, Al-Awadi F (1995) Knowledge, attitude and beliefs towards HIV/AIDS among students of health institutes in Sana'a city. *East Mediterr Health J* 18(3): 221-226. <https://doi.org/10.26719/2012.18.3.221>
- Ankunda D (2017) Determinants of comprehensive knowledge of HIV/AIDS among women of the reproductive age (15-49) in Uganda. Master Thesis, Makerere University, Kampala, Uganda.
- Ashur S (1977) An evaluation plan for the development and updating of nutrition curriculum at upper elementary and preparatory levels in Jordan. The IVES/UNESCO International conference in Nutrition Education NE (Oxford), Oxford, United Kingdom, August 31-September 9, pp 67-74.
- Ball D, Mazarurwi P (2003) HIV/AIDS knowledge and attitudes amongst pharmacists in Zimbabwe. *Cent Afr J Med* 49(3-4): 27-31. <https://pubmed.ncbi.nlm.nih.gov/14562587/>
- Bassey EA, Abasiubong F, Ekanem U, Abasiatai AM (2007) Attitude of antenatal attendees to people living with HIV/AIDS in Uyo, South-South Nigeria. *Afr Health Sci* 7(4): 239-243. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3074378/>
- Chela C, Mensah M (1996) Possible barrier to HIV prevention. *AIDS Action* 29: 83.
- Crawley MJ (2012) *The R book*. 2nd edn. Chichester, United Kingdom: John Wiley & Sons, pp. 977.
- Deribew A, Abebe G, Apers L, Jira C, Tesfaye M, Shifa J, Abdisa A, Woldemichael K, Deribie F, Bezabih M (2010) Prejudice and misconceptions about tuberculosis and HIV in rural and urban communities in Ethiopia: A challenge for the TB/HIV control program. *BMC Public Health* 10: 400. <https://doi.org/10.1186/1471-2458-10-400>
- Duong CT, Nguyen TH, Hoang TTH, Nguyen VV, Do TMN, Pham VH, Detels R (2008) Sexual risk and bridging behaviors among young people in Hai Phong, Vietnam. *AIDS Behav* 12: 643-651. <https://doi.org/10.1007/s10461-007-9265-0>
- Esparza J (2013) A brief history of the global effort to develop a preventive HIV vaccine. *Vaccine* 31(35): 3502-3518. <https://doi.org/10.1016/j.vaccine.2013.05.018>
- Estifanos TM, Hui C, Tesfai AW, Teklu ME, Ghebrehiwet MA, Embaye KS, Andegiorgish AK (2021) Predictors of HIV/AIDS comprehensive knowledge and acceptance attitude towards people living with HIV/AIDS among unmarried young females in Uganda: A cross-sectional study. *BMC Womens Health* 21: 37. <https://doi.org/10.1186/s12905-021-01176-w>
- Farotimi AA, Nwozichi CU, Ojediran TD (2015) Knowledge, attitude, and practice of HIV/AIDS-related stigma and discrimination reduction among nursing students in Southwest Nigeria. *Iran J Nurs Midwifery Res* 20(6): 705-711. <https://doi.org/10.4103/1735-9066.170011>
- Gebremedhin S, Wang Y, Tesfamariam E (2017) Predictors of HIV/AIDS knowledge and attitude among young women of Nigeria and Democratic Republic of Congo: Cross-sectional study. *J AIDS Clin Res* 8(3): 677-684. <https://doi.org/10.4172/2155-6113.1000677>
- Herek GM, Capitanio JP, Widaman KF (2002) HIV-related stigma and knowledge in the United States: Prevalence and trends, 1991-1999. *Am J Public Health* 92(3): 371-377. <https://doi.org/10.2105/AJPH.92.3.371>
- Koenraadt CJ, Tuiten W, Sithiprasasna R, Kijchalao U, Jones JW, Scott TW (2006) Dengue knowledge and practices and their impact on *Aedes aegypti* populations in Kamphaeng Phet, Thailand. *Am J Trop Med* 74(4): 692-700.
- Li ATW, Fung KPL, Maticka-Tyndale E, Wong JPH (2018) Effects of HIV stigma reduction interventions in diasporic communities: Insights from the CHAMP study. *AIDS Care* 30(6): 739-745. <https://doi.org/10.1080/09540121.2017.1391982>
- Linguissi LSG, Yombi RNO, Nkenfou CN, Ibara JR (2018) Knowledge on HIV/AIDS among students of the Faculty of Health Sciences, Brazzaville, Republic of Congo. *Am J Epidemiol Infect Dis* 6(1): 7-13. <https://doi.org/10.12691/ajeid-6-1-2>
- Lohiniva AL, Benkirane M, Numair T, Mahdy A, Saleh H, Zahran A, Okasha O, Talaat M, Kamal W (2016) HIV stigma intervention in a low-HIV prevalence setting: A pilot study in an Egyptian healthcare facility. *AIDS Care* 28(5): 644-652. <https://doi.org/10.1080/09540121.2015.1124974>
- Mahajan AP, Sayles JN, Patel VA, Remien RH, Ortiz D, Szekeres G, Coates TJ (2008) Stigma in the HIV/AIDS epidemic: A review of the literature and recommendations for the way forward. *AIDS* 22(suppl. 2): S67-S79. <https://doi.org/10.1097/01.aids.0000327438.13291.62>
- Maimaiti N, Shamsuddin K, Abdurahim A, Tohti N, Memet R (2010) Knowledge, attitude and practice regarding HIV/AIDS among university students in Xinjiang. *Glob J Health Sci* 2(2): 51-60. <https://doi.org/10.5539/gjhs.v2n2p51>
- Majelantle R, Keetile M, Bainame K, Nkawana P (2014) Knowledge, opinions and attitudes towards HIV and AIDS among youth in Botswana. *J Glob Econ* 2(1): 108-114. <https://doi.org/10.4172/economics.1000108>
- Maswanya E, Moji K, Aoyagi K, Yahata Y, Kusano Y, Nagata K, Izumi T, Takemoto T (2000) Knowledge and attitudes toward AIDS among female college students in Nagasaki, Japan. *Health Educ J* 15(1): 5-11. <https://doi.org/10.1093/her/15.1.5>
- Maughan-Brown BG (2006) Attitudes towards people with HIV/AIDS: stigma and its determinants amongst young adults in Cape Town, South Africa. *S Afr Rev Sociol* 37(2): 165-188. <https://doi.org/10.1080/21528586.2006.10419153>
- MOH - Vietnam Ministry of Health (MOH) (2016) HIV Sentinel Surveillance report. Vietnam Ministry of Health, Hanoi, Vietnam.
- MOH - Vietnam Ministry of Health (MOH) (2012) Viet Nam HIV/AIDS estimates and projections 2011-2015. Vietnam Ministry of Health, Hanoi, Vietnam.
- Norman LR, Carr R (2005) Discriminatory attitudes toward persons living with HIV/AIDS in Jamaica: A hierarchical analysis of university students. *AIDS Public Policy J* 20(1-2): 40-50. <https://pubmed.ncbi.nlm.nih.gov/17260568/>
- Nubed CK, Akoachere JFTK (2016) Knowledge, attitudes and practices regarding HIV/AIDS among senior secondary school students in Fako Division, South West Region,

- Cameroon. *BMC Public Health* 16(1): 847. <https://doi.org/10.1186/s12889-016-3516-9>
- Nwaorgu OC, Onyeneho NG, Okolo M, Obadike E, Enibe G (2008) Reproductive health knowledge and practices among junior secondary school grade one students in Enugu State: Threat to achieving millennium development goals in Nigeria. *East Afr J Public Health* 5(2): 126-132. <https://pubmed.ncbi.nlm.nih.gov/19024423/>
- Okafor R (1997) Sexual knowledge and sources of sexual information of secondary school students in Anambra State, Nigeria. *Health Move Educ J* 1(1): 9-15.
- Oyewale TO (2008) HIV/AIDS knowledge and attitude among teachers in Abuja, Nigeria. *The Masters Abstracts International*. <http://hdl.handle.net/10500/2125>
- Parker R (2012) Stigma, prejudice and discrimination in global public health. *Cad Saude Publica* 28(1): 164-169. <https://doi.org/10.1590/s0102-311x2012000100017>
- Shokoohi M, Karamouzian M, Mirzazadeh A, Haghdoost A, Rafierad AA, Sedaghat A, Sharifi H (2016) HIV knowledge, attitudes, and practices of young people in Iran: Findings of a national population-based survey in 2013. *PLoS One* 11(9): e0161849. <https://doi.org/10.1371/journal.pone.0161849>
- Sohn A, Park S (2012) HIV/AIDS knowledge, stigmatizing attitudes, and related behaviors and factors that affect stigmatizing attitudes against HIV/AIDS among Korean adolescents. *Osong Public Health Res Perspect* 3(1): 24-30. <https://doi.org/10.1016/j.phrp.2012.01.004>
- Tang W, Zhuang X, Zhao H, Pang C, He Y, Liu F, Jiang H, He D (2016) HIV/AIDS-related stigma among medical students in Beijing, China. *Int J Clin Exp Med* 9(5): 8743-8748.
- Tavoosi A, Zaferani A, Enzevaei A, Tajik P, Ahmadinezhad Z (2004) Knowledge and attitude towards HIV/AIDS among Iranian students. *BMC Public Health* 4(1): 17. <https://doi.org/10.1186/1471-2458-4-17>
- Tee Y, Huang M (2009) Knowledge of HIV/AIDS and attitudes towards people living with HIV among the general staff of a public university in Malaysia. *SAHARA-J: J Soc Asp HIV/AIDS* 6(4): 179-187. <https://doi.org/10.1080/17290376.2009.9724946>
- Terán Calderón C, Gorena Urizar D, González Blázquez C, Alejos Ferreras B, Rubio OR, Bolumar Montrull F, Ortiz Rivera M, del Amo Valero J (2015) Knowledge, attitudes and practices on HIV/AIDS and prevalence of HIV in the general population of Sucre, Bolivia. *Braz J Infect Dis* 19(4): 369-375. <https://doi.org/10.1016/j.bjid.2015.04.002>
- Teshome R, Youjie W, Habte E, Kasm N (2016) Comparison and association of comprehensive HIV/AIDS knowledge and attitude towards people living with HIV/AIDS among women aged 15-49 in three east African countries: Burundi, Ethiopia and Kenya. *J AIDS Clin Res* 7: 599-606. <https://doi.org/10.4172/2155-6113.1000559>
- Tsala Dimbuene Z, Kuate Defo B (2011) Fostering accurate HIV/AIDS knowledge among unmarried youths in Cameroon: Do family environment and peers matter? *BMC Public Health* 11: 348. <https://doi.org/10.1186/1471-2458-11-348>
- Turan JM, Bukusi EA, Onono M, Holzemer WL, Miller S, Cohen CR (2011) HIV/AIDS stigma and refusal of HIV testing among pregnant women in rural Kenya: Results from the MAMAS Study. *AIDS Behav* 15: 1111-1120. <https://doi.org/10.1007/s10461-010-9798-5>
- Ugoji FN, Agokei RC (2012) Rural nursing students' knowledge of HIV/AIDS, and beliefs and their attitude towards people living with HIV/AIDS. *Int J Psychol Behav Sci* 2(6): 226-230. <https://doi.org/10.5923/j.ijpbs.20120206.05>
- UNAIDS - The Joint United Nations Programme on HIV/AIDS (UNAIDS) (2016) Prevention gap report.
- UNAIDS - The Joint United Nations Programme on HIV/AIDS (UNAIDS) (2020) HIV prevention.
- Varni SE, Miller CT, Solomon SE (2012) Sexual behavior as a function of stigma and coping with stigma among people with HIV/AIDS in rural New England. *AIDS Behav* 16: 2330-2339. <https://doi.org/10.1007/s10461-012-0239-5>
- Vietnam Ministry of Labor, Invalids, and Social Affairs (2010) Overview of the Impact of Policies on Drug Rehabilitation Treatment on Its Implementation in Vietnam. Vietnam Ministry of Labor, Invalids, and Social Affairs, Hanoi, Vietnam.
- Wagenaar BH, Sullivan PS, Stephenson R (2012) HIV knowledge and associated factors among internet-using men who have sex with men (MSM) in South Africa and the United States. *PLoS One* 7(3): e32915. <https://doi.org/10.1371/journal.pone.0032915>
- Zarei E, Khabiri R, Tajvar M, Nosratnejad S (2018) Knowledge of and attitudes toward HIV/AIDS among Iranian women. *Epidemiology health*, 40: e2018037. <https://doi.org/10.4178/epih.e2018037>
- Zhang C, Li X, Liu Y, Qiao S, Zhang L, Zhou Y, Tang Z, Shen Z, Chen Y (2016) Stigma against people living with HIV/AIDS in China: Does the route of infection matter? *PLoS One* 11(3): e0151078. <https://doi.org/10.1371/journal.pone.0151078>.

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Contribution	Tram NTH	Somying P	Sermsiri S	Luerat A
Concepts or ideas	x	x	x	x
Design	x	x	x	x
Definition of intellectual content	x	x	x	x
Literature search	x	x	x	x
Experimental studies	x			x
Data acquisition	x			x
Data analysis	x			x
Statistical analysis	x			x
Manuscript preparation	x			x
Manuscript editing	x	x	x	x
Manuscript review	x	x	x	x

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