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PROPRIEDADES PSICOMÉTRICAS DO QUESTIONÁRIO HLS-EU-Q16: APLICAÇÃO E VALIDAÇÃO EM ANGOLA  
PSYCHOMETRIC PROPERTIES OF THE HLS-EU-Q16 QUESTIONNAIRE: APPLICATION AND VALIDATION IN ANGOLA  
PROPIEDADES PSICOMÉTRICAS DEL CUESTIONARIO HLS-EU-Q16: APLICACIÓN Y VALIDACIÓN EN ANGOLA

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## RESUMO

**Introdução:** A literacia em saúde pode ser definida como a capacidade de aceder, compreender, avaliar e aplicar informação relacionada com a saúde para tomar decisões informadas. Em Angola, um país marcado por desafios socioeconómicos e desigualdades no acesso aos serviços de saúde, o desenvolvimento da literacia em saúde é essencial para a saúde pública e para o empoderamento dos cidadãos.

**Objetivo:** Validar o questionário HLS-EU-Q16 para a população angolana.

**Métodos:** Trata-se de um estudo psicométrico, descritivo e correlacional, baseado na recolha de dados transversais de acordo com as orientações do documento STROBE (Strengthening the Reporting of Observational studies in Epidemiology). A investigação foi realizada na comuna de Gungo, localizada na cidade do Sumbe, província do Kwanza Sul, Angola, através do questionário HLS-EU-PT-Q16. As análises descritivas e a avaliação da fiabilidade foram realizadas através do alfa de Cronbach ( $\alpha$ ) e do ómega de McDonald ( $\omega$ ). Uma análise fatorial exploratória (EFA) foi seguida por uma análise fatorial confirmatória (CFA).

**Resultados:** A amostra incluiu 89 participantes que classificaram o seu nível de literacia em saúde como “inadequado” (75,3%), seguido de “problemático” (18%) e “adequado” (6,7%). Os valores de alfa de Cronbach e ómega de McDonald variaram entre 0,88 e 0,89, com um valor global de 0,89. A análise fatorial exploratória (AFE) demonstrou a adequação da amostra e propôs uma solução tridimensional com cargas fatoriais adequadas (todos os itens  $> 0,50$ ). A análise fatorial confirmatória (AFC) revelou um ajuste global adequado com base nos índices de ajuste testados.

**Conclusões:** Embora este estudo, sendo o primeiro nesta população, não constitua a validação definitiva deste instrumento, podemos aceitar que os resultados psicométricos obtidos representam a sua validação inicial. Não obstante, os dados gerais sugerem que o HLS-EU-Q16 é uma medida viável para avaliar a literacia em saúde na população angolana. Assim, o instrumento é conciso, apresenta propriedades psicométricas adequadas e pode ser utilizado para avaliar as necessidades da população, bem como para monitorizar e avaliar iniciativas e políticas de promoção da literacia em saúde.

**Palavras-chave:** literacia em saúde; validação psicométrica; HLS-EU-Q16; Angola

## ABSTRACT

**Introduction:** Health literacy is defined as the ability to access, understand, evaluate, and apply health-related information to make informed decisions. In Angola, a country marked by socioeconomic challenges and inequalities in access to health services, the development of health literacy is essential for public health and the empowerment of citizens.

**Objective:** To validate the HLS-EU-Q16 Questionnaire for the Angolan population.

**Methods:** This is a psychometric, descriptive, and correlational study based on the collection of transversal data according to the guidelines of the statement STRENGTHENING THE REPORTING OF OBSERVATIONAL STUDIES IN EPIDEMIOLOGY (STROBE). The investigation was carried out in the commune of Gungo, located in the city of Sumbe, province of Kwanza Sul, Angola, using the HLS-EU-PT-Q16 questionnaire. Descriptive analyses and reliability assessment were performed using Cronbach's alpha ( $\alpha$ ) and McDonald's omega ( $\omega$ ). An exploratory factor analysis (EFA) was followed by a confirmatory factor analysis (CFA).

**Results:** The sample included 89 participants who classified their health literacy level as “inadequate” (75.3%), followed by “problematic” (18%) and “adequate” (6.7%). Cronbach's alpha and McDonald's omega values vary between 0.88 and 0.89, with an overall value of 0.89. EFA showed measuring sampling adequacy and proposed a three-dimensional solution with adequate factorial structure's factor loadings (all items  $> 0.50$ ). CFA revealed an overall adequate fit based on tested fit indices.

**Conclusion:** Although this study, being the first of its kind in this population, does not constitute a definitive validation of this instrument, we can accept that the psychometric results obtained represent its initial validation. Nevertheless, the overall data suggest that the HLS-EU-Q16 is a viable measure for assessing health literacy in the Angolan population. Thus, the instrument is concise, exhibits adequate psychometric properties, and can be used to assess the needs of the population, as well as to monitor and evaluate initiatives and policies aimed at promoting health literacy.

**Keywords:** health literacy; psychometric validation; HLS-EU-Q16; Angola

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## RESUMEN

**Introducción:** La alfabetización en salud se define como la capacidad de acceder, comprender, evaluar y aplicar información relacionada con la salud para tomar decisiones informadas. En Angola, un país marcado por desafíos socioeconómicos y desigualdades en el acceso a los servicios de salud, el desarrollo de la alfabetización en salud es esencial para la salud pública y el empoderamiento de la ciudadanía.

**Objetivo:** Validar el cuestionario HLS-EU-Q16 para la población angoleña.

**Métodos:** Se trata de un estudio psicométrico, descriptivo y correlacional basado en la recopilación de datos transversales, de acuerdo con las directrices de la Declaración de Fortalecimiento de la Comunicación de Estudios Observacionales en Epidemiología (STROBE). La investigación se llevó a cabo en la comuna de Gungo, ubicada en la ciudad de Sumbe, provincia de Kwanza Sul, Angola, utilizando el cuestionario HLS-EU-PT-Q16. Se realizaron análisis descriptivos y se evaluó la fiabilidad mediante el alfa de Cronbach ( $\alpha$ ) y el omega de McDonald ( $\omega$ ). Se realizó un análisis factorial exploratorio (EFA) y un análisis factorial confirmatorio (CFA).

**Resultados:** La muestra incluyó a 89 participantes que clasificaron su nivel de alfabetización en salud como "inadecuado" (75,3%), seguido de "problemático" (18%) y "adecuado" (6,7%). Los valores de alfa de Cronbach y omega de McDonald's oscilan entre 0,88 y 0,89, con un valor total de 0,89. El AFE mostró la adecuación del muestreo y propuso una solución tridimensional con cargas factoriales adecuadas en la estructura factorial (todos los ítems > 0,50). El AFC reveló un ajuste general adecuado según los índices de ajuste probados.

**Conclusión:** Aunque este estudio, al ser el primero realizado en esta población, no constituye la validación definitiva de este instrumento, podemos considerar que los resultados psicométricos obtenidos representan su validación inicial. No obstante, los datos generales sugieren que el HLS-EU-Q16 es una herramienta viable para evaluar la alfabetización en salud en la población angoleña. Así pues, el instrumento es conciso, presenta propiedades psicométricas adecuadas y puede utilizarse para evaluar las necesidades de la población, así como para supervisar y evaluar iniciativas y políticas de promoción de la alfabetización en salud.

**Palabras clave:** alfabetización en salud; validación psicométrica; HLS-EU-Q16; Angola

## INTRODUCTION

Health literacy (HL) has been recognized in recent decades as a modifiable determinant of health behaviors, service navigation, and clinical and economic outcomes, assuming an increasingly central role in public health agendas (Cruz, 2023; World Health Organization [WHO], 2013). In Angola, a study found limited levels of HL among participants, and national analyses based on the 2015/16 Demographic and Health Survey (DHS) reveal significant inequalities by sex, education, and residence (Ramos et al, 2022). The Seigungo project research team conducted preliminary exploratory research to understand the practices and knowledge in the field of individual health, as well as how the population manages the scarce resources available in this area. Gungo is a very poor rural and mountainous community in the Kwanza Sul province of Angola, consisting of 33,969 inhabitants distributed across 108 neighborhoods. The community does not have a hospital and only has one school that teaches up to the 11th grade, with very limited access to education and healthcare.

According to Santos (2016), 56.8% of his sample in Angola had low levels of health literacy, suggesting challenges in accessing and understanding relevant information and in implementing practices for its development. Other studies with results from initiatives in Gungo, Angola, such as health and food literacy, highlight and reinforce the need for training and community-based approaches (Ferreira et al., 2025; Campos et al., 2025). In this context, the use of a validated health literacy survey instrument is important to ensure that interventions and public policies are effective, equitable, and evidence-based.

In the integrative proposal by the European Health Literacy Consortium, HL corresponds to the set of knowledge, motivations, and skills necessary to access, understand, evaluate, and apply health information, to support judgments and daily decisions in three domains: healthcare, disease prevention, and health promotion, throughout the course of life (Sørensen et al. 2012). This conception supports a comprehensive model, operationalized by a matrix with subdomains and operations on information, and establishes plausible pathways of relationship between social determinants, LS, and health outcomes (Sørensen et al, 2012; Sørensen et al, 2015). The need to measure HL comparably between countries first led to the development of the HLS-EU-Q47 questionnaire and subsequently to abbreviated forms for population applications and more demanding operational contexts (HLS-EU-Q16; HLS-EU-Q12; HLS-EU-Q6). Short forms aim to reduce the response burden while preserving conceptual validity and robust metrics (Finbråten et al., 2018; Rouquette et al, 2018), however, the dichotomization of categories in Q16 (easy/difficult) implies a loss of information, a fact that motivated subsequent work on psychometric improvements and scoring alternatives, namely the adoption of the type P score instead of the type D score (Pelikan et al., 2022; Lorini et al, 2019). In 2018, WHO Europe launched the Action Net-work on Measuring Population and Organizational Health Literacy (M-POHL) (WHO, 2018) and the multinational survey HLS19 (2019–2021), which adopted the integrative concept of HLS-EU and provided harmonized instruments (HLS19-Q4, HLS19-Q16, HLS19-Q12) and specific modules (e.g., digital literacy, navigational literacy, vaccination), reinforcing international

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comparability and usefulness for public policies. The European results confirmed a social gradient in HL and the relevance of regular monitoring, with recommendations for systemic interventions that go beyond the exclusive perspective of individual competencies (M-POHL. (2019–2021). From a psychometric perspective, the multinational development and validation of the HLS19-Q12 demonstrated adequate internal consistency ( $\alpha \geq 0.70$ ), acceptable fit in unifactorial models (CFA), and a coherent association with social determinants and health outcomes, in addition to a high correlation with the long form (Q47) (Pelikan et al., 2022).

These findings support the robustness of the underlying metrics and their intercultural transferability, although with indications for future improvements and monitoring of possible differential functioning of items. The Q16 form has been extensively used and validated in multiple linguistic and cultural contexts with evidence of construct validity (unidimensional or three-dimensional CFA consistent with the conceptual domains) and acceptable reliability, as well as sensitivity to social determinants of LS. These results reinforce the suitability of Q16 as a screening and monitoring tool in population surveys and community studies, as well as in multinational replication (Rouquette et al., 2018; Pedro et al., 2023; Bergman et al., 2023).

In the Portuguese-speaking world, the Portuguese version of the HLS-EU-Q16, the HLS-EU-PT-Q16, was the subject of a recent methodological study, confirming satisfactory psychometric properties and operational feasibility. This may be relevant for the instrument's adoption in Portuguese-speaking African countries, given its linguistic proximity (Pedro et al., 2023). Although research on HLS is expanding on the African continent, there remains a scarcity of psychometric studies using HLS instruments in sub-Saharan African countries, particularly in Angola. However, applications of the HLS-EU-Q16 in some African contexts, such as the cross-sectional survey in Cameroon, point to patterns of determinants similar to those observed in other regions. This reinforces the importance of having reliable and culturally appropriate measures to inform policies and interventions (Soh & Wamba, 2022).

In this context, the choice of the HLS-EU-Q16 is justified by its brevity and ease of application in resource-limited scenarios, with lower functional literacy requirements for participants, its history of use and validation in multiple countries, with consistent psychometric performance, its availability of a previously studied Portuguese version; and the possibility of mapping to widely used indexes and categories: inadequate, problematic, sufficient, excellent, facilitating its interpretation.

## 2. METHODS

### 2.1. Study Design and Participants

This is a psychometric, descriptive, correlational study based on cross-sectional data collection in accordance with the STrengthening the Reporting of OBServational studies in Epidemiology statement guidelines (STROBE) (von Elm et al., 2007). The research was conducted in the Gungo commune, located in the city of Sumbe, Kwanza Sul province, Angola, in the ambit of the SeiGungo project. Previous results of the programme can be found in previous publications (Ferreira et al., 2025; Campos et al., 2025).

### 2.2 Inclusion criteria

The inclusion criteria for participants were being over 18 years of age, being able to read and write, and being inhabitants of Gungo.

### 2.3. Data collection and instruments

Data collection was carried out by the project's research fellow, who remained on-site throughout the data collection period, contributing equally to the clarification and understanding of the study's objectives among the participants. The sample is non-probabilistic, based on convenience, and consists of residents of the Gungo community, meeting the inclusion criteria. The low educational level of the residents justifies the small sample size (89 participants).

The HLS-EU-PT-Q16 used was a shortened version of the European Health Literacy Survey Questionnaire, with 16 items. Responses to these items were categorized: those designated as 'difficult' or 'very difficult' received a value of 0, whereas those labeled 'easy' or 'very easy' received a value of 1. The cumulative score was derived by aggregating the results of all 16 items, which indicates each participant's degree of health literacy. A score of 13 or higher signifies "adequate" health literacy, scores between 9 and 12 denote "problematic" health literacy, and scores of 8 or less represent "inadequate" health literacy. To ensure effective comparison between subdomains, scores were standardized using the General Health Literacy Index (GHLI), based on a variable metric scale ranging from 0 to 50. The G-HL16 index was calculated as follows:  $G\text{-HL16 index} = (\text{mean} - 1) \times (50/3)$ . Four HL levels were defined: inadequate (0-25), problematic (25.1-33), sufficient (33.1-42), and excellent (42.1-50).

### 2.4 Statistical analysis

First, a descriptive analysis was conducted using IBM® SPSS® Statistics software, version 29.0. The instrument's reliability was evaluated using Cronbach's alpha ( $\alpha$ ) and McDonald's omega ( $\omega$ ) coefficients. The following threshold values were established:  $>0.9$  (excellent); between 0.8 and 0.9 (good); between 0.7 and 0.8 (acceptable); between 0.6 and 0.7 (questionable); between 0.5

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and 0.6 (poor); and <0.5 (unacceptable). Finally, we aimed at testing the Portuguese version of the HLS-EU-Q16 for reliability and factorial validity by calculating Cronbach's alpha ( $\alpha$ ) and McDonald's omega ( $\omega$ ) and testing factorial validity with confirmatory factor analysis to obtain main fit indices. An exploratory factor analysis (EFA) was initially performed to decide how many factors should be retained and interpreted. Several methods (Lim & Jahng, 2019; Watkins, 2021; Dinno, 2009) are described in the literature: 1) eigenvalue cut-off rule (i.e., retain factors with eigenvalues > 1), which is not currently recommend; 2) scree plot inflection point analysis; 3) parallel analysis and/or minimum average partial (MAP); 4) comparison of models (in terms of fit) that contain different numbers of factors. We used a combination of 3) and 4). The factorial structure for HLS-EU-Q16 was tested using Confirmatory Factor Analysis (CFA) through the algorithm of maximum likelihood. This analysis was conducted in IBM® SPSS® AmosTM 29.0.0. As recommended, different global adjustment indices were used, namely the Chi-square to Degrees of Freedom ratio ( $X^2/df$ ), Root Mean Square Error of Approximation (RMSEA), Root Mean Square Residual (RMR), Comparative-Fit Index (CFI), Tucker–Lewis Index (TLI), Bollen's Incremental Fit Index (IFI), Parsimony Normed Fit Index (PNFI). According to Bentler (1990) and Kline (2011),  $X^2/df < 3$ , RMSEA and RMR less than 0.08, CFI, TLI, and IFI greater than 0.90, and PNFI greater than 0.50 reflect adequate structural models. Four covariances were entered in the measurement model following modification indices examination/analysis. A value of  $p < 0.05$  was considered statistically significant.

### 3. RESULTS

#### 3.1. Sample Characterization

The sample consisted of 89 participants, the majority of whom were female (60.7%) with a mean age of  $44.13 \pm 12.10$  years (range 18–66 years). Most participants were single and had completed six years of formal education. In terms of lifestyle background, most participants reported that they do not smoke or consume alcohol regularly (Table 1).

**Table 1** - Sociodemographic and lifestyle background

Variables	n	%		
<b>Gender</b>				
Male	35			39.3
Female	54			60.7
<b>Marital status</b>				
Single	47			52.8
Married or Cohabiting couples	41			46.1
Other	1			1.1
<b>Level of education</b>				
1 years	1			1.1
2 years	2			2.3
3 years	3			3.4
4 years	18			20.2
5 years	5			5.6
6 years	19			21.3
7 years	2			2.3
8 years	6			6.7
9 years	6			6.7
11 years	3			3.4
12 years	5			5.6
13 years	7			7.9
Bachelor's degree	12			13.5
<b>Smoking</b>				
Yes	1			1.1
No	88			98.9
<b>Regularly drinking</b>				
Yes	12			13.5
No	77			86.5
	<b>M</b>	<b>DP</b>	<b>Min</b>	<b>Max</b>
<b>Age</b>	44.13	12.10	18	66

M: mean; DP: standard deviation; Min: minimum; Max: maximum

#### 3.2. General Health Literacy

Table 2 indicates that item 1. "Find information on treatments for illnesses that concern you," item 3 "understand what your doctor says to you"; and item 4, "understanding your doctor's or pharmacist's instruction on how to take a prescribed medicine," yielded the highest percentages of "very difficult results" (12.4%, 13.5%, and 18%, respectively). Conversely, the "very easy" results were also predominantly observed in item 1 and item 2, "find out where to get professional help when you are ill." item 8, "find

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information on how to manage mental health problems like stress or depression," and 9, "understand health warnings about behavior such as smoking, low physical activity, and drinking too much." (18%, 11.2%, 9%, and 9%, respectively).

**Table 2** - Responses to the HLS-EU-Q16 (n; percentages).

Domain	On a Scale from Very Easy to Very Difficult, How Easy Would You Say It Is for You To	Don't know/no answer	Very easy	Easy	Difficult	Very difficult
HC	1. find information on treatments of illness that concern you	2; 2.2%	16; 18%	12; 13.5%	48; 53.9%	11; 12.4%
HC	2. find out where to get professional help when you are ill?	2; 2.2%	10; 11.2%	11; 12.4%	57; 64%	9; 10.1%
HC	3. understand what your doctor says to you?	1; 1.1%	4; 4.5%	8; 9%	64; 71.9%	12; 13.5%
HC	4. understand your doctor's or pharmacist's instruction on how to take a prescribed medicine	-	6; 6.7%	6; 6.7%	61; 68.5%	16; 18%
HC	5. Judge when you may need to get a second opinion from another doctor?	2; 2.2%	5; 5.6%	29; 32.6%	45; 50.6%	8; 9%
HC	6. use information the doctor gives you to make decisions about your illness?	3; 3.4%	3; 3.4%	17; 19.1%	60; 67.4%	6; 6.7%
HC	7. follow instructions from your doctor or pharmacist?	-	3; 3.4%	8; 9%	68; 76.4%	10; 11.2%
DP	8. find information on how to manage mental health problems like stress or depression?	10; 11.2%	8; 9%	39; 43.8%	26; 29.2%	6; 6.7%
DP	9. understand health warnings about behaviour such as smoking, low physical activity and drinking too much?	9; 10.1%	8; 9%	11; 12.4%	54; 60.7%	7; 7.9%
DP	10. understand why you need Health screenings?	20; 22.5%	7; 7.9%	25; 28.1%	29; 32.6%	8; 9%
DP	11. judge if the information on health risks in the media is reliable?	9; 10.1%	4; 4.5%	29; 32.6%	44; 49.4%	3; 3.4%
DP	12. decide how you can protect yourself from illness based on information in the media?	6; 6.7%	4; 4.5%	26; 29.2%	49; 55.1%	4; 4.5%
HP	13. find out about activities that are good for your mental well-being?	8; 9%	5; 5.6%	19; 21.3%	47; 52.8%	10; 11.2%
HP	14. understand advice on health from family members or friends?	1; 1.1%	6; 6.7%	11; 12.4%	61; 68.5%	10; 11.2%
HP	15. understand information in the media on how to get healthier?	6; 6.7%	6; 6.7%	9; 10.1%	59; 66.3%	9; 10.1%
HP	16. judge which everyday behaviour is related to your health?	8; 9%	4; 4.5%	22; 24.7%	49; 55.1%	6; 6.7%

Note. HC: health care; DP: disease prevention; HP: health promotion.

### 3.2.1. Level of Health Literacy

General health literacy (HL) was assessed by aggregating the results of the primary health literacy measurement questions (HLS-EU-Q16), which were normalized to a 0-to-50 scale. The categories were created according to the previously described criteria. The predominant classification of participants was "inadequate" (75.3%), followed by "problematic" (18%) and "adequate" (6.7%) (Table 3).

**Table 3** - Level of health literacy (n; percentages)

	n	%
<b>Level of health literacy (HL index)</b>		
Inadequate	35	39.3
Problematic	25	28.1
Sufficient	28	31.5
Excellent	1	1.1
Total score		M=5.03; SD=4.49
Level of health literacy		
<b>Inadequate</b>	67	75.3
Problematic	16	18.0
Adequate	6	6.7
Total score		M=26.29; SD =9.47

\* Statistically significant; M: mean; SD: standard deviation.

### 3.3. Reliability for HLS-EU-Q16

The results in Table 4 showed that all items had a correlation value greater than 0.3, ranging from a minimum of 0.36 (item 14) to a maximum of 0.71 (item 11). Cronbach's alpha and McDonald's omega values vary between 0.88 and 0.89, with an overall value of 0.89. This indicates that the internal consistency is good. The mean values and respective standard deviations of the various items suggest that they are well centred.

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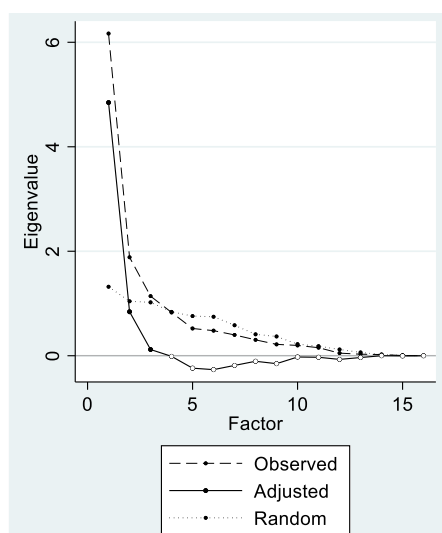
**Table 4 - Internal consistency for HLS-EU-Q16**

Item	Mean	Standard deviation	Corrected Item-Total Correlation	Cronbach's $\alpha$ if Item Deleted	McDonald's $\omega$ if Item Deleted
Q1	2.56	1.00	0.58	0.89	0.88
Q2	2.69	0.89	0.42	0.89	0.89
Q3	2.92	0.71	0.46	0.89	0.89
Q4	2.98	0.72	0.53	0.89	0.89
Q5	2.58	0.82	0.69	0.88	0.88
Q6	2.71	0.79	0.61	0.89	0.88
Q7	2.96	0.58	0.47	0.89	0.89
Q8	2.11	1.04	0.51	0.89	0.89
Q9	2.47	1.1	0.55	0.89	0.88
Q10	1.98	1.3	0.56	0.89	0.88
Q11	2.31	1.00	0.71	0.88	0.88
Q12	2.46	0.92	0.67	0.88	0.88
Q13	2.52	1.07	0.54	0.89	0.89
Q14	2.82	0.76	0.36	0.89	0.89
Q15	2.66	0.99	0.60	0.88	0.88
Q16	2.46	1.01	0.68	0.88	0.88
Total Score	41.19	9.26	-	0.89	0.89

### 3.4. Factorial Structure for HLS-EU-Q16

#### 3.4.1. Exploratory Factor Analysis (EFA)

The EFA results for this dataset indicated a satisfactory Kaiser–Meyer–Olkin (KMO = 0.826) value for assessing sampling adequacy. The Bartlett's Test of Sphericity validated this analysis by demonstrating a statistically significant Chi-square distribution ( $X^2(120) = 730.41; p < 0.001$ ). According to the Minimum Average Partial Correlation for Number of Principal Components and the Parallel analysis, the best solution that fits these data is a three-dimensional solution shown in the Scree plot (Figure 1). For comparison, the Kaiser eigenvalue > 1 rule suggests extracting four principal components.



**Figure 1-** Scree plot for exploratory factor analysis.

The factorial structure's factor loadings showed adequate loadings for each item (all items > 0.50), as shown in Table 5.

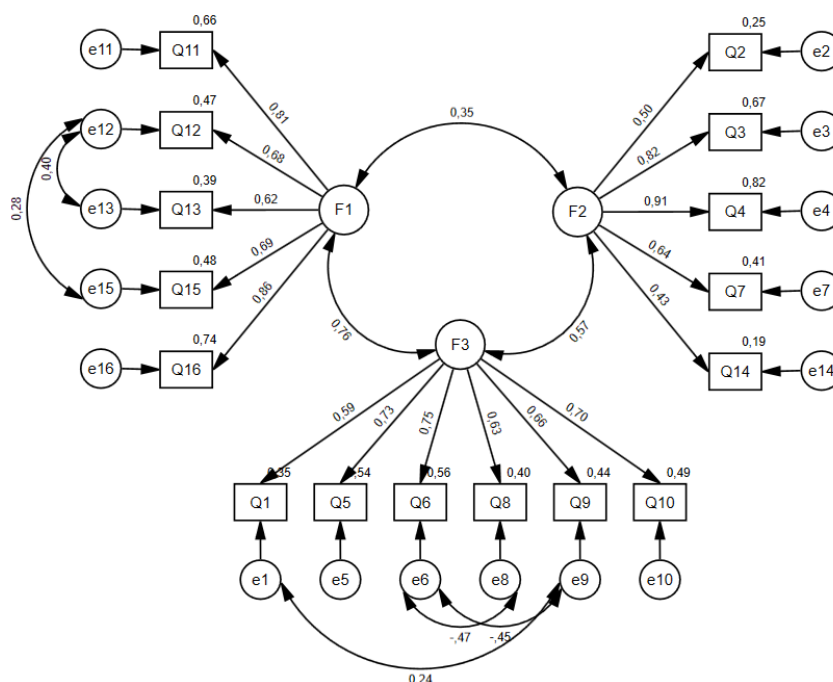
DOI: <https://doi.org/10.29352/mill0223e.45081>

**Table 5 - Level of health literacy (n; percentages)**

	Factor 1	Factor 2	Factor 3
Q1			0.70
Q2		0.57	
Q3		0.85	
Q4		0.89	
Q5			0.73
Q6			0.61
Q7		0.72	
Q8			0.74
Q9			0.75
Q10			0.79
Q11	0.74		
Q12	0.85		
Q13	0.82		
Q14		0.57	
Q15	0.83		
Q16	0.81		

### 3.4.2. Confirmatory Factor Analysis (CFA)

The factorial structure of HLS-EU-Q16 was evaluated by Confirmatory Factor Analysis (CFA). This evaluation demonstrated a satisfactory fit based on the fit indices, as indicated by the following information:  $\chi^2/df$  (Chi-square to Degrees of Freedom ratio) = 1.67, RMSEA (root mean square error of approximation) = 0.08 (Lower Interval 90 = 0.06, Upper Interval 90 = 0.11), RMR (Root Mean Square Residual) = 0.06, CFI (Comparative Fit Index) = 0.90; TLI (Tucker–Lewis Index) = 0.89, IFI (Bollen’s Incremental Fit Index) = 0.91; PNFI (Parsimony Normed Fit of Index) = 0.64. Figure 6 depicts the resulting structural model.



**Figure 2 - Factorial structure for HLS-EU-Q16 using Confirmatory Factor Analysis**

## 4. DISCUSSION

Considering the results, this article assumes dual scientific and practical relevance. In scientific terms, it helps to fill a gap in the psychometric evidence of LS instruments in Angola, testing the reliability and validity of the HLS-EU-PT-Q16 in a rural community context such as Gungo in Kwanza Sul, examining its factorial structure and associated metrics. In practical terms, it offers a standardized and parsimonious instrument for local diagnosis and program monitoring, aligning with international agendas and allowing comparability with European (HLS-EU/HLS19) and Lusophone studies.

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The Portuguese results of HLS19 and the guidelines from WHO/M-POHL reinforce this multiscale approach, which should inform both community interventions and organizational reforms in the Angolan NHS. Validating the HLS-EU-Q16 in Angola is a necessary step to: have a standardized and comparable indicator of health literacy in adult populations; identify at-risk subgroups and specific areas of difficulty (e.g., understanding clinical instructions, evaluating the reliability of media information, or applying preventive recommendations); and support the design, implementation, and evaluation of policies and programs for promoting health literacy and community food/health literacy, in coordination with local development projects and health promoter training. In the present study, the sample included 89 participants who classified their health literacy level as “inadequate” (75.3%), followed by “problematic” (18%) and “adequate” (6.7%). In another study that the research team conducted using this measure, it was also found that 60% of the 30 health promoters in the sample had inadequate health literacy. After employing an interventional model to improve health literacy across different domains, this figure fell to 20% (Ferreira et al. 2025). The study demonstrated that inaccessibility to health care and education has a direct effect on health literacy because it restricts a person's ability to obtain, comprehend, and apply health information efficiently. The lack of access to formal education might make it more difficult to comprehend diagnoses, interpret medical information, and follow health advice (Ferreira et al. 2025).

Although the HLS-EU-Q16 shows good internal consistency, good correlation between items, and a factorial structure with an overall adequate fit based on the fit indices, it should be noted that its structure presented a three-dimensional solution. The validation studies of the HLS tested various psychometric properties, including validity and reliability, as well as factorial validity/structure through EFA or CFA, the Rasch model (RM), and the Partial Credit Model (PCM), among others. The Cronbach's alpha values, the EFA results, and an additional CFA suggested that the most appropriate solution is a unidimensional factor solution, supporting the hypothesis that the HLS is a sufficiently unidimensional scale, suitable for measuring general HL at the population level (Pelikan et al., 2020; Pelikan et al., 2022; Arriaga et al., 2022). Future validation studies in Angola with larger and more diverse samples should confirm the factorial structure, as well as other important psychometric properties (e.g., construct validity, face validity, among others).

Validated instruments for assessing health literacy can have a profound and very concrete impact in countries like Angola, especially when used strategically by decision-makers, training institutions, and health teams. Linguistic diversity, regional inequalities, and limitations of access make it essential to know how people understand, interpret, and use health information in order to adapt health communication to the population's actual level of comprehension. A rigorous assessment of population health literacy allows the identification of more vulnerable groups and the prioritization of investments in critical areas such as vaccination, maternal health, child health, HIV/AIDS, and malaria. Thus, the analysis of the results of health literacy levels resulting from the use of the validated instrument adapted to the population can guide fairer policies, train better-prepared professionals, create more effective interventions, and empower the community to make more appropriate decisions regarding their health.

## CONCLUSION

Health literacy is a tool for social transformation. In Angola, particularly in places with such limited resources as Gungo, its development is urgent to ensure a more informed, healthy, and resilient population. The integration of health literacy into public policies is a strategic step to improve the health of the population. The availability of the HLS-EU-PT instrument validated for Angola constitutes a valuable resource that allows for the identification of gaps and coordinated, multi-systemic intervention to address them. The instrument we propose, after its psychometric validation, consists of 3 dimensions, is concise, presents adequate psychometric properties, and can be used to assess the needs of the population and monitor and evaluate health literacy promotion initiatives and policies. Despite being its first validation, from a reliability standpoint, Cronbach's alpha and McDonald's omega values are considered good as they range between 0.88 and 0.89, with an overall value of 0.89. The EFA showed the adequacy of the measurement sampling with adequate factor loadings of the factorial structure (all items > 0.50). And finally, the CFA revealed a general adequacy based on the tested adequacy indices, confirming the factorial structure. We can therefore affirm that it is a robust instrument capable of evaluating the construct it proposes, that is, objectively measuring the limitations in access, comprehension, and use of health information, allowing better health decisions.

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## AUTHORS' CONTRIBUTION

Conceptualization, M.F. and E.S.; data curation, E.S.; formal analysis, M.F. and E.S.; funding acquisition, M.F., S.C., J.A., I.F. and V.M.; investigation, M.F. and E.S.; methodology, M.F. and E.S.; project administration, M.F.; resources, M.F., J.A., I.F. and V.M.; software, E.S.; supervision, M.F.; validation, M.F. and E.S.; writing – original draft, M.F., E.S. and S.C.; writing – review & editing, M.F. and E.S.

## CONFLICT OF INTERESTS

The authors declare no conflict of interests.

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