



Evaluation of normative data of the instrument European Health Literacy Survey Questionnaire short-short form (HLS-EU-Q6) in Brazilian adults

Avaliação dos dados normativos do instrumento *European Health Literacy Survey Questionnaire short-short form* (HLS-EU-Q6) em adultos brasileiros

Evaluación de datos normativos del instrumento del instrumento *European Health Literacy Survey Questionnaire short-short form* (HLS-EU-Q6) en adultos brasileños

Fábio Luiz Mialhe¹, Flávio Rebutini².

ABSTRACT

Objective: To investigate the normative data of the Brazilian Portuguese version of the instrument for measuring health literacy European Health Literacy Survey Questionnaire short-short form (HLS-EU-Q6) in Brazilian adults. **Methods:** This is a methodological study in which the normative data of scores of HLS-EU-Q6 was evaluated in a sample of 783 adult users of the Brazilian public health system (SUS). The normative analysis went through three stages: descriptive analysis of the items and the instrument scores; analysis of the distribution of the score and confirmation that the cutoffs established in the distribution were able to effectively identify the participants in each range. **Results:** It was observed that all instrument items had a median of 3 and the median of the total score was 17 points. The results suggest that a model with 3 cutting lines and with different scores two proposals by the authors of the original study turned the classification capacity of the instrument more accurate for this population. **Conclusion:** It is concluded that the classification criteria of the HLS-EU-Q6 to be used in Brazilian adults should be different from those proposed by the authors of the original study, so as not to generate biases in the measurement of health literacy levels in this population.

Keywords: Health literacy, Validation studies, Unified health system.

RESUMO

Objetivo: Investigar os dados de normatização da versão em português do Brasil do instrumento para aferição do letramento em saúde *European Health Literacy Survey Questionnaire short-short form* (HLS-EU-Q6) em adultos brasileiros. **Métodos:** Trata-se de um estudo metodológico no qual se avaliou a normatização dos escores do HLS-EU-Q6 em uma amostra de 783 adultos usuários do sistema público de saúde brasileiro (SUS). As análises de normatização passaram por três etapas: análise descritiva dos itens e do escore do instrumento; análise de distribuição dos escores e a confirmação de que os cortes estabelecidos na distribuição conseguiram efetivamente identificar os participantes em cada faixa. **Resultados:** Observou-se que todos os itens do instrumento apresentaram a mediana 3 e a mediana do escore total foi de 17 pontos. Os resultados apontaram que um modelo com 3 faixas de corte e com escores diferentes dos propostos pelos autores do estudo original tornou a capacidade de classificação do instrumento mais precisa para essa

¹ Universidade Estadual de Campinas (UNICAMP), Faculdade de Odontologia de Piracicaba, Piracicaba - SP.

² Universidade de São Paulo (USP), Escola de Artes, Ciências e Humanidades, São Paulo - SP.

população. **Conclusão:** Conclui-se que os critérios de classificação do HLS-EU-Q6 a serem utilizados em adultos brasileiros devem ser diferentes dos propostos pelos autores do estudo original, de forma a não gerar vieses de aferição nos níveis de letramento em saúde nessa população.

Palavras-chave: Letramento em saúde, Estudos de validação, Sistema único de saúde.

RESUMEN

Objetivo: Investigar los datos de estandarización de la versión en portugués brasileño del instrumento para medir la alfabetización en salud European Health Literacy Survey Questionnaire short-short form (HLS-EU-Q6) en adultos brasileños. **Métodos:** Se trata de un estudio metodológico en el que se evaluó la estandarización de los puntajes HLS-EU-Q6 en una muestra de 783 usuarios adultos del sistema público de salud (SUS) brasileño. El análisis de estandarización pasó por tres etapas: análisis descriptivo de los ítems y puntuación del instrumento; análisis de la distribución de la puntuación y la confirmación de que los puntos de cortes establecidos en la distribución lograron identificar efectivamente a los participantes en cada rango. **Resultados:** Se observó que todos los ítems del instrumento tuvieron una mediana de 3 y la mediana de la puntuación total fue de 17 puntos. Los resultados mostraron que un modelo con 3 rangos de corte y con puntajes diferentes a los propuestos por los autores del estudio original hizo más precisa la capacidad de clasificación del instrumento para esta población. **Conclusion:** Se concluye que los criterios de clasificación HLS-EU-Q6 a ser utilizados en adultos brasileños deben ser diferentes a los propuestos por los autores del estudio original, para no generar sesgos en la medición de los niveles de alfabetización en salud en esta población.

Palabras clave: Alfabetización en salud, Estudio de validación, Sistema único de salud.

INTRODUCTION

Health literacy (HL) is considered by the World Health Organization as an important determinant of health and has been studied with more interest by several authors in recent decades (KICKBUSCH I, et al., 2013; LIU C, et al., 2020). HL was defined as the knowledge, motivation and skills of people to access, understand, evaluate and apply information in health, in order to make judgments and make decisions on a daily basis regarding health care, disease prevention and health promotion to maintain or improve quality of life (SØRENSEN K, et al., 2013).

According to the Health Promotion Glossary of Terms, HL *“represents the personal knowledge and competencies that accumulate through daily activities, social interactions and across generations. Personal knowledge and competencies are mediated by the organizational structures and availability of resources that enable people to access, understand, appraise and use information and services in ways that promote and maintain good health and well-being for themselves and those around them”* (WORLD HEALTH ORGANIZATION, 2021).

Several instruments have been developed so far to measure the population's HL levels, however, many of them only assess aspects of functional health literacy, characterized by the person ability to read and interpret health information (SØRENSEN K, et al., 2013; SØRENSEN K, et al., 2015; TAVOUSI M, et al., 2022). However, HL *“means more than being able to access web sites, read pamphlets and follow prescribed health-seeking behaviours. It includes the ability to exercise critical judgement of health information and resources, as well as the ability to interact and express personal and societal needs for promoting health”* (WORLD HEALTH ORGANIZATION, 2021). Therefore, those tools are insufficient to measure the HL construct more comprehensively.

Among the instruments developed to measure HL in a multidimensional way, the *European Health Literacy Survey Questionnaire* (HLS-EU-Q47) assesses the difficulty perceived by individuals in carrying out certain activities related to the field of health (KICKBUSCH I, et al., 2013; SØRENSEN K, et al., 2013; SØRENSEN K, et al., 2015). It is one of the most used instruments to measure the HL construct worldwide and has been adapted to several languages (TAVOUSI M, et al., 2022). Others, like the Health Literacy Questionnaire (HLQ)

developed in Australia demonstrated good psychometric properties and have been adapted to the Brazilian Portuguese language (OSBORNE RH, et al., 2013; MORAES KL, et al., 2021).

The HLS-EU-Q47 instrument is composed of 47 questions, which assess the self-reported difficulties of individuals to make decisions in three contexts: health care, disease prevention and health promotion. Despite its qualities to measure the HL construct more comprehensively, it is considered too long for the purposes of individual assessments in the daily context of health services (PELIKAN JM and GANAHL K, 2017).

Therefore, two short versions were developed from it, one with 16 questions (HLS-EU-Q16), named short-form and other with only 6 questions named short-short-form (HLS-EU-Q6) (PELIKAN JM and GANAHL K, 2017). They were developed by a team of the European Consortium using the HLS-EU-Q47 data based on Item Response Theory and Rasch Analysis (PELIKAN JM, et al., 2014). The HLS-EU-Q6 instrument presents 6 of the 16 items of HLS-EU-Q16 and takes about a minute of interviewing time (PELIKAN JM, et al., 2014).

Very few studies evaluated the characteristics of HSL-EU-Q6 indicate that the instrument present good psychometric properties (LORINI C, et al., 2019; ROUQUETTE A, et al., 2018). In relation to the scoring process, the developers of the instrument recommended three levels for the scale classification: inadequate, problematic and sufficient HL and stated that the “criterion was correct classification, as far as possible, compared to Q47 levels (PELIKAN JM, et al., 2014).

Therefore, no studies to date have assessed the validity of this form of categorization suggested by the authors through using a more robust analyzes to establish valid and reliable cutoff criteria for classifying HL levels using HLS-EU-Q6. If individuals are classified incorrectly on their HL level, this fact can have important implications for the planning of health service activities.

HLS-EU-Q6 was previously adapted to Brazilian Portuguese language and their psychometric properties evaluated in Brazilian adults (MIALHE FL, et al., 2021). However, the validity of the classification scores for Brazilian adults was not evaluated until the development of this research. Therefore, the aim of this study was to investigate the normative data of the Brazilian Portuguese version of HLS-EU-Q6 in Brazilian adults.

METHODS

The evaluation of the psychometric properties of HLS-EU-Q6 was carried out through a cross-sectional study with a convenience sample of 783 Brazilian adults. The detailed methodology was also described in a previous publication (MIALHE FL, et al., 2021). In short, 320 participants were from the city of São Paulo/SP and 293 from the city of Piracicaba/SP, both living next to Primary Health Units. The households were randomly selected, and adults who were present at the time of the visit were invited to participate in the research. In addition, 50 patients from a reference institution in cancer treatment in Fortaleza/CE and 120 individuals living next to a Primary Health Unit from Aparecida de Goiânia/GO, Brazil were invited to participate in the research.

The HLS-EU-Q6 consists of six questions from HLS-EU-Q47 with five response categories as follows: very difficult=1, difficult=2, easy=3, very easy=4, and a fifth alternative for when participants did not answer or did not have a definitive answer. This is labelled as “don’t know/refused and is treated as missing value (value 0). The instrument present the following statement: [On a scale that goes from “very easy” to “very difficult”, how easily you can] 1. assess when you need a second opinion from another doctor? 2. use the information that your doctor gives you to make decisions about your illness?; 3. find information on how to deal with mental health problems, such as stress or depression?; 4. Assess whether the information on health risks available in the media is reliable? (e.g. TV, Internet or other means of communication); 5. find information about activities that are good for your mental well-being? (e.g. meditation, exercise, walking, pilates, etc.); 6. understand the information available in the media on how to stay healthier? (e.g. Internet, newspapers, magazines)].

According to the authors who developed the instrument, the final individual score is a mean calculated by summing up the answers to the six questions divided by the number of items answered (PELIKAN JM, et al.,

2014). The score is calculated as long as at least five of the six questions are answered differently from 0, and varies between 1 and 4, with higher values indicating better levels of HL.

According to them, the final score values classify individuals according to three levels of HL: (likely) inadequate (≤ 2); (likely) problematic (> 2 and ≤ 3); and (likely) sufficient (> 3) (PELIKAN JM, et al., 2014). Moreover, another General HL index (G-HL16 index) can be calculated as follows: $G\text{-HL16 index} = (\text{mean} - 1) \times (50/3)$. Then, four levels of HL were defined: inadequate (0-25), problematic (25.1- 33), sufficient (33.1-42) and excellent (42.1-50) (PEDRO AR, et al., 2023).

The study of standardization goes through three stages: the first is the descriptive analysis of the items and the instrument score; second, the analysis of the distribution of the score and, finally, the confirmation that the cuts established in the distribution are able to effectively identify the participants in each range. In this way, a descriptive exploratory study of the general scores of the HLS-EU-Q6 was initially carried out. The results of the items and the total score were represented by the frequency of responses, median (Md), interquartile range (IQR), range (amp), minimum (min), maximum (max).

As a way of identifying the instrument items that can serve as relevant markers and their weights for the assessment of the NCSM, a regularized linear regression with elastic net was applied, adopting the instrument score as the dependent variable and the items as predictors. Holdout was applied as a cross-validation technique with 50% of the sample for training and 50% for testing. The first stage of normalization was carried out with the identification of the score cuts based on the distribution of participants. Despite this process, since the distribution of participants is recurrent in standardization studies, it can be distorted, as the score is not directly analyzed, but considered as a consequence of the position of the participants in the cutoff points.

In order to obtain greater precision regarding the cuts in the ranges and to verify the predictive capacity of classifying the individuals, a discriminant analysis was used for each of the ranges and the scores of the HLS-EU-Q6. Discriminant analysis aims to understand group differences and predict the probability that an entity (individual or object) belongs to a specific class or group based on several independent metric variables (HAIR JR, et al., 2019) allowing to determine which of the independent variables are most responsible for the differences in the average score profiles of the two or more groups (HAIR JR, et al., 2019)

Boedeker P and Kearns NT (2019) point out that discriminant analysis has proven to perform better than other techniques, such as: logistic regression, multinomial regression, Random forest, k-nearest neighbor and Support-vector machines, when the objective is to classify a member of a group. In this way, it can be used to confirm whether the cutoffs established by the distribution have the property of correctly classifying individuals into the bands. Data were analyzed using the statistical program SPSS v.23 and JASP 16.04. The research project was approved by the Research Ethics Committee (CAAE: 58131216.5.0000.5418; technical opinion nº 2.786.634).

RESULTS

This study included 783 individuals whose mean age was 38.6 years, and 68.1% were female. In addition, 33.5% had studied up to elementary school. **Table 1** presents the descriptive data for the items and for the instrument score. An important point is that the amplitude of the scale was used, which indicates, preliminarily, that it is effective in capturing nuances of the participants' responses. All items had the median 3.0 as the central point, with items 2, 5 and 6 having an IIQ (interquartile range) = 0 and items 1, 3 and 4 having an IIQ = 1. The median of the total score was 17 points (IIQ = 2) with a range ranging from 6 to 24, so the sample presented scores in all possible ranges.

Table 1 - Descriptive Statistics of Items and response frequency on the scale.

Questions of HLS-EU-Q6	Measures of central tendency and dispersion						Item Response Frequency (N/%)			
	Md	IIQ	Amp	Min/Max	Mean	SD	4.Very easy	3. Easy	2. Difficult	1. Very difficult
Q1. assess when you need a second opinion from another doctor?	3.0	1	3	1/4	2.73	.65	69 (8.80)	452 (57.70)	240 (30.70)	22 (2.80)
Q2. use the information that your doctor gives you to make decisions about your illness?	3.0	0	3	1/4	2.83	.60	74 (9.50)	519 (66.30)	176 (22.50)	14 (1.80)
Q3. find information on how to deal with mental health problems, such as stress or depression?	3.0	1	3	1/4	2.73	.71	82 (10.50)	449 (57.30)	211 (26.90)	41 (5.20)
Q4. assess whether the information on health risks available in the media is reliable?	3.0	1	3	1/4	2.80	.69	97 (12.40)	459 (58.60)	200 (25.50)	27 (3.40)
Q5. find information about activities that are good for your mental well-being?	3.0	0	3	1/4	3.01	.59	134 (17.10)	532 (67.90)	108 (13.80)	9 (1.10)
Q6. understand the information available in the media on how to stay healthier?	3.0	0	3	1/4		.58	106 (13.50)	567 (72.40)	93 (11.90)	17 (2.20)
Total Score	17.0	2	18	6/24	12.93	2.97				

Legend: Md – median; IIQ – interquartile range; Amp – amplitude; Min – minimum; Max – maximum; SD – standard deviation.

Source: Mialhe FL and Rebusini F, 2023.

Due to these score results, it was decided to test 3 types of ranges: the first classification model with 2 ranges was composed of the first cut in the median, thus, from 6 to 16 points (insufficient) and 17 to 24 points (sufficient). The second model was tested with 3 ranges: low (6 to 15 points), moderate (16 to 17 points) and high (from 18 to 24).

The third model proposed would be by quartiles; however, the second and third quartiles would have only one score, 16 for the 2nd and 17 for the 3rd quartile, which makes it unproductive and does not improve the accuracy of classification and interpretation of data.

The results of the discriminant analysis for model 1 were: MBox = 4.87; $p < 0.001$; λ wilks = 0.43; $F_{(1, 781)} = 1033,23$; $p < 0.001$; canonical correlation = 0.75, and it was able to correctly classify 100.00% of the original cases. Model 2 presented a result for the discriminant analysis of MBox = 319.76; $p < 0.001$; λ wilks = 0.29; $F_{(2, 780)} = 946.66$; $p < 0.001$; canonical correlation = 0.84. Model 2 was also able to correctly classify 100% of the cases. Model 3 presented a result for the discriminant analysis of MBox = 6.84; $p < 0.009$; λ wilks = 0.28; $F_{(3, 779)} = 666.58$; $p < 0.001$; canonical correlation = 0.84 and was also able to correctly classify 64.6% of the cases.

As both classification of models 1 (with 2 ranges) and 2 (with 3 ranges) were able to correctly classify the participants, it is recommended the use of the model 2 with 3 ranges, as shown in **table 2**, because HL is not a dichotomous construct (high and low), but has different levels, as already demonstrated in the literature (TAVOUSHI M, et al., 2022).

Table 2 - Classification and interpretation of HLS 6 scores in Brazilian adult sample.

	Classification	Percentile range	Score
3 track model	Low/inadequate	Up to 25	6 to 15 points
	Moderate/problematic	26 to 75	16 to 17 points
	High/sufficient	76 to 100	18 to 24 points

Source: Mialhe FL and Rebustini F, 2023.

According to the classification criteria presented above, 23.5% of the sample presented high/sufficient HL levels, 30.5% moderate/problematic HL levels and 46.0% presents low/inadequate HL levels.

Once the classification and interpretation ranges had been established, it was essential to understand the impact of the items and their influence on the formation of the score. For this, a boosting regression (machine learning technique) with Gaussian function loss and cross-validation with 5-Kfold using the total score of the instrument and the items as predictors. The regression had a Shrinkage = 0.1 with an MSE (mean standard error) in the training bank of 0.020 and 0.017 in the test bank. The model had an $R^2 = 98.4\%$ with a Mean Absolute Percentage Error (MAPE) = 24.17% and an RMSE (root mean squared error) = 0.13.

Table 3 indicates the relative influence of the instrument items. The values indicate items 3 and 6 have highest influence in the score. It is interesting to point out that both deal with issues of obtaining information regarding health problems.

Table 3 – Relative influence of item in the score.

Item	Relative Influence (%)
Q1. assess when you need a second opinion from another doctor?	17.02
Q2. use the information that your doctor gives you to make decisions about your illness?	9.58
Q3. find information on how to deal with mental health problems, such as stress or depression?	22.14
Q4. assess whether the information on health risks available in the media is reliable?	15.51
Q5. find information about activities that are good for your mental well-being?	14.26
Q6. understand the information available in the media on how to stay healthier?	21.45

Source: Mialhe FL and Rebustini F, 2023.

DISCUSSION

The present study demonstrated through a rigorous standardization process, the determination of the best cutoff points for classifying the scores of the HLS-EU-Q6 instrument in Brazilian adults.

To date, this is the first study that evaluated the validity of the scores of HLS-EU-Q6 proposed by the authors who developed the instrument. All other studies using that instrument only replicated the scores proposed by original authors to classify the HL levels of individuals in their samples (PELIKAN JM, et al., 2014; AMOAH PA, et al., 2017; VANDENBOSCH J, et al., 2018; SCHINCKUS L, et al., 2018; LORINI C, et al., 2019; ROUQUETTE A, et al., 2018).

Our results indicated that the way of scoring the instrument in Brazilian adults should be substantially different from that proposed by the original authors in order not to generate incorrect interpretations. In the original study, the HLS-EU-Q6 items were selected from HLS-EU-Q16 items based on higher item difficult and the authors recommended that the score should be calculated as a mean score by the sum of answers divided by the number of items answered (PELIKAN JM, et al., 2014). Thus, scores range from 1 to 4. According to the authors, three levels for the scale were defined, that is, “likely” inadequate (≤ 2); “likely” problematic (> 2 and ≤ 3); and “likely” sufficient (> 3) (PELIKAN JM, et al., 2014).

In the scoring proposal for the Brazilian sample, the division of the sum of responses by the number of items answered was not used. However, if that were the case, the classification criteria would be: low or “inadequate” (≤ 2); moderate or “problematic” (2.17-2.33) and high or “sufficient” (2.5-4.0). Therefore, the scale of normed scores of HLS-EU-Q6 in Brazilian adults was very different from that recommended by the original authors and used in European and other countries (PELIKAN JM, et al., 2014; AMOAH PA, et al., 2017; VANDENBOSCH J, et al., 2018; SCHINCKUS L, et al., 2018; LORINI C, et al., 2019; ROUQUETTE A, et al., 2018).

This fact has important impacts on the classification of individuals according to their HL levels. According to the classification proposed by the original authors of the HLS-EU-Q6, only 2% of the participants of this study would be classified as having sufficient levels of HL; 51.7% with problematic levels, and 46.3% with inadequate levels.

However, according to the classification proposed in the present study, 23.5% of the sample presents high/sufficient HL levels, 30.5% moderate/problematic HL levels and 46.0% presents low/inadequate HL levels, indicating a huge variation in how individuals were classified. This fact can cause serious biases in the measurement of individual and population HL levels, impacting the planning and effectiveness of interventions carried out by professionals and health services.

The results from table 3 demonstrated an interesting and new evidence related to the influence of the items on the formation of the score of HLS-EU-Q6. It was observed that the questions related to find information about how to deal with mental problems (Q3) and understand the information available in the media on how to stay healthier (Q6) had the greatest impact on the scores.

Some hypotheses can be considered to explain this fact, such as the increase in the incidence of mental problems in the world population, also mediated by aspects related to fake news and infodemics in social networks (WORLD HEALTH ORGANIZATION, 2019; BORGES DO NASCIMENTO IJ, et al., 2022).

It is pertinent to emphasize that it is difficult to compare the classification of the Brazilian sample with other studies due to the huge differences between the techniques adopted. We must bear in mind that the score of a scale is not a continuous data or restricts or eliminates the possibility of using the mean as a reference for the analyses.

The set of techniques adopted in the present study enabled the combination of descriptive and distribution techniques with techniques whose property is to classify individuals into clusters (groupings). Thus, testing more than one possibility of initial classification and subsequent assessment of the precision of the cuts adopted protects against possible biases that may be created by the imprecision of the technique adopted and prevents arbitrary options. This combination to improve the accuracy also prevents or reduces the effects of asymmetries that can affect cutoffs.

It is important to remember that the cutoffs are made by percentiles and not by the score, and the score is obtained from the position of individuals in the distribution. An example is that we may have a score that runs through more than one quartile and, if this occurs, individuals with the same score on the instrument may be in different quartiles and would present classifications in different ranges. Discriminant analysis was used to prevent this type of inaccuracy from occurring.

Another fundamental aspect is to understand that the normality of the distribution is not the rule (PINO FA, 2014) and that asymmetry can decisively affect the analyzes and consequently the interpretation of the data (VERNA JP and ABDEL-SALAM ASG, 2019).

Despite the potential of the current normative data, this study presents some limitations. The sample consisted of users of primary care who may have a different characteristic from users of private services. Data were collected only in one city. Future studies are needed for comparison of current normative data of HLS-EU-Q6 with other populations.

CONCLUSION

This study demonstrated that the HLS-EU-Q6 classification criteria to be used in Brazilian adults should be different from those proposed by the authors of the original study, so as not to generate biases in the measurement of health literacy levels in this population. The normative data of the Brazilian Portuguese version of the instrument indicated that the classification model with 3 specific ranges were able to correctly classify the participants according to their HL levels.

REFERENCES

1. AMOAH PA, et al. Health literacy and self-perceived health status among street youth in Kumasi, Ghana. *Cogent Medicine* 2017; 1: e1275091.
2. BOEDEKER P, KEARNS NT. Linear discriminant analysis for prediction of group membership: a user-friendly primer. *Advances in Methods and Practices in Psychological Science* 2019; 2(3): 250-263.
3. BORGES DO NASCIMENTO IJ, et al. Infodemics and health misinformation: a systematic review of reviews. *Bulletin of the World Health Organization*, 2022; 100(9): 544-561.
4. HAIR JR, et al. *Multivariate Data Analysis*. 7th ed. Upper Saddle River, NJ: Pearson Prentice Hall; 2019; 816p.
5. KICKBUSCH I, et al. Health literacy: the solid facts. Copenhagen (DK): WHO Regional Office for Europe; 2013. Available in: <https://apps.who.int/iris/bitstream/handle/10665/128703/e96854.pdf>. Accessed on: 05 Feb. 2023.
6. LIU C, et al. What is the meaning of health literacy? A systematic review and qualitative synthesis. *Family Medicine and Community Health*, 2020; 8(2): e000351.
7. LORINI C, et al. Florence Health Literacy Research Group. Measuring health literacy in Italy: a validation study of the HLSEU-Q16 and of the HLS-EU-Q6 in Italian language, conducted in Florence and its surroundings. *Annali dell Istituto Superiore di Sanita*, 2019; 55(1): 10-8.
8. MIALHE FL, et al. Psychometric properties of the adapted instrument European Health Literacy Survey Questionnaire short-short form. *Revista Latinoamericana de Enfermagem*, 2021; 2; 29: e3436.. Erratum in: *Revista Latinoamericana de Enfermagem*. 2022; 30: e3645.
9. MORAES KL. Validation of the Health Literacy Questionnaire (HLQ) to Brazilian Portuguese. *Acta Paulista de Enfermagem*, 2021; 34: eAPE02171.
10. OSBORNE RH, et al. The grounded psychometric development and initial validation of the Health Literacy Questionnaire (HLQ). *BMC Public Health*, 2013; 13(1): 658–74.
11. PEDRO AR, et al. Version of the HLS-EU-Q6 and HLS-EU-Q16 Questionnaire: Psychometric Properties. *International Journal of Environmental Research and Public Health*, 2023; 7; 20(4): 2892.
12. PELIKAN JM, et al. Measuring comprehensive health literacy in general populations - the HLS-EU instruments. *International Conference of Health Literacy and Health Promotion*; Taipei/Taiwan 2014. Available in: <https://www.bumc.bu.edu/healthliteracyconference/files/2014/06/Pelikan-et-al-HARC-2014-fin.pdf>. Accessed on: 05 Feb. 2023.
13. PELIKAN JM, GANAHL K. Measuring health literacy in general populations: Primary findings from the HLS-EU Consortium's health literacy assessment effort. *Studies in Health Technology and Informatics*, 2017; 240. 34-59.
14. PINO FA. A questão da não normalidade: Uma revisão. *Revista de economia agrícola*, 2014; 61(2): 17-33.
15. ROUQUETTE A, et al. Validity and measurement invariance across sex, age, and education level of the French short versions of the European Health Literacy Survey Questionnaire. *PLoS One*, 2018; 13(12): e0208091.
16. SCHINCKUS L, et al. When knowing is not enough: Emotional distress and depression reduce the positive effects of health literacy on diabetes self-management. *Patient Education and Counseling*, 2018; 101(2): 324-30.
17. SØRENSEN K, et al. HLS-EU Consortium. Health literacy in Europe: comparative results of the European health literacy survey (HLS-EU). *European Journal of Public Health*, 2015; 25(6): 1053-8.
18. SØRENSEN K, et al. Measuring health literacy in populations: illuminating the design and development process of the European Health Literacy Survey Questionnaire (HLS-EU-Q). *BMC Public Health*, 2013; 13: 1-10.
19. TAVOUSHI M, et al. Measuring health literacy: A systematic review and bibliometric analysis of instruments from 1993 to 2021. *PLoS One* 2022; 17(7): e0271524.
20. VANDENBOSCH J, et al. The impact of health literacy on diabetes self-management education. *Health Education Journal*, 2018; 77(3): 349-62.
21. VERMA JP, ABDEL-SALAM ASG. *Testing statistical assumptions in research*. 1st ed. New York: J. Willey. 2019; 224p.
22. WORLD HEALTH ORGANIZATION. The WHO special initiative for mental health (2019-2023): universal health coverage for mental health. World Health Organization. Available in: <https://apps.who.int/iris/handle/10665/310981>. Accessed on: 29 Mar. 2023.
23. WORLD HEALTH ORGANIZATION. Health promotion glossary of terms 2021. Geneva. Available in: <https://www.who.int/publications/i/item/9789240038349>. Accessed on: 29 Mar. 2023.