

# Measuring Health Literacy Among People Living with HIV in a Medical University Hospital: A Cross-Sectional Study

Sitthiphon Bunman<sup>1,2\*</sup> ; Prakasit Wannapaschaiyong<sup>3</sup> ; Narongpon Dumavibhat<sup>4</sup> ; Tirathat Virojskulchai<sup>4</sup> ; Aphicha Nomsiri<sup>1</sup> ; Anan Malarat<sup>5</sup> ; Sonthaya Saiyasalee<sup>6</sup>



Sitthiphon Bunman

## Abstract

**OBJECTIVES:** The study aimed to evaluate the level of health literacy among people living with HIV.

**MATERIALS AND METHODS:** A cross-sectional survey was conducted among HIV-infected adult patients in the HIV clinic. We recruited 530 adults with HIV patients. The level of health literacy was evaluated with the 17 items of the Thai version of the HIV-HLT.

**RESULTS:** The participants had an average age of  $42.66 \pm 11.26$  years. The majority of the participants are male (65.8%). 92.6% were of straight sexual orientation. 57.6% of participants had been diagnosed with HIV infection for more than five years. 86.6% had a CD4 count of more than 200 cells/cm<sup>3</sup>, and 68.7% had a viral load of less than 20 copies/ml. Most participants (62.1%) had adequate HIV health literacy. The CD4 count of greater than 200 cells/cm<sup>3</sup> and viral load of less than 20 copies/ml were also associated with adequate health literacy. Moreover, participants with no previous history of opportunistic infections within the past six months were associated with adequate HIV health literacy.

**CONCLUSION:** Adequate health literacy is significantly associated with CD4 count and viral load, resulting in opportunistic infections. Therefore, encouraging health literacy is crucial in reducing the negative consequences of the disease and promoting health outcomes.

**Keywords:** Health literacy, HIV, HIV health literacy

Health literacy refers to the ability of individuals to access, comprehend, evaluate, and apply health information and services that promote and maintain adequate health.<sup>1</sup> Health literacy is increasingly recognized as a critical factor influencing health and illness behaviors among people living with HIV (PLHIV).<sup>2,3</sup> Although the specific definitions may vary, health literacy is commonly understood as the degree of competence individuals possess in accessing, comprehending, evaluating, and applying health-related information.<sup>4</sup> Research conducted in PLHIV has demonstrated that low health literacy is associated with limited knowledge about HIV and its treatment, reduced adherence to medication, and negative clinical outcomes, such as higher viral loads and increased hospitalizations.<sup>5-7</sup> Consequently, it is crucial for healthcare professionals to consider their patients' health literacy levels when providing care, particularly in tailored counseling for PLHIV, where factors such as stigma may also play a role.<sup>8</sup> Furthermore, the level of health literacy should be taken into account when developing interventions aimed at improving healthcare, such as the implementation of clearer medication labels to reduce misunderstandings.<sup>9</sup>

As regards HIV, individuals with limited health literacy skills are more prone to a poor rate of adherence to HIV treatment and management of their health.<sup>10</sup> Studies conducted in the United States have provided evidence that health literacy pertaining to HIV plays a crucial role in health-related behavior and acts as a mediator for HIV knowledge and outcomes.<sup>11</sup> Previous studies have indicated that individuals with poor HIV health literacy often possess insufficient knowledge about the disease, struggle to manage their HIV treatment effectively, exhibit lower CD4 counts, and are less likely to

<sup>1</sup> Department of Community and Family Medicine, Faculty of Medicine, Thammasat University, Pathumthani, Thailand.

<sup>2</sup> Center of Excellence in Stroke, Faculty of Medicine, Thammasat University, Pathum Thani, Thailand.

<sup>3</sup> Department of Pediatrics, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok, Thailand.

<sup>4</sup> Department of Preventive and Social Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand.

<sup>5</sup> Faculty of Physical Education, Srinakharinwirot University, Bangkok, Thailand.

<sup>6</sup> Faculty of Science and Health Technology, Kalasin University, Kalasin, Thailand.

\*Address Correspondence to author:  
Sitthiphon Bunman, PhD  
Department of Community and Family Medicine,  
Faculty of Medicine, Thammasat University,  
Pathumthani 12121, Thailand  
email: Bunman@tu.ac.th.

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achieve undetectable viral loads (VL) compared to those with adequate HIV health literacy skills.<sup>12</sup> Most studies have demonstrated an association between limited health literacy and lower adherence to antiretroviral therapy (ART), as well as lower CD4 and VL levels.<sup>13,14</sup> However, other studies have failed to find such relationships.<sup>15,16</sup> Taken together, these findings emphasize the significance of evaluating health literacy and utilizing the findings to inform health management and care plans for PLHIV.

Most research on health literacy in PLHIV has been conducted in the United States, Europe, and certain regions in Africa, while limited information is available regarding health literacy among PLHIV in developing countries in Asia, such as Thailand. Therefore, this study aims to evaluate the health literacy level of PLHIV in Thailand and examine the relationships between sociodemographic factors, laboratory results, and opportunistic infections.

## Materials and Methods

A cross-sectional survey was conducted among HIV-infected adult patients in the HIV Clinic, Thammasat University Hospital, Pathumthani, Thailand from October 2021 to May 2022 to investigate health literacy and related factors in these patients. The study protocol was approved by the Human Research Ethics Committee of the Faculty of Medicine, Thammasat University (MTU-EC-IM-0-250/64).

### Study population and procedures

We recruited 530 adults with HIV who met the following criteria:

1. 18 to 64 years of age.
2. Fluent in the Thai language.
3. Able to provide informed consent.

Patients with any psychiatric disorder, cognitive impairment, or memory impairment were excluded.

Members of the medical teams at the HIV clinic approached treatment-seeking patients and explained the purpose and objective of the study. The patients who volunteered in this study and agreed to sign the informed consent completed the anonymous internet-based survey that included demographic data and HIV-health literacy test.

## Measurements

### Demographic items

Fifteen demographic items (e.g., age, gender, sexual orientation) were included in the quantitative assessment.

### The Thai version of the HIV-HLT<sup>17</sup>

The Thai version of the HIV-HLT was used to measure the levels of HIV health literacy. The self-report questionnaire consisted of 17 items evaluating HIV knowledge and adherence to ART. The possible total score was between 0-17 and was classified into 3 levels: less than 13 as inadequate, 14-15 as marginal, and 16-17 as adequate health literacy. The Cronbach's alpha for this questionnaire was 0.81.

## Statistical analysis

Descriptive statistics were used to analyze the sociodemographic characteristics of participants. A chi-square test was used to test for factors association level of health literacy. The variables with an observed association of p-value < 0.05 were noted and considered significant. All statistical analyses were performed using the software program SPSS version 25.

**Table 1:** Sociodemographic characteristics of HIV-infected participating patients attending the HIV Clinic, University Hospital.

Demographic data	Number of participants (%) (n = 530)
Age (years), Mean±SD	42.66 ± 11.29
Range	18 - 64
Gender	
Male	349 (65.8)
Female	181 (34.2)
Sexual orientation	
Male	177 (33.4)
Female	341 (59.2)
Bisexual	26 (4.9)
Lesbian	13 (2.5)
Marital status	
Single	221 (41.7)
Couple	49 (9.2)
Divorced	260 (49.1)
Education	
Illiterate	10 (1.9)
Primary school	41 (7.7)
Junior high school	56 (10.6)
Senior high school	98 (18.5)
Diploma degree	54 (10.2)
Bachelor's degree	193 (36.4)
Graduate degree	78 (14.7)
Occupation	
Government service	136 (25.7)
Private business	86 (16.2)
Officer	70 (13.2)
Unemployed	66 (12.5)
Employee	59 (11.1)
Student	35 (6.6)
State enterprise employee	17 (3.2)
Industrial worker	11 (2.1)
Agriculturist	10 (1.9)
Other	40 (7.5)
Income per month (THB)	
< 5,000	77 (14.5)
5,000 - 10,000	99 (18.7)
10,001 - 15,000	81 (15.3)
15,001 - 20,000	132 (24.9)
20,001 - 25,000	141 (26.6)
Medical scheme	
Civil servant medical benefit scheme	177 (33.4)
Social security scheme	137 (25.8)
Private insurance	1 (0.2)
Universal coverage scheme	95 (17.9)
Personal	110 (20.8)
Other	10 (1.9)
Duration of HIV infection	
< 6 months	44 (8.3)
6 months - 1 year	33 (6.2)
> 1 year - 5 years	148 (27.9)
> 5 years	305 (57.6)

## Results

### Demographic characteristics

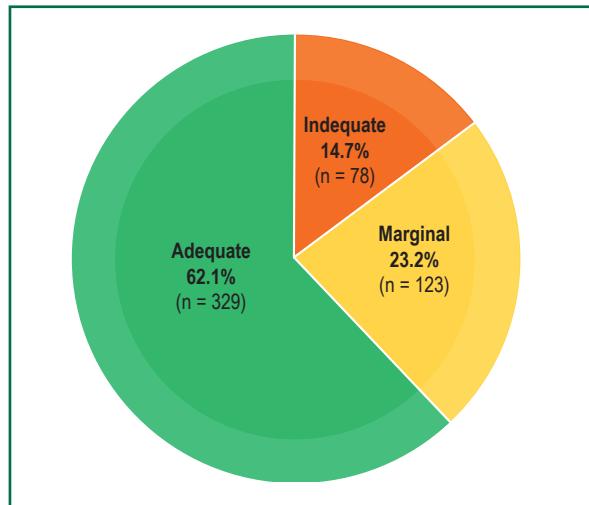
As shown in Table 1, the average age of the participants was  $42.66 \pm 11.26$  years. The majority of the participants are male (65.8%). 92.6% had straight sexual orientation, and 49.1% had divorced marital status. 51.1% had finished their bachelor's degrees or above. Among the participants, 25.7% were government officials, and 16.7% were self-employed. Approximately half of the participants (51.5%) had a 15,001-25,000 Thai baht monthly income. For rights to treatment, 33.4% had a civil servant medical benefit scheme, and 25.8% had a social security scheme. More than half of the participants (57.6%) had been diagnosed with HIV infection for more than 5 years. 86.6% had a CD4 count of more than 200 cells/cm<sup>3</sup>, and 68.7% had a viral load of less than 20 copies/ml Table 2. Additionally, it was found that less than 5% of the participants had a previous history of opportunistic infections, such as tuberculosis, pneumocystis carinii pneumonia, and cryptococcosis, within the past 6 months Table 3.

### HIV health literacy and related factors

As shown in Figure 1, the majority of the participants (62.1%) had adequate HIV health literacy with an average score of  $15.31 \pm 2.03$ . The association between general demographic characteristics and HIV health literacy are described in Table 4. Educational degrees of bachelor's degree and above, monthly income of more than 15,000 Thai baht, rights to treatment as a civil servant medical benefit scheme and social security scheme, and the duration after the first diagnosis of HIV infection of more than 5 years were associated with adequate health literacy and the association was statistically significant. The CD4 count of greater than 200 cells/cm<sup>3</sup> and viral load of less than 20 copies/ml were also associated with adequate health literacy, see Table 2. Moreover, participants who had no previous history of opportunistic infections, such as tuberculosis, pneumocystis pneumonia (PCP), and cryptococcosis within the past 6 months were associated with adequate HIV health literacy, and the finding was statistically significant, see Table 3.

**Table 2:** Factors related to health literacy among people living with HIV in a medical university hospital.

Factors	Total participants (n)	Level of health literacy			p-value
		Inadequate n (%)	Marginal n (%)	Adequate n (%)	
Gender					
- Male	349	54 (15.4)	77 (21.1)	218 (62.5)	0.60
- Female	181	24 (13.3)	46 (25.4)	111 (61.3)	
Education					
- Illiterate	10	6 (60)	1 (10)	3 (30)	0.00
- Primary school	41	9 (22)	13 (31.7)	19 (46.3)	
- Junior high school	56	12 (21.4)	17 (30.4)	27 (48.2)	
- Senior high school	98	12 (12.2)	28 (28.6)	58 (59.2)	
- Diploma degree	54	9 (16.6)	11 (20.4)	34 (63)	
- Bachelor's degree	193	27 (14)	44 (22.8)	122 (63.2)	
- Graduate degree	78	3 (3.9)	9 (11.5)	66 (84.6)	
Occupation					
- Government service	136	14 (10.3)	28 (20.6)	94 (69.1)	0.30
- Private business	86	10 (11.6)	17 (19.8)	59 (68.6)	
- Officer	70	9 (12.8)	20 (28.6)	41 (58.6)	
- Unemployed	66	10 (15.2)	21 (31.8)	35 (53)	
- Employee	59	14 (23.7)	16 (27.1)	29 (49.2)	
- Student	35	6 (17.1)	8 (22.9)	21 (60)	
- State enterprise employee	17	3 (17.7)	4 (23.5)	10 (58.8)	
- Industrial worker	11	1 (9.1)	2 (18.2)	8 (72.7)	
- Agriculturist	10	1 (10)	1 (10)	8 (80)	
- Other	40	10 (25)	6 (15)	24 (60)	
Income per month (THB)					
- < 5,000	77	17 (22.1)	23 (29.8)	37 (48.1)	0.01
- 5,000-10,000	99	15 (15.2)	29 (29.3)	55 (55.5)	
- 10,001-15,000	81	16 (19.8)	18 (22.2)	47 (58)	
- 15,001-20,000	132	17 (12.8)	29 (22)	86 (65.2)	
- 20,001-25,000	141	13 (9.2)	24 (17)	104 (73.8)	
Medical scheme					
- Civil servant medical benefit scheme	177	25 (14.1)	34 (19.2)	118 (66.7)	0.00
- Social security scheme	137	10 (7.3)	33 (24.1)	94 (68.6)	
- Private insurance	1	1 (100)	0	0	
- Universal coverage scheme	95	21 (22.1)	29 (30.5)	45 (47.4)	
- Personal	110	19 (17.3)	24 (21.8)	67 (60.9)	
- Other	10	2 (20)	3 (30)	5 (50)	
Duration of HIV infection					
- < 6 months	44	11 (25)	14 (31.8)	19 (43.2)	0.01
- 6 months - 1 year	33	8 (24.2)	6 (18.2)	19 (57.6)	
- > 1 year - 5 years	148	22 (14.9)	41 (27.7)	85 (57.4)	
- > 5 years	305	37 (12.2)	62 (20.3)	206 (67.5)	
CD4 count (cell/cm <sup>3</sup> )					
- < 200	71	20 (28.2)	26 (36.6)	25 (35.2)	0.00
- 200 - 499	231	40 (17.3)	56 (24.2)	135 (58.5)	
- 500 - 1,500	228	18 (7.9)	41 (18)	169 (74.1)	
Viral load (copy/ml)					
- < 20	364	36 (9.9)	75 (20.6)	253 (69.5)	0.00
- ≥ 20	166	42 (25.3)	48 (28.9)	76 (45.8)	



**Figure 1:** Overview of the percentage of HIV health literacy level.

**Table 3:** Association between the level of health literacy and opportunistic infections outcome

Opportunistic infections	Total participants (n)	Level of health literacy			p-value
		Inadequate n (%)	Marginal n (%)	Adequate n (%)	
Tuberculosis					
- Yes	18	10 (55.6)	2 (11.1)	6 (33.3)	0.00
- No	512	68 (13.3)	121 (23.6)	323 (63.1)	
Pneumocystis carinii pneumonia					
- Yes	11	7 (63.6)	2 (18.2)	2 (18.2)	0.00
- No	519	71 (13.7)	121 (23.3)	327 (63)	
Cryptococcosis					
- Yes	10	6 (60)	2 (20)	2 (20)	0.00
- No	520	72 (13.8)	121 (23.3)	327 (62.9)	

## Discussion

HIV remains a global health challenge with millions of people affected by the virus. While advancements in treatment have significantly improved the quality of life for those living with HIV, which is crucial to recognize the importance of HIV health literacy in managing the virus effectively. HIV health literacy encompasses knowledge about HIV transmission, prevention, treatment, and support services.<sup>18</sup> The impact of HIV health literacy is profound, both at the individual and community levels. Individuals are well-informed about HIV, its transmission, prevention, testing, treatment, and the associated emotional and social aspects, which can lead to a range of positive outcomes.<sup>19</sup>

The association between the level of health literacy and laboratory outcome are complex and multifaceted. CD4 count and viral load are two crucial markers used to monitor the progression of HIV infection and the effectiveness of treatment. HIV health literacy can influence a person's likelihood of getting tested for HIV, and their understanding of the significance of CD4 count monitoring.<sup>20</sup> Individuals with higher health literacy may be more proactive in seeking regular CD4 count tests and adhering to recommended monitoring schedules. Adequate health literacy can also improve adherence to antiretroviral therapy (ART), which is

crucial for maintaining or increasing CD4 counts. Understanding the importance of adherence and the role of ART in suppressing the virus can lead to better CD4 count outcomes. Individuals with higher HIV health literacy are more likely to be diagnosed earlier during the infection. Early diagnosis and initiation of treatment can help preserve higher CD4 counts over time.<sup>21</sup> Individuals with higher HIV health literacy are more likely to be diagnosed earlier during the infection.<sup>22</sup> Early diagnosis and initiation of treatment can help preserve higher CD4 counts over time. Similar to CD4 count, adherence to ART is critical for achieving and maintaining an undetectable viral load. Patients with higher health literacy are more likely to comprehend the importance of adherence and the connection between adherence and viral suppression.<sup>23</sup> Understanding the concept of viral load and how it relates to virus replication can motivate individuals to adhere to their treatment regimen consistently. Consistent adherence reduces the risk of drug resistance, which can lead to treatment failure and increased viral load.

However, our study has some limitations. We cannot infer cause and effect from this cross-sectional study design. In addition, the limitation of our statistical analysis leads to this work not clarifying the influence of each variable. Therefore,

longitudinal multicenter investigations and regression analysis should be done in future studies.

## Conclusion

Adequate HIV health literacy significantly influences CD4 count and viral load outcomes by affecting behaviors, testing frequency, adherence to treatment, and overall engagement with healthcare services. However, it may not directly

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