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The society human immunodeficiency virus health literacy scale: the development and psychometric assessment

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Article Info

ABSTRACT

Society human immunodeficiency virus (HIV) related health literacy is an essential behavioural skill that contributes to understanding the disease and responding to people living with HIV. Measuring HIV health literacy in the community requires reliable tools to produce an objective health literacy index. This study aimed to design and examined the society HIV health literacy scale's (SHIVAL) psychometric properties. A cross sectional study was conducted on 381 people without HIV. Sample recruitment used convenience sampling. Instrument development and psychometric analysis include item pool construction and content validity examination, consistency reliability test, and exploratory and confirmatory factor analysis. A standardized four factor model fits the HIV health literacy measure well. This scale has 15 items with good Cronbach's Alpha reliability index and content validity index. The final SHIVAL Scale has been determined reliable and appropriate for measuring health literacy related to HIV. Nurses or healthcare professionals can use this scale to predict an individual's HIV health literacy, thereby influencing the social intervention of HIV disease and enabling effective community health literacy strategies.

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1.   INTRODUCTION

Health literacy is the capacity to find, comprehend, and use health information to guide decisions about one's own and other people's health, according to the healthy people 2030 framework [1]. Health literacy strongly focuses on a person's capacity to apply knowledge rather than merely comprehend it. Health literacy-based decisions place a focus on being fully informed rather than just making the appropriate choices. Health literacy is vital for obtaining complete knowledge and abilities that allow a person to attain their health objectives [2].

Health literacy is widely recognized as a mediator between personal and societal health status and health consequences. Health literacy enables a person to make decisions and behave about health care, health promotion and illness prevention, and to perceive a disease condition, whether suffered by oneself or others [3], [4]. Similarly, in the case of human immunodeficiency virus (HIV), understanding the HIV disease and responding to the social problems it causes requires individual competence, knowledge, and comprehensive health literacy.

There will be 39 million HIV positive individuals living with the virus globally by the end of 2022, with 1.3 million new cases expected to occur [5]. Similarly, in Indonesia, the cumulative number of people living with HIV reported up to March 2022 was 329,581. In the three months from January to March 2022,

10,525 new HIV infections were detected, and 8,784 people received antiretroviral treatment (ARV) in Indonesia [6]. Meanwhile, in the last year until March 2023, the cumulative number of people with HIV was recorded at 358,571 cases [7]. The discovery of HIV cases increased by 28,990 cases from March 2022. This HIV infection condition indicates that HIV cases are still a problem that cannot be handled since it first appeared globally and in Indonesia.

HIV infection in the community affects many aspects of life, even for people who are not infected. The high number of HIV cases requires comprehensive knowledge because it involves the whole community. Community members who do not have complete knowledge about HIV will spontaneously express negative thoughts and perceptions about people with HIV [8]. This lack of awareness and public understanding poses a significant risk if not adequately addressed and can even fuel the growth of HIV related stigmatization [9]–[11]. Health literacy acts as a bridge in encouraging individuals to know and understand information about HIV disease so that they can control prejudice and correct false beliefs about HIV infection [12], [13].

Health literacy is a measure of success in changing views about HIV disease. The community's health literacy offers an excellent opportunity for enhancing knowledge, abilities, and health-related behaviours that have the best possible effects on health [14]. One measurable aspect of psychosocial problems is HIV related health literacy, which may be evaluated using a measuring instrument. Therefore, to support the strengthening of HIV health literacy in the community, it is first necessary to measure an accurate health literacy index using instruments that are appropriate, credible, reliable, and easy to operate and will contribute to future experimental studies.

So far, many HIV related health literacy instruments have been developed, including in Indonesia [15]–[17]. However, HIV related health literacy tools are more focused on assessing the level of health literacy among individuals living with HIV. However, the community's level of HIV health literacy also has a significant impact on how people understand and view the virus and those who are HIV positive. Therefore, we believe it is necessary to develop an HIV health literacy scale for people not infected with HIV using systematic steps with an appropriate and measurable psychometric approach. In light of this, our goal as healthcare professionals was to design an HIV related health literacy measure for the general population that non-HIV positive individuals would use. The study objective was to develop and assess the psychometric properties of an Indonesian society HIV health literacy (SHIVAL) Scale for those without HIV.

2. METHOD

2.1. Study design

This study was designed as a cross sectional design to develop and evaluate the psychometric attributes of the SHIVAL Scale in the general population. We prepared and considered this scale in the original language, Indonesian. The development of this scale refers to various theories of health literacy in HIV, which will ultimately be carried out through psychometric analysis in Indonesian sentence structure. Instrument development and psychometric analysis include item pool construction and content validity evaluation, consistency reliability assessment (CRA), exploratory factor analysis (EFA) and confirmatory factor analysis (CFA).

The study sample comprised 381 members of the public who were recruited using convenience sampling. The research used this sampling method to enrol participants who voluntarily agreed to participate and provide the required information. The inclusion criteria include: i) people living without HIV; ii) aged 19 – 58 years; iii) community members who live in Bandung City, Indonesia; and iv) able to read and operate digital communication tools. Meanwhile, residents who moved their domicile and became sick during the study were excluded. We collected the data through a digital survey distribution application, which participants can access via an online website link.

Sample size in psychometric studies is determined by counting the number of items in the questionnaire. Factor analysis required a sample size of 10–20 observations per item to get an adequate sample size in psychometric investigations [18]. In addition, the samples analyzed at EFA must differ from those studied at CFA [19]. While CFA was used to validate a model in a new sample, EFA is necessary to test new relations that have never been tried. Thus, in this study, there were two samplings. The first sample consisted of 220 participants, and the data was used to analyze CRA and EFA. Concurrently, we performed a CFA on the data from 161 persons in the second sample.

2.2. Development of the items pool

Developing the items pool of an Indonesian SHIVAL scale was based on the integrated model of health literacy [20]. Thus, we defined HIV health literacy as individual skills to access, understand, assess, and apply health information related to HIV. HIV health literacy on this scale is specifically aimed at individuals who do not have HIV disease. The skills of accessing, understanding, evaluating, and applying HIV information reflect the scale's construction.

Access in health literacy pertains to discovering and procuring health information. A balance between information accessibility and the reliability of its sources must be maintained [2]. This scale has six items that represent access to HIV information, including: "I found easy information about HIV", "I can easily find information about the signs and symptoms of HIV", "I can easily read and find information about HIV and its transmission", "I can easily obtain information on HIV education activities in the community", "I can easily access information related to HIV and facts about people infected with HIV in the media (social media, internet, newspapers, and magazines)" and "I can easily find information about discrimination against people with HIV in society".

Understanding information is also a significant aspect of forming health literacy. Information comprehension is influenced by expectations, perceived utility, and causality interpretation [20]. Five statement items represent the component of understanding HIV/AIDS information. This statement item includes: "I can easily understand HIV information obtained from the information media I find", "I easily understand the process of HIV transmission in the community", "I understand the information related to HIV explained by other people", "I understand that information about HIV can be obtained from the print media", and "I understand that information about HIV can be obtained from digital media".

Assessing information is the next skill that contributes to health literacy. Information appraisal is the process of analyzing, sorting, and evaluating the health information obtained so that it is meaningful [21]. The scale has five statement items that represent components of the HIV information appraisal. The statement items include: "I value the benefits of the HIV information I get for my interests", "I assess the good and bad of interacting with people living with HIV based on the information obtained", "I assess the incidence of HIV infection in the community based on my understanding", "I distinguish factual information and myths about HIV disease", and "I sift through unsubstantiated information from obscure sources of information related to HIV".

Applying information is the final aspect of health literacy. The application of information skills made individuals communicate and utilize information to make decisions about preserving one's health [20]. The scale was formed by four statement items that lead to the application of HIV information components, including: "I always apply the HIV information I get in my daily life", "I decided how to protect myself from HIV infection based on advice from family or friends", "I decided how to protect myself from HIV infection based on advice from family or friends", and "I am easy to get along with and join activities involving people with HIV".

Finally, this scale consists of 20 questions structured in positive sentences and answered using a 4-point Likert scale. Questions on this scale have several responses: i) strongly agree, agree, disagree, and strongly disagree; ii) very easy, easy, complex, and complicated; and iii) always, often, rarely, and never. Each question item's score was added to determine the scale's overall score, divided into high, medium, and low.

2.3. Assessment of content validity index (CVI)

Experts evaluated the scale for content validity once the item pool was created. Six experts conducted the assessment: two experts related to HIV nursing, two in mental health nursing, and two in community nursing and public health. All experts have doctoral education qualifications, and there are two professors in the field of nursing. Every expert examines all questions and evaluates their quality to measure the phenomena the scale needs to count. After that, assess the theory's references' appropriateness, linguistic qualities, and clarity of meaning. Each expert evaluates the items by assigning a CVI score. Experts give CVI values ranging from 1 to 4 for each item (not being relevant to highly relevant). Three and four grades were seen as satisfactory. The CVI values are expected to reach a minimal 0.83 to ensure the validity of the contents for studies involving an expert panel of at least six experts [22], [23].

2.4. Evaluation of psychometric characteristics

Examining the CRA is the first step in the psychometric analysis. Correlations between each item and the total number of items are reviewed to make measurements. First, assess the connection with individual items, including inter item correlation. The results are considered satisfactory when the items' correlation with the total number of items is 0.30 or above [24]. Measurements of the reliability coefficient are also conducted to evaluate the consistency of each item and the scale as a whole. If the reliability coefficient is deemed satisfactory, the Cronbach's Alpha score needs to be at least 0.70 [25].

The null hypothesis was tested using Bartlett's sphericity and the kaiser-meyer-olkin (KMO) test in EFA. The KMO test is a tool used to assess if data are suitable for factor analysis with values between 0.7 and 0.79, moderate, and between 0.6 and 0.69, mediocrity. Meanwhile, factor analysis could be ideal for the data set if Bartlett's sphericity has a significant value <0.05 [26], [27]. EFA is used to find correlations between variables to build a construct. Principal component factors, orthogonal rotation criteria, and an

eigenvalue larger than 1.0 are used in factor extraction [28], [29]. Factor analysis necessitates a factor loading value of at least 0.3. When a factor loading >0.5, the variable represents this factor [27], [29].

CFA was used after this study. CFA was used to measure the correlation between latent variables or components and the observed size or indication to assess the exact fit between the observed and theoretical models. The model was fit if it meets the following index values: the relative Chi-square index $(\chi2/df)<5$; normed fit index (NFI) >0.90; comparative fit index (CFI) >0.90; tucker lewis index (TLI) >0.90; and root mean square error of approximation (RMSEA) <0.08 [30].

2.5. Ethical considerations

The Research Ethics Committee of the Faculty of Nursing at Universitas Airlangga in Indonesia has granted ethical permission for this study (Nomor 2802-KEPK). Before participants filled out the questionnaire, they received information about the study objectives, benefits, risks, and procedures. We explained the study information orally and in writing on digital information sheets given to participants. Every person who consented to participate in this study gave their informed consent. We keep all participant identities confidential and store data safely within the required timeframe. Data is entered into a computerized database using a code to access it.

3. RESULTS AND DISCUSSION
3.1. Expert review about content validity

Every expert thoroughly evaluates and concurs with the items developed in this scale. No items from that scale were omitted. Each item's CVI evaluation score falls between three and four; hence, the CVI of 20 items was 0.86, where the index meets the standards for content validity. Furthermore, based on an Indonesian sentence structure assessment, experts do not recommend any changes or input. Experts assess that the targets of this scale can understand the sentences composed in each question item, so the 20 items scale was declared appropriate for measuring health literacy skills regarding HIV/AIDS for each community member.

3.2. Socio demographics characteristics of respondents

Table 1 presents the sociodemographic information of the individuals. This study included 381 people in total. All participants are citizens from Bandung City, West Java Province, Indonesia. Most participants are between 19 and 58 years old, and most are female (62.4%). Almost all citizens have graduated from university (82.2%), and most participating citizens are married (57.0%). Most of those who participated in the study were employed (62.7%).

Table 1. Socio demographics information of participants

Socio demographics	Frequancy (f) and Percentage (%)		
	Total (n=381)	CRA and EFA (n=220)	CFA (n=161)
Age (year)			
Mean±SD	31.52±10.75	30.49±9.67	32.54±11.82
Range	19–58 years	21–50 years	19–58 years
Gender			
Male	139 (37.6)	67 (30.5)	72 (44.7)
Female	242 (62.4)	153 (69.5)	89 (55.3)
Education			
Junior high school	7 (1.8)	0	7 (4.3)
Senior high school	61 (16.0)	3 (1.4)	58 (36.0)
University/diploma	313 (82.2)	217 (98.6)	96 (67.7)
Marital			
Married	217 (57.0)	109 (49.5)	108 (67.1)
Not married	157 (41.2)	106 (48.2)	51 (31.7)
Widower	7 (1.8)	5 (2.3)	2 (1.2)
Occupation			
Employed	239 (62.7)	116 (52.7)	123 (76.4)
Unemployed	142 (37.3)	104 (47.3)	38 (23.6)

3.3. Consistency reliability assessment outcomes

The results of the internal consistency reliability analysis shown in Table 2. The overall item score was 15 items (correlation value >0.3). Meanwhile, 5 question items did not meet the internal consistency standard (correlation value <0.3), and all items were excluded. Thus, this scale consists of 15 valid items. The standardized Cronbach's alpha coefficient for the 15 items scale is 0.874, indicating internal consistency.

Every item's reliability value ranged between 0.858 and 0.868. Each item on the scale had a correlation value between 0.408 and 0.635, indicating a medium level of reliability.

Table 2. The result of consistency reliability assessment (n=220)

Item	Initial scale		Revised scale	
	Corrected item-total correlation	A	Corrected item-total correlation	A
I found easy information about HIV.	0.039	0.816	Exclude	
I can easily find information about the signs and symptoms of HIV.	0.219	0.804	Exclude	
I can easily read and find information about HIV and its transmission.	0.501	0.786	0.566	0.861
I can easily obtain information on HIV education activities in the community.	0.547	0.785	0.635	0.858
I can easily access information related to HIV and facts about people infected with HIV in the media (social media, internet, newspapers, and magazines).	0.546	0.786	0.619	0.859
I can easily find information about discrimination against people with HIV in society.	0.489	0.787	0.579	0.860
I can easily understand HIV information obtained from the information media I find.	0.542	0.785	0.589	0.860
I easily understand the process of HIV transmission in the community.	0.107	0.811	Exclude	
I understand the information related to HIV explained by other people.	0.551	0.785	0.612	0.859
I understand that information about HIV can be obtained from the print media.	0.565	0.785	0.593	0.860
I understand that information about HIV can be obtained from digital media.	0.434	0.790	0.464	0.866
I value the benefits of the HIV information I get for my interests.	0.374	0.794	0.422	0.868
I assess the good and bad of interacting with people living with HIV based on the information obtained.	0.413	0.792	0.423	0.868
I assess the incidence of HIV infection in the community based on my understanding.	0.037	0.816	Exclude	
I distinguish factual information and myths about HIV disease.	0.428	0.791	0.519	0.863
I sift through unsubstantiated information from obscure sources of information related to HIV.	0.469	0.789	0.459	0.866
I always apply the HIV information I get in my daily life.	0.479	0.787	0.473	0.866
I decided how to protect myself from HIV infection based on advice from family or friends.	0.219	0.804	Exclude	
I decided how to protect myself from HIV infection based on advice from family or friends.	0.415	0.791	0.492	0.865
I am easy to get along with and join activities involving people with HIV.	0.407	0.792	0.408	0.868
Total		**0.802**		**0.874**

3.4. Exploratory factor analysis (EFA)

KMO and Bartlett's test of sphericity of the scale are displayed in Table 3. Bartlett's test yielded a 0.001 (p<0.05) result, and the KMO coefficient was 0.850. Based on these results, the study data meets the requirements for an EFA study.

Table 3. The result of KMO and Bartlett's test of sphericity of the scale (n=220)

KMO coefficiency	0.850
Bartlett's test of sphericity	
χ^2	1294.875
Degrees of freedom	105
p-value	0.001

Table 4 presents the results of the EFA. The newly generated component accounts for 63.27% of the variation. There were four factors produced based on the analysis factor, including: i) HIV information accessing, which contains four items with a coefficient correlation of 0.745 to 0.785. The factor of HIV information access has an eigenvalue of 5.517 and explains 36.78% of the total variance; ii) HIV information understanding, explained an 11.25% variance with an eigenvalue of 1.687. This factor contained five items with a coefficient correlation of 0.580 to 0.828; iii) HIV information appraising, explained 8.41% variance with an eigenvalue of 1.262. This factor comprised five items with a coefficient correlation of 0.561 to 0.812; iv) explaining the 6.83% variance with an eigenvalue of 1.025 is labelled HIV information applying. This factor consisted of three items with a coefficient correlation of 0.514 to 0.867.

Table 4. The result of exploratory factor assessment (n=220)

Items	Diagonal anti-image correlation	Factor loading			
		Factor 1	Factor 2	Factor 3	Factor 4
HL01 I can easily read and find information about HIV and its transmission.	0.866	**0.758**	0.065	0.214	0.132
HL02 I can easily obtain information on HIV education activities in the community.	0.849	**0.745**	0.236	0.200	0.095
HL03 I can easily access information related to HIV and facts about people infected with HIV in the media (social media, internet, newspapers, and magazines).	0.847	**0.785**	0.175	0.212	0.060
HL04 I can easily find information about discrimination against people with HIV in society.	0.841	**0.745**	0.038	0.225	0.202
HL05 I can easily understand HIV information obtained from the information media I find.	0.891	0.178	**0.580**	0.118	0.520
HL06 I understand the information related to HIV explained by other people.	0.854	0.279	**0.761**	0.144	0.135
HL07 I understand that information about HIV can be obtained from the print media.	0.819	0.188	**0.828**	0.152	0.131
HL08 I understand that information about HIV can be obtained from digital media.	0.841	0.067	**0.769**	0.099	0.153
HL09 I value the benefits of the HIV information I get for my interests.	0.872	0.320	0.376	**0.568**	-0.265
HL10 I assess the good and bad of interacting with people living with HIV based on the information obtained.	0.812	0.128	0.068	**0.812**	0.058
HL11 I distinguish factual information and myths about HIV disease.	0.893	0.223	0.100	**0.699**	0.253
HL12 I sift through unsubstantiated information from obscure sources of information related to HIV.	0.902	0.264	0.181	**0.561**	0.080
HL13 I always apply the HIV information I get in my daily life.	0.762	0.133	0.135	0.162	**0.867**
HL14 I decided how to protect myself from HIV infection based on advice from family or friends.	0.821	0.206	0.230	0.061	**0.789**
HL15 I am easy to get along with and join activities involving people with HIV.	0.918	0.075	0.218	0.047	**0.514**
Eigenvalue		5.517	1.687	1.262	1.025
Explain variance		36.78%	11.25%	8.41%	6.83%
Cumulative explain variance		**63.27%**			

3.5. The result of confirmatory factor evaluation

Figure 1 illustrates how data from the second sample (n=161) were processed and how model fits were discovered for the four domains of HIV health literacy. All 15 items in the CFA form a rigged model of HIV health literacy. Standardized covariance values for the four scale dimensions range from 0.62 to 0.87, indicating a high correlation between them. The factor loadings of 15 items were accepted, with 0.50 to 0.86. The multiple square correlations varied from 0.25 to 0.75, indicating that each modified component contributed to the model. We changed the initial model to get the revised model that best fits. The model was adjusted by adding covariations between items HL04 with items HL05; item HL07 with items HL05, HL06, and HL08; items HL08 with item HL13; and item HL12 with item HL13. As shown in Table 5, this model revision in Figure 1 produces a fit statistics model. Thus, the SHIVAL Scale demonstrates the properly standardized redesigned four factor model.

The final scale of the 15 items society HIV health literacy scale for Indonesians showed excellent psychometric properties and had a good fit model. The SHIVAL scale proved valid and delivered a superb reliability index assessed using Cronbach's alpha coefficients. Measurement instruments are essential in health assessment, clinical practice, and research. This instrument quality study proves how measurement parameters were analyzed, which helps researchers choose an appropriate tool [31]. Therefore, a good quality HIV health literacy scale will assist in assessing HIV related health literacy in the community.

The final SHIVAL scale consists of four dimensions: accessing, understanding, appraising, and applying HIV information. This scale has a four factor model of HIV health literacy theoretical support assumption that HIV health literacy is a multi component concept that includes access, understanding, appraisal, and application of information [20], [32]. Thus, HIV health literacy measures an individual's ability to obtain, interpret, evaluate, and use knowledge to make appropriate choices about HIV care, disease prevention, and health promotion. As previously stated, in this study, the society's HIV health literacy scale consists of four dimensions that form a unified whole health literacy concept. HIV health literacy elements include HIV information access, understanding, appraisal, and application.
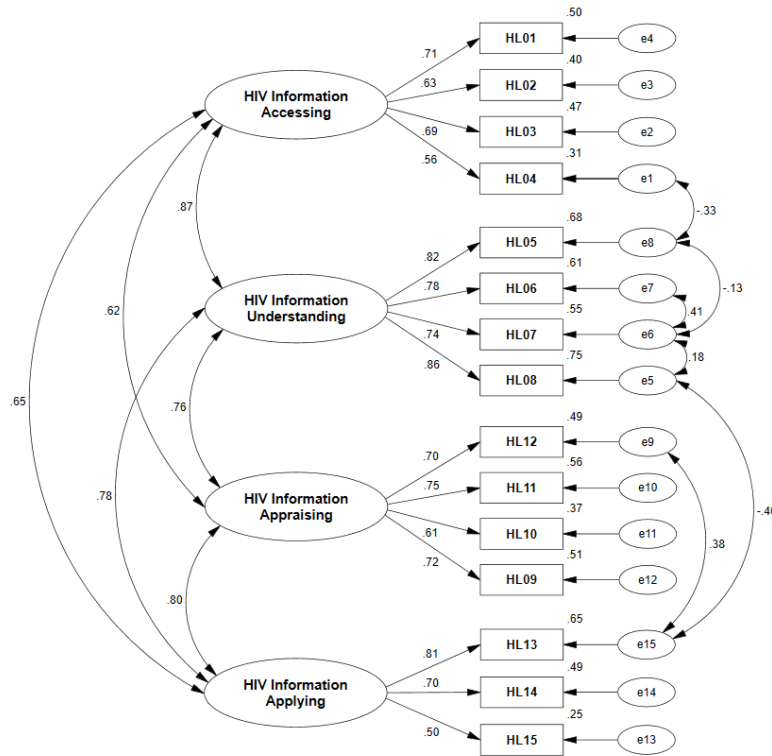
Figure 1. CFA for the SHIVAL scale (n=161)

Table 5. The SHIVAL scale's goodness of fit statistics

Model fit statistics	Value	Expected value
Chi-square	117.217	
χ^2/df	1.503	<5
p-values	0.003	<0.05
NFI	0.906	Close to 1
CFI	0.966	>0.9
TLI	0.954	Close to 1
RMSEA	0.056	<0.08

The first dimension is the capacity to access HIV related information. Information access refers to searching, locating, and acquiring information [20], [32]. The ability to access HIV information is the initial process of utilizing information to be meaningful and able to support health decision making. This skill will trigger the following steps: understanding, assessing, and applying health information [33]. Health literacy in finding information directly affects health capacity through the role of knowledge and skills obtained from information accessed by these individuals [34]. Health literacy skills tend to be inadequate for someone with limited access to information.

The second dimension of HIV health literacy is understanding HIV information. Similar to the dimension of access to HIV information, this dimension directly impacts developing health capacity by comprehending the knowledge that individuals gain [34]. The ability to understand information in health literacy means understanding the information accessed [32], [35]. Individuals who understand HIV information will have an impact on changing views to understand personal risk factors and develop prevention strategies, including increasing disease awareness as a first step in perceiving the opinions of people with HIV [36], [37].

The third factor of HIV health literacy is information appraisal. This dimension is the stage of critically assessing the quality of information after the information is obtained and understood [38]. Individuals who can consider HIV related details will be able to determine the benefits of HIV information, assess the pros and cons of interacting with people living with HIV, filter information related to unclear diseases, and even distinguish information from myths associated with HIV. Thus, the ability to appraise information related to HIV disease will determine how a person behaves and acts regarding the disease. Indirectly, the ability to evaluate HIV information will trigger public awareness and rearrange beliefs related to the disease [38].

The final aspect of HIV related health literacy is the ability to apply HIV information. The capacity to use information indirectly positively affects health promotion behaviour. These indirect effects are related to physical symptoms, health, and well being [34]. Someone who uses HIV knowledge for health literacy will always use the information daily. Individuals who are not infected with HIV will determine how to protect themselves against HIV infection and interact in communities that include persons living with HIV. The ability to apply this information will directly determine how a person behaves in a situation [20], [35].

Health literacy at the community level presents significant potential for enhancing health knowledge, skills, and habits that result in better health outcomes [14], [39]. When information is correctly received, comprehended, and appraised for its validity, it produces the optimal conclusion since the information is excellent [40]. A person with competent health literacy can care for their own, families, and community's health. Adequate society HIV health literacy benefits both HIV negative and HIV positive individuals, as well as the general management of the disease.

We realize that this study has limitations. First, our research region's distinctive social and cultural aspects will likely impact the generality of our results. Not only is Indonesian society socially prevalent, but it is also ruled by a single ethnic group, the Sundanese of West Java Province. The second limitation is that using a self report questionnaire has limitations compared to real time evaluation or direct observation. Given that individuals may feel stigmatized if they reply to questionnaire questions. The third limitation is that the data were collected by a non representative sampling method. The use of convenience sampling still presents a bias in sample selection. Thus, a stratified random sampling approach can be derived in the future.

4.   CONCLUSION

The SHIVAL Scale was unidimensional, concise, and user friendly for the general public and healthcare professionals. This scale is a pertinent measure for evaluating the community's health literacy regarding HIV disease. This scale evaluates an individual's capacity to obtain, comprehend, analyze, and use HIV knowledge as a foundation for decisionmaking in HIV related matters. Measurable HIV health literacy can be a recommendation for health practitioners to address social problems arising from misinformation or misperceptions of HIV disease information among the public. In addition, a more comprehensive HIV health literacy assessment tool such as the HIV health literacy scale could highlight the need for service users for additional support in accessing health services and their strengths and capabilities. Appropriate and precise measurement of public health literacy can bring to health services meetings and initiatives to promote public health related to the HIV phenomenon.

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