

Cross-cultural adaptation and validation of the 9-item Indonesian HIV/AIDS Stigma Scale (InHASS-9) for the general population

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Abstract

Stigma against people living with human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) (PLWHA) poses significant health threats and contributes to the uncontrolled transmission of HIV. Although tools for measuring stigma against PLWHA have been validated in Indonesia, a previous study was geographically limited and conducted with small sample sizes. The aim of this study was to perform cross-cultural adaptation and validate the psychometric properties of the 9-item Indonesian HIV/AIDS Stigma Scale (InHASS-9) in the Indonesian general population. Utilizing a cross-sectional design, the study recruited 1,302 participants from six major islands in Indonesia. The validity of the instrument was determined using recognized group validity and construct validity, while internal consistency was evaluated using Cronbach's alpha. During the adaptation phase, nine simple items were finalized for inclusion in the scale. The findings revealed that the InHASS-9 instrument exhibited strong internal consistency, with Cronbach's alpha coefficient of 0.83, indicating high reliability. In conclusion, the InHASS-9 instrument is a valid and reliable tool for assessing the extent of social stigma associated with PLWHA in Indonesia.

Keywords: AIDS, cultural adaptation, Indonesia, validation, 9-item Indonesian HIV/AIDS stigma

Introduction

Globally, 38.4 million people are HIV-positive, and 1.5 million of them have new infections, according to the Joint United Nations Program on Human Immunodeficiency Virus/Acquired



Immunodeficiency Syndrome (HIV/AIDS) [1]. As of September 2022, the total number of HIV/AIDS cases in Indonesia was expected to reach 478,784, with 338,760 HIV cases and 140,024 AIDS cases [2]. The stigma surrounding people living with HIV/AIDS (PLWHA) is one of the major challenges to HIV/AIDS prevention and control worldwide, particularly in Indonesia [3-6].

Stigma will have a negative influence on PLWHA's psychological well-being, health outcomes, and social life, lowering access and adherence to antiretrovirals or initiatives for HIV prevention and treatment [7-10]. Stigma and prejudice against PLWHA can manifest in numerous ways, including reluctance to share food and housing, exclusion from family members, and poor treatment in daily activities. Neighbors, acquaintances, and colleagues all engage in rejection, avoidance, and humiliation [11-16]. Furthermore, healthcare personnel perpetuate stigma and discrimination in healthcare facilities by criticizing, blaming, refusing treatment, and making unnecessary referrals [12,14,17-19].

Measuring Indonesians' stigma is critical in developing a health promotion strategy to minimize negative public views that can have an impact on PLWHA's quality of life. The instrument used to measure HIV/AIDS stigma must be valid and trustworthy, as its validity will have a significant impact on the quality of the data [20]. To assess people's attitudes towards PLWHA, the 9-item stigma scale instrument can be used [21]. A study on the validation of an instrument to measure HIV/AIDS stigma involving 2,306 men and women in Cape Town, South Africa, showed Cronbach-Alpha internal consistency scores between 0.64 and 0.83 [21]. A valid instrument to measure stigma towards PLWHA in Indonesia has yet to be identified. This 9-item stigma scale instrument is suitable for the Indonesian population, considering that African society has characteristics similar to Indonesians as both are developing countries with similar cultural diversity and solid communal values. It is considered comprehensive because it includes essential stigma factors of HIV/AIDS in Indonesian society, such as exclusion, avoidance, and persecution measurements. The general population was selected as the target of the study because it serves as the primary source of stigma and discrimination against PLWHA. The stigma that arises can affect several aspects of PLWHA's lives, including access to health services, social interactions, employment opportunities, and even family support. Another reason is that validating the general population is a form of external validation (instrument generalization) to enhance the reliability and applicability of the resulting instrument.

In an Indonesian study [22], a 12-item stigma scale was used to survey 1,013 pharmacy students and 250 pharmacists who provide pharmaceutical services to PLWHA (including drug distribution and counseling based on doctors' prescriptions) about their attitudes toward PLWHA. However, the original study's psychometric assessments were limited to reliability evaluations using Cronbach's alpha [22]. Our study cross-culturally adapted and validated a 9-item scale based on the original 'development of a brief instrument scale to measure AIDS-related stigma [21]. The previous Indonesian study [22] utilized the original 12-item version of the instrument, whereas this research adopted its brief version [21], which was simplified from 12 to 9 items. A measuring instrument's validity and reliability are not fixed values because they vary depending on the study's population, type, and goal [23]. The aim of this study was to cross-culturally adapt and validate a 9-item Indonesian HIV/AIDS Stigma Scale (InHASS-9) in the Indonesian general public.

Methods

Research design

This study implemented a cross-sectional approach from September 2020 to November 2021. This study covered locations throughout Indonesia, including participants from six major islands: Sumatra, Java, Kalimantan, Sulawesi, Bali-Nusa Tenggara, and Maluku-Papua. Data collection was conducted online using a Google Form-based questionnaire distributed through various digital platforms to reach participants from various regions. Online data collection was chosen to ensure a broader geographical reach and convenient access to participants.

Instruments

The instrument includes sociodemographic data as well as a 9-item HIV/ AIDS stigma measure. Professor Seth C. Kalichman (University of Connecticut) granted permission for the cross-cultural adaptation and validation of the 9-item HIV/AIDS stigma scale on May 17, 2020. This instrument comprises nine items, with each item offering two options: "agree" or "disagree." Any answer that is stigmatized, which means exclusion or discrimination, will receive one point, whereas answers that are not stigmatized will receive zero points. The higher the score, the more stigmatized the participant [21].

Sociodemographic information collected included age, occupation, sex, education level, marital status, monthly expenditures, and place of residence (according to the Indonesian national identification card). Participants were separated into two groups: those who had attended an HIV/AIDS education program (HIV/AIDS seminar, webinar, etc.) and those who had not. To protect secrecy, participants were only allowed to write down the initials of their names and ages. Only authorized researchers had access to the dataset.

Study procedure and data collection

Cross-cultural adaptation

The 9-items included in this study were taken from a brief scale designed to measure AIDS-related stigma [21]. These items were subsequently processed through a forward-backward translation approach [24]. During this process, the translated 9-items were compared with a 12-item instrument previously translated into Bahasa Indonesia by Sianturi *et al.* [22]. Notably, the 9-items in Sianturi's study were identical to those translated in this study. The phase was conducted online with the involvement of multiple authors. Input from Indonesian researchers was collected through Google Sheets, and when disagreements occurred, online discussions were held to reach a consensus.

Following the ethical approval, the data collection process was conducted in two sequential phases. Phase 1 focused on expert consultation, where data were collected through face-to-face consultations with four general practitioners and an obstetrician, complemented by online input from two HIV campaigners. During this initial phase, these healthcare experts and campaigners were asked to provide professional opinions regarding the nine proposed items. Subsequently, phase 2 concentrated on regional data collection, where data were gathered from 60 participants, comprising 10 representatives from each central island, using a pre-tested Google Forms questionnaire (**Appendix 1**). All Indonesian researchers in this study facilitated this second phase, ensuring that the minimum requirement of 10 participants per island was met according to the study's inclusion criteria. This two-phase approach enabled comprehensive data collection from expert stakeholders and regional representatives. Based on this comprehensive feedback, the lead researcher refined the items, which were then collaboratively reviewed with other researchers to produce the final version of the 9-item Indonesian HIV/AIDS Stigma Scale (InHASS-9). The online instrument used during the validation stage is provided in **Appendix 2**. It represents the final product of the cross-cultural adaptation phase.

Validation

The Indonesian researchers played a key role in the data collection process by facilitating the distribution of the InHASS-9 online survey through various communication channels, including WhatsApp, emails, and social media platforms such as Instagram and Facebook. To maximize response rates, researchers from western Indonesia's (FFA, SS, Z, RN, DAP, MDK, RSP, SDA, and MRR), central (BA, BD, Y, and F), and eastern (SR) regions collaborated, targeting participants within their respective geographical areas. To ensure data integrity, participants' birthdates and initials were cross-verified across platforms, preventing duplicate submissions. This data collection process strictly adhered to Indonesia's established research ethics protocols and complied with all specifications submitted to the ethics committee.

To ensure methodological rigor and reliability, the authors relied on previous comparable studies conducted by BA, MRR, and DAP. Moreover, each Indonesian author was hired in the capacity of a teacher or lecturer in Indonesia; lecturers are obligated to participate in community service. The research team has been engaged in community-wide education concerning

HIV/AIDS initiatives, with a focus on middle and high school teachers and students. Some of the authors have completed at least one comparable study (some are actively publishing articles, while others are gathering data). This study evaluated several components of psychometric studies, including construct validity and face validity [24-26].

Participants and sample size

The general population of the study's participants consisted of Indonesians with a minimum age of 18 years who were willing to take part in this study. It is important to clarify that the "research site" in this study refers to the participant's domicile location (district and province). The sample size was calculated based on psychometric study requirements for the main study. After completing the cross-cultural adaptation phase, at least 200 participants are required if the instrument comprises no more than 40 items [27]. A study recommended that the minimal sample size for a psychometric investigation is 5–10 times the number of items in the instrument that require validation [28]. As a result, for each study region (island), a minimum of 90 participants (9 items \times 10) are required, increasing the overall validation aim for all Indonesian islands to 540 (90 \times 6) [28]. This study employed the convenience sample approach, a type of non-random sampling technique. The online study instrument was widely distributed to the general public who met the inclusion and exclusion criteria. This strategy was developed to maximize the reach and engagement of target participants in filling out online forms while adhering to the ideals of volunteerism and informed consent.

Data analyses

Cross-cultural adaptation

In this phase, a qualitative analysis was conducted to gather input from two key groups. Feedback was obtained from healthcare professionals, including four general practitioners and one obstetrician, as well as from two HIV campaigners through online consultations. Additionally, responses from 60 participants involved in the cross-cultural adaptation process were analyzed. During the final session of completing the instrument, an optional question was included to gather participants' thoughts: "What are your thoughts on the 9-item (nine statements) about HIV/AIDS stigma that you have completed?" Participants' answers to this question, along with their responses to specific items, were carefully monitored, and any requests for clarification were documented. Items that received feedback or suggestions were thoroughly reviewed, and both the original and translated versions were compared. The findings were discussed collaboratively with the Indonesian authors, and the final wording of each item was determined by the principal investigator to ensure clarity, accuracy, and cultural relevance. No quantitative analysis was conducted during this phase, as the focus was entirely on qualitative feedback to refine the instrument.

Validation

Following the cross-cultural adaptation phase, the validation phase was undertaken, which involved testing the instrument with a larger participant pool across more expansive geographical areas. During this validation phase, several analyses were conducted: each item's performance was examined, correct answer rates were calculated, and item-total correlations were assessed. Additionally, a descriptive study of participant characteristics was performed. Items were considered suitable if their correct response rates fell between 30% and 80%, ensuring they could effectively differentiate participants' knowledge levels without being too easy or too difficult [29]. In this phase, items with a corrected item-total correlation below 0.3 were identified for potential deletion [30].

The psychometric features of the InHASS-9 instrument were evaluated using validity and reliability tests. Internal consistency was assessed using Cronbach's alpha, with a value greater than 0.7 indicating a dependable instrument [31]. Validity was measured using the validity of known groups and the validity of constructs. The validity of recognized groups was determined by comparing participants' levels of stigma towards PLWHA according to three variables: education level, educational background, and experience attending HIV workshops. Previous investigations on the general population proved that there are distinct subgroups based on the

degree of education [32-34], health science education background [35], and the experience of attending workshops on HIV status has different stigmas towards PLWHA [36,37].

Consequently, a hypothesis was formulated beforehand that individuals with a higher level of education, a background in health science education, and previous attendance at HIV workshops would exhibit significantly less stigma towards PLWHA contrasted with individuals with a lower level of education, no background in health sciences education, and no prior attendance at HIV workshops. To analyse the differences in PLWHA stigma between two subgroups, an independent t-test or a Mann-Whitney test was used for the variables. Group validity refers to a tool's ability to anticipate and recognize expected differences in advance [38].

As with other studies, to confirm construct validity, exploratory factor analysis (EFA) with a maximum likelihood estimation (ML) and oblimin rotation was carried out [34]. The 9-item HIV stigma scale instrument uses a binary answer format to assess the accuracy of the construct analyzed by EFA utilizing a polychoric correlation matrix [39,40]. The number of variables that can be retained was determined using parallel analysis, optimal coordinates, eigenvalues, and acceleration factors. These methods were employed to eliminate subjectivity in the interpretation of scree plots. When the variables must consist of a minimum of three items and the probable underlying factors need to be understood, additional considerations are taken into account [28]. To assess the quality of fit, the root mean square of residuals (RMSR) was utilized when the parameters provided varying recommendations for the number of components to maintain. A model is regarded as having a good fit if the RMSR value is below 0.05 [41,42]. In order to establish a strong link between each item and its underlying component, a factor loading of 0.4 or greater must be achieved. The statistical analyses were conducted using SPSS version 26 (IBM, Armonk, NY, USA). EFA was done using R version 4.2.3 and RStudio Version 2023.03.0+386 (RStudio, Boston, USA), using the following packages: polycor, nFactors, GPArotation, and psych.

Results

Characteristics of participants

A total of 1,302 participants from six Indonesian regions were recruited during the validation stage. All participants fell within the age range of 18 to 65 years old, with women making up the majority. Most participants indicated their monthly expenses were below two million rupiah (\$137). Further details on the sociodemographic characteristics of the participants are presented in **Table 1**.

Table 1. Characteristics of participants (n=1,302)

Variable	n	%
Age (years)		
18–25	862	66.2
26–35	252	19.4
>36	188	14.4
Sex		
Female	903	69.4
Male	399	30.6
Education level		
Up to high school graduates	264	20.3
Bachelor graduates	1038	79.7
Marital status		
Single	945	72.6
Married	337	25.9
No Answer	20	1.5
Monthly expenses (Million Rupiah)		
≤2	929	71.4
>2	373	28.6
Have a background in health sciences education		
No	498	38.2
Yes	804	61.8
Have attended a workshop on human immunodeficiency virus (HIV)		
No	886	68.0
Yes	416	32.0

Variable	n	%
Location		
Jawa	266	20.3
Bali and Nusa Tenggara	132	10.1
Maluku and Papua	157	12.1
Sulawesi	475	36.5
Sumatera	114	8.8
Kalimantan	153	11.8
No answer	5	0.4

Cross-cultural adaptation result

Consistent translations across all nine instrument items were identified through collaborative discussions among the Indonesian researchers. These translations were compared with the 12 items previously translated in an earlier study [22]. Based on feedback from healthcare professionals, it was recommended that the term ‘HIV/AIDS’ be used instead of ‘AIDS’ or ‘HIV’ alone, as the term ‘HIV/AIDS’ is more commonly utilized in educational contexts. This recommendation was implemented across all nine items distributed to the 60 participants. For example, in Item 9, the original version stated, “people who have AIDS should not be allowed to work.” The forward and backward translations initially resulted in “*penderita AIDS seharusnya tidak diperbolehkan bekerja.*” Following input from healthcare professionals, this item was revised to “*penderita HIV/AIDS seharusnya tidak diperbolehkan bekerja.*” The finalized version of the item was then distributed to 60 participants across six major islands in Indonesia. Additionally, based on responses collected from the 60 participants, it was concluded that all items were easily comprehensible. This conclusion was supported by the observation that participants rarely used the feedback feature in the Google Form. Most participants reported that “all nine items are easy to understand.” A few participants opted not to provide comments (as it was optional), while one participant entered the word “taboo” in the response column. The distribution of responses from all 60 participants is presented in **Figure 1**.

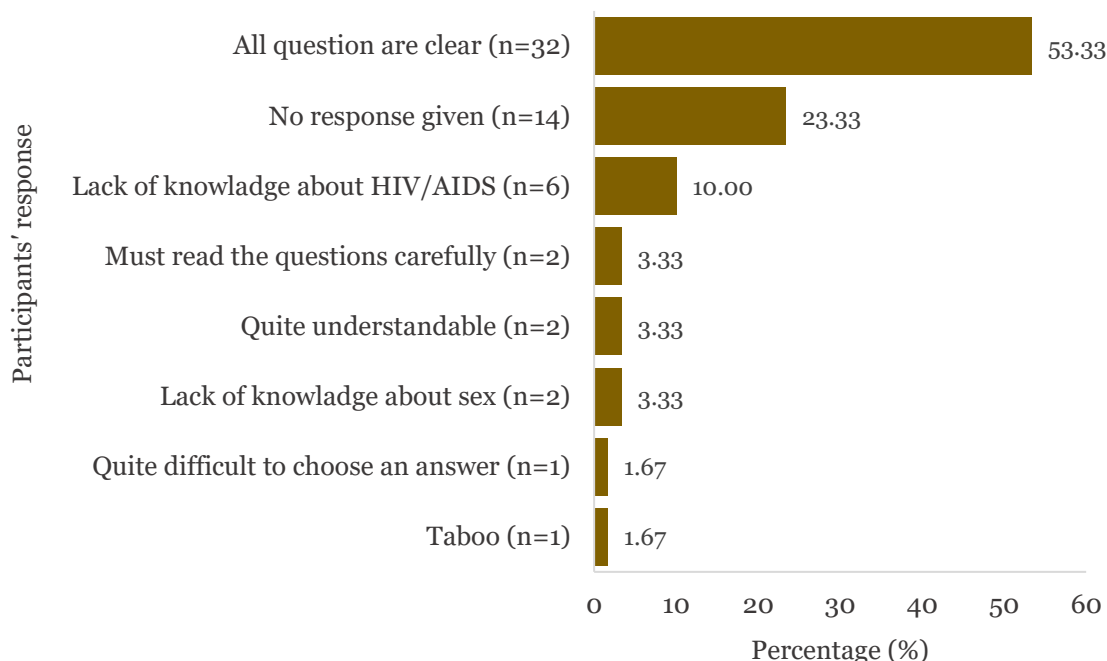


Figure 1. Participant response distribution on the 9-item HIV/AIDS stigma scale during the cross-cultural adaptation phase (n=60).

Decisions on these matters were made through consensus. This phase reaffirmed a commitment to using the more respectful term 'people with HIV/AIDS (*orang dengan HIV/AIDS*)' instead of the potentially stigmatizing phrase 'HIV/AIDS sufferers (*penderita HIV/AIDS*).

Item analysis

The results of the item analysis revealed the percentage of accurate responses from all items. Item #2 (People who have AIDS are cursed/*orang dengan HIV/AIDS adalah orang yang mendapat kutukan*) has the highest percentage of correct answers, while item #9 (People who have AIDS should not be allowed to work/*orang dengan AIDS seharusnya tidak diperbolehkan bekerja*) has the lowest percentage of correct answers. The items range in accuracy from 21.8% to 92.9% (**Table 2**).

Table 2. Item analysis results of the 9-item Indonesian HIV/AIDS Stigma Scale (InHASS-9)

Item	Original version	Indonesian version	Percentage of correct answers	Corrected item-total correlation
1	People who have AIDS are dirty	<i>Orang dengan HIV/AIDS itu menjijikkan (kotor/najis)</i>	81.3	0.583
2	People who have AIDS are cursed	<i>Orang dengan HIV/AIDS adalah orang yang mendapat kutukan</i>	92.9	0.426
3	People who have AIDS should be ashamed	<i>Orang dengan HIV/AIDS seharusnya merasa malu</i>	74.3	0.533
4	It is safe for people who have AIDS to work with children	<i>Aman bagi Orang dengan HIV/AIDS untuk bekerja bersama dengan orang lain, termasuk anak-anak</i>	53.9	0.487
5	People with AIDS must expect some restrictions on their freedom	<i>Orang dengan HIV/AIDS HARUS BERSEDIA dibatasi sebagian kebebasannya</i>	44.9	0.502
6	A person with AIDS must have done something wrong and deserves to be punished	<i>Orang dengan HIV/AIDS pasti telah melakukan sesuatu yang menyimpang sehingga pantas dihukum</i>	81.6	0.496
7	People who have HIV should be isolated	<i>Orang dengan HIV harus diisolasi</i>	65.7	0.658
8	I do not want to be friends with someone who has AIDS	<i>Saya tidak ingin berteman dengan orang dengan HIV/AIDS</i>	81.4	0.577
9	People who have AIDS should not be allowed to work	<i>Orang dengan HIV/AIDS seharusnya tidak diperbolehkan bekerja</i>	21.8	0.571

Based on the group's known validity, participants who were high school graduates, lacked a health science education background, and had never attended an HIV workshop exhibited significantly higher stigma towards PLWHA than those who were university graduates, had a health science education background, and had attended an HIV workshop (**Table 3**).

Table 3. Known-group validity analysis results of the Indonesian HIV/AIDS Stigma Scale-9 (InHASS-9)

Variable	Mean rank	Median (interquartile range)	p-value
Education Level			
Up to high school graduates	792.27	3.0 (5.0)	<0.001*
University graduates	615.70	1.0 (3.0)	
Have a background in health sciences education			
No	761.88	3.0 (4.0)	<0.001*
Yes	583.13	1.0 (3.0)	
Experience a workshop on HIV			
No	681.32	2.0 (3.0)	<0.001*
Yes	587.99	1.0 (3.0)	

*Statistically significant at $p=0.05$; analyzed using Mann-Whitney test

The construct validity from EFA could be maintained in five factors based on eigenvalues, two factors based on parallel analysis ideal coordinates, and an acceleration factor. Nevertheless, the interpretation of the five factors proved to be challenging, as certain factors failed to meet the minimum requirement of three items per factor for a stable factor structure. In EFA, a stable factor structure is defined as having at least three items with significant loadings per factor. In this study, one factor exhibited two items with significant loadings, whereas another contained a single item. These factors were deemed unstable and challenging to interpret because they did not satisfy the minimum criteria. Consequently, only two primary components that satisfy the

stability criteria will be retained: an RMSR value of 0.03 and item loadings greater than or equal to 0.40. The specifics of the EFA are presented in **Table 4**.

Table 4. Construct validity results of the Indonesian HIV/AIDS Stigma Scale-9 (InHASS-9)

Item	Original version	Indonesian version	Loading factor	
			Factor 1	Factor 2
9	People who have AIDS should not be allowed to work	<i>Orang dengan AIDS seharusnya tidak diperbolehkan bekerja</i>	0.913	-0.040
7	People who have HIV should be isolated	<i>Orang dengan HIV harus diisolasi</i>	0.875	0.077
4	It is safe for people who have AIDS to work with children	<i>Aman bagi orang dengan AIDS untuk bekerja bersama dengan orang lain, termasuk anak-anak</i>	0.817	-0.091
5	People with AIDS must expect some restrictions on their freedom	<i>Orang dengan AIDS HARUS BERSEDIA dibatasi sebagian kebebasannya</i>	0.722	0.059
8	I do not want to be friends with someone who has AIDS	<i>Saya tidak ingin berteman dengan orang dengan AIDS</i>	0.491	0.395
2	People who have AIDS are cursed	<i>Orang dengan AIDS adalah orang yang mendapat kutukan</i>	-0.022	0.872
3	People who have AIDS should be ashamed	<i>Orang dengan AIDS seharusnya merasa malu</i>	-0.018	0.850
6	A person with AIDS must have done something wrong and deserves to be punished	<i>Seorang yang hidup dengan AIDS pasti telah melakukan sesuatu yang menyimpang sehingga pantas dihukum</i>	-0.023	0.836
1	People who have AIDS are dirty	<i>Orang dengan AIDS itu menjijikkan (kotor/najis)</i>	0.095	0.807

Items are ordered based on factor analysis results. Bold values indicate the highest factor loading, categorizing each item into Factor 1 (social barriers: items 9, 7, 4, 5, and 8) or Factor 2 (moral judgment: items 2, 3, 6, and 1), while non-bold values represent lower cross-loadings on the other factor

Internal consistency

The Indonesian version of the InHASS-9 demonstrated strong internal consistency, as indicated by a Cronbach's alpha coefficient of 0.83. This suggests that the scale provides reliable measurements in assessing stigma-related attitudes and perceptions within the Indonesian context. Furthermore, the analysis revealed a two-factor structure, with the first factor exhibiting a reliability coefficient of 0.78 and the second factor showing a coefficient of 0.74. These values indicate that both factors contribute meaningfully to the overall reliability of the instrument.

Discussion

This study aimed to conduct the first translated and adapted Indonesian psychometric examination of the 9-item HIV/AIDS stigma scale in the general population, testing its validity and reliability in the Indonesian context. Our study included 1,302 participants from six major Indonesian islands: Sumatra, Kalimantan, Sulawesi, Java, Bali, and Nusa Tenggara, as well as Maluku and Papua. The reliability value is good at 0.83, indicating that this tool can effectively measure stigma against PLWHA in Indonesia's complex social and cultural context. Participants in the adaptation stage demonstrated a good understanding of the 9-item HIV/AIDS stigma scale. As part of the validation phase, our study showed two factors: Factor 1 had five items (9, 7, 4, 5, and 8), and Factor 2 had four items (2, 3, 6, and 1). The magnitude of this factor loading also determines the order of items in the Indonesian language version of the instrument, with item 9 (People with AIDS should not be allowed to work/*orang dengan AIDS seharusnya tidak diperbolehkan bekerja*) appearing first and item 1 (People with AIDS are dirty/*orang dengan HIV itu menjijikkan (kotor/najis)*) appearing last on the Indonesian language version of the HIV/AIDS stigma instrument.

The Indonesian 9-item HIV/AIDS stigma scale instrument has a high-reliability score, indicating that it is both trustworthy and acceptable. The research on the 9-item stigma scale reliability test produced better findings than the internal consistency reliability value reported by the instrument's compiler; the original study found an internal consistency score of 0.75 [21]. The reliability test findings are also superior to the 8-item stigma scale instrument, which was

developed as a version of the 9-item stigma scale instrument. During the reliability test, the 9-item stigma scale instrument had an internal consistency of 0.74 [34].

The previous study [21] validated the 9-item stigma scale in South Africa, demonstrating acceptable psychometric properties and translating it into English, Xhosa, and Afrikaans. Specifically, this study [21] reported that item-total correlations exceeded 0.3 across all items, a key indicator of the scale's validity. Our most recent analysis backs up these results, as item 4 (It is safe for people who have AIDS to work with children/ *aman bagi orang dengan AIDS untuk bekerja bersama dengan orang lain, termasuk anak-anak*) in our study indicated a revised item-total correlation of 0.487, which is higher than the acceptable level of 0.3. Therefore, item 4 is deemed valid and retained in the scale. Another study on the 9-item stigma scale among South African construction workers found satisfactory validity results after removing one item (item 4) while providing both convergent and divergent validity evidence [34].

The Indonesian version of the 9-item HIV/AIDS stigma scale demonstrated strong structural validity, incorporating two factors for construct validity. Furthermore, the Indonesian 9-item HIV/AIDS stigma scale labeled the two factors as Factor 1 (5 items): social barriers and Factor 2 (4 items): moral judgment. To better represent the meaning, the naming process was carefully realigned. In contrast, the original version of the scale employed a single-factor structure and maintained all nine items without removal [21]. However, another study suggests one factor with 8 items, because item 4 (It is safe for people with AIDS to work with children/*aman bagi orang dengan AIDS untuk bekerja bersama dengan orang lain*) was omitted in that study [34]. Aside from having a high loading factor above 0.4, all items on this instrument have an RMSR value close to 0.05, indicating that the model is valid [41,42]. However, further research is needed.

According to the results of the 9-item HIV/AIDS stigma scale instrument, Indonesians can have a stigma towards PLWHA based on their experience attending HIV seminars, education level, and educational background. Participants who had previously attended HIV seminars felt less stigmatized towards PLWHA than those who had never attended an HIV workshop. Another study found that people with less awareness about HIV/AIDS were 1,210 times more likely to stigmatize PLWHA than those with sufficient knowledge [3]. Similarly, a study also found that HIV workshops were effective in boosting understanding and lowering stigma for PLWHA among healthcare practitioners and students [37]. HIV-related training or courses were associated with lower stigma scores [45].

Participants with a background in health science education were less stigmatized against PLWHA than those who did not. The known-group validity study on the 9-item stigma scale based on differences in education background showed the same result that other studies have shown: health science students and chemists, in general, have lower levels of HIV stigma [35]. However, these findings contradict previous research in Indonesia, which highlights that HIV stigma among medical students in East Java remains prevalent, both in their attitudes and practices [48]. Acquiring knowledge about HIV/AIDS does not ensure the absence of stigmatization towards PLWHA [48]. Based on the findings [48], it is suggested that medical education curricula should be improved to more effectively address stigma and prejudice toward PLWHA. Efforts should not only focus on increasing HIV/AIDS knowledge but also on promoting empathy and reducing negative attitudes. This can be achieved by incorporating specialized training modules that address both the psychological and social aspects of HIV stigma, fostering a more comprehensive and empathetic understanding of the issue. Another study [49] found that factors like limited education, inadequate knowledge of HIV transmission and prevention, lack of direct patient interaction, and insufficient HIV/AIDS training drive stigmatization and discriminatory attitudes among health workers. In Aceh, cultural and religious beliefs associating HIV with 'immoral' behaviors, such as drug use or free sex, significantly contribute to stigma. Additionally, the lack of clear guidelines for managing PLWHA and the lack of knowledge about the effectiveness of antiretroviral therapy contribute to the widespread misconception that HIV is highly contagious and fatal. These results indicate systemic and educational issues that exacerbate discrimination and stigma against PLWHA in healthcare settings [49].

The results that came out of the known-group validity study on the 9-item stigma scale, which is based on educational levels, align with previous hypotheses and studies [46,47]. The

results show a correlation between education and the presence of bias and stigma towards PLWHA. The lower the participants' level of education, the greater the degree of stigma and prejudice towards PLWHA because those with a lower level of education may have inadequate knowledge of HIV/AIDS, which promotes stigma against PLWHA [46]. Two previous studies revealed that Individuals with lower levels of education were more likely to demonstrate greater levels of stigma [21,34]. Another research found that HIV/AIDS stigma was much reduced among university graduates compared to high school graduates [47].

The primary strength of this study lies in its status as the first to evaluate the 9-item HIV/AIDS stigma scale among the general population in Indonesia, encompassing individuals from diverse sociodemographic backgrounds. However, a notable limitation of this study is the use of online distribution for the instrument, which may introduce bias, as individuals without internet access, low education, and low literacy might be excluded from participation. Additionally, potential sample bias may arise from uncontrolled factors in the environment (for example, participants may have completed the survey in varying physical settings such as noisy or uncomfortable places, which can influence their responses) and difficulty in confirming the identity of participants (for instance, ensuring that the person who completed the survey was eligible to participate). Methodological issues, such as self-selection bias and the potential for incomplete data, further complicate the research process. To mitigate these issues, periodic data entry restrictions were implemented, limiting each account to a single instrument submission. However, beyond internet access, other factors, such as voluntary participation, can substantially influence the representativeness of the research participants. It should also be noted that while the InHASS-9 is concise and user-friendly, it may not adequately capture experiences related to HIV/AIDS stigma, particularly those influenced by specific cultural or contextual factors. It is necessary to conduct further research using qualitative data analysis that goes beyond the general population and includes PLWHA as primary informants, ensuring a deeper exploration of stigma experiences.

Conclusion

The findings confirm the 9-item Indonesian HIV/AIDS Stigma Scale (InHASS-9) is found to be a valid and reliable instrument for assessing the level of stigma towards PLWHA among the general community in Indonesia. Future studies should encourage the use of this standard instrument as a reference for assessing HIV stigma against PLWHA and enhance the distribution of the instruments directly to enable more participants with poor reading levels, especially those without internet access or with low education levels, to participate in the study.

Ethics approval

This research has been approved by the Research Ethics Committee (Komite Etik Penelitian (KEP)) of Ahmad Dahlan University (Universitas Ahmad Dahlan (UAD)) Yogyakarta, with document number 012007028 dated 22 September 2020 (Amendment 1: 26 November 2021, and Amendment 2: 14 March 2023). This cross-sectional study with two main stages, cross-cultural adaptation and validation. The online and offline instruments included participant information and a consent form. The participant information form provides details about the research title, objectives, instruments used, and the plan to maintain confidentiality during analysis and publication by only using the participant's initials. After reading and understanding the contents of the form, to declare that the participants had voluntarily agreed to participate in this study, they checked "yes," completed their sociodemographic data and answered nine questions about HIV/AIDS stigma. This shows that the participants have given their voluntary consent and fully understand the research being conducted.

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Competing interests

The author reports no conflicts of interest in this work.

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Underlying data

Supplementary material and appendixes are available at the following link: <https://doi.org/10.6084/m9.figshare.28082750>. Please kindly contact the corresponding author to utilize this instrument.

Declaration of artificial intelligence use

Some aspects of this study utilized artificial intelligence (AI) tools and techniques, with the authors carefully considering the recommendations provided by AI models, such as ChatGPT, Claude, and QuillBot. These AI-driven models were employed to a) refine language (enhancing grammar, sentence structure, and the overall readability of the manuscript), b) summarize content (helping to present findings and conclusions concisely), and c) assist in technical writing (offering suggestions on how to structure complex technical descriptions and draw conclusions effectively). However, the authors made all final decisions regarding the manuscript's content, structure, and conclusions.

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