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Concordance between two instruments for health literacy assessment*

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Abstract

Objetivo: To determine agreement between the Short Test of Functional Health Literacy in Adults (S-TOFHLA) and the Short Assessment of Health Literacy for Portuguese-speaking Adults (SAHLPA-18) measurement instruments as a strategy for estimating concurrent validity. **Methods:** This was a cross-sectional study conducted with users of the Brazilian National Health System. An agreement approach using a weighted Kappa test for qualitative data was applied in order to test for concurrent validity. **Results:** 372 individuals participated. It was found that 66% and 62% of them did not have an adequate level of literacy according to SAHLPA-18 and S-TOFHLA, respectively. There was strong correlation between the instruments ($p<0.001$; $r=0.60$), although the 65.3% agreement of correct answers found was considered weak (Kappa=0.35; $p<0.001$). **Conclusion:** The SAHLPA-18 and S-TOFHLA instruments have different constructs and poor agreement. Use of different instruments is indicated in research intended to measure level of literacy, as is the development of instruments specific to health conditions that allow results close to the real context of individuals to be obtained.

Keywords: Health Literacy; Public Health; Reproducibility of Results; Self Care; Noncommunicable Diseases; Health Education.

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Introduction

In their clinical practice healthcare professionals constantly provide documents and information that require numerical, communication and reading skills from service users in order for them to achieve better health self-care management. Socio-educational barriers, which interfere with the simultaneous use of these skills, are frequent and limit autonomy among people in whom limited health literacy stands out.[1,2]

> *Adequate health literacy affects people's health. Literacy is understood as the cognitive and social skills that determine the individual's ability to obtain, process and understand health information in order to use it in daily life.*

Health literacy is defined as the set of cognitive and social skills that determine the individual's ability to obtain, process and understand health information in order to use it in his or her daily life.[3] Despite education and health concepts being discussed, sometimes, in isolation, there is interdependence of these basic citizenship rights in this definition of health literacy.[4] Inadequate literacy is a neglected public health problem, although it negatively impacts the individual´s clinical outcome.[5-7] Thus, literacy is a condition for self-care and therapeutic effectiveness and it is therefore recommended that health professionals stratify, in the clinical context, people who will need greater instructional support, in order to provide equitable care.[8]

Assessing something that is not tangible, such as knowledge or literacy, requires psychometric tools to be selected and applied in each situation. Some instruments have been created in an attempt to better measure individuals health literacy level, and thus outline intervention strategies. Rapid Estimate of Adult Literacy in Medicine (REALM) and the Test of Functional Health Literacy in Adults (TOFHLA) are the most described instruments in the literature.

TOFHLA, first published in 1995,[9] has been translated and cross-culturally adapted by other countries. In view of the long time taken to administer it, a shorter version of TOPHLA was developed: the Short Test of Functional Health Literacy in Adults (S-TOFHLA).[10] REALM, developed in the 1990s,[11] consists of a questionnaire that assesses the ability to recognize, read and pronounce. The Short Assessment of Health Literacy for Spanish-speaking Adults (SAHLSA) was developed inspired by REALM.[12] The adapted version for the Portuguese language, the Short Assessment of Health Literacy for Portuguese-speaking Adults (SAHLPA-18)[13,14] was based on SAHLSA-50.

The existence of these various instruments and the absence of a 'gold standard' instrument makes it difficult to compare studies in different countries and alerts, furthermore, as to the need to create new health literacy assessment tools.[15,16]

In Brazil there are few studies on cultural adaptation of literacy assessment instruments. Knowing how similar or different health literacy psychometric instrument classifications are, among diverse subpopulations with distinct social and health conditions, would help health care workers to use them more adequately. SAHLPA-18 is an easy-to-use instrument and could be used more often as a screening test in clinical practice.

The objective of this study was to determine agreement between the S-TOFHLA and SAHLPA-18 psychometric measurement instruments, as a strategy for estimating concurrent validity.

Methods

This was a study of agreement between instruments, with a cross-sectional design, conducted in the city of Paulo Afonso, state of Bahia, between August 2017 and March 2020.

Paulo Afonso is located in the Northeast region of Brazil, in the backland of Bahia. In 2019, the municipality had a population of 117,782 inhabitants, average monthly income of formal workers was 2.2 minimum wages and 43.6% of the population had *per capita* income of up to 0.5 minimum wage. The municipal schooling rate for the 6-14 age group is 96.4%. The municipality has a structured health service network, with all levels of care.[17]

Users of 22 primary health care units (PHU), including urban and rural areas, a municipal medical specialty outpatient department and a renal

replacement therapy center, were eligible for the study. Data collection was carried out weekly, in these health establishments, throughout the study period.

The participants of the study were selected based on the following criteria: being 18 years old or over; being literate; and being a registered Primary Health Care service user in the city. The exclusion criteria were self-reported use of drugs that affect cognition, and the absence of a minimum of visual acuity or adequate hearing to perform the tests or the presence of manifestations of neurological or cognitive disorders, checked using simple attention, location and temporality questions performed by the researchers.

A non-probabilistic random sample was used. Recruitment took place before the consultation, prioritizing the last individuals on the waiting list, in order to optimize time and favor greater adherence to the study. Losses and refusals were not recorded.

The minimum sample size to estimate good or high agreement (Kappa index > 0.6) and to reduce possible type II errors was 110 participants. Equal absolute agreement for adequate and inadequate literacy, as well as for disagreement, which was nine times lower, was taken into account.

The variables studied were:

a) sex (male; female);
b) age group (in years: up to 30; 30 to 59; 60 or over);
c) education (elementary school, high school or higher education, complete or incomplete); and
d) economic classification of the respondent (according to the Brazilian Economic Classification Criteria - Brazilian Criteria 2019), of the Brazilian Market Research Association [ABEP]: A; B1; B2; C1; C2; D-E).[18]

The interview was conducted by the researchers, after adequate prior training on the specifics of each test, and conducted in a room exclusively reserved for this purpose. Interviews were performed using questionnaires. The level of health literacy was assessed by SAHLPA-18 and S-TOFHLA tests.

SAHLPA-18, validated from SAHLSA, was the first instrument used.[14] 18 cards were prepared, containing different medical terms, to assess the pronunciation and understanding skills of popular medical terms. The interviewee was asked to read the highlighted term on the card aloud so that the interviewer could evaluate his or her pronunciation. Then, the interviewee had to associate the term read with one of the answer options. This is a type of questionnaire that can be administered in about three minutes, by trained professionals. For each correct answer 1 mark was awarded, and literacy was considered adequate when the individual got a number of correct answers equal to or greater than 15 points.[14]

Following this, S-TOFHLA was applied. This instrument, translated and adapted from the original version,[19] had an estimated completion time of 12 minutes, by a trained professional; its questionnaire was comprised of 36 multiple choice items for reading comprehension, and 2 marks were awarded for each correct answer. In the numerical skill assessment, four cards requiring correct interpretation of everyday health situations were presented, 7 marks were awarded for each one. Depending on the score, each individual's level of health literacy was classified as follows: scores between 0 and 53, inadequate; scores between 54 and 66, borderline; and scores between 67 and 100, adequate.[2]

The data were analyzed descriptively, in the form of absolute and relative frequency, for the health literacy classifications. Pearson's correlation test was calculated to check the relationship between scores according to the instrument.

The weighted Kappa statistic was calculated to analyze concurrent validity between the literacy measurement instruments, considering: Kappa <0.40 as weak agreement; from 0.41 to 0.60, regular agreement; from 0.61 to 0.80, good; and Kappa ≥0.81, excellent agreement.[20] Concordance analysis was applied to both the overall sample and the stratified sample, the latter according to specific chronic disease subpopulations and also by sex, age and economic classification, aiming to minimize secondary selection bias and intervening characteristics. Of this, the type of multivariate approach of this analysis consists, possible to reveal interactions between these predictors. In the case of such inferences, it will only be emphasized, as long as the main effect is present.

The chi-square test was applied to estimate the probability associated with the null hypothesis and the Kappa agreement measure. A significance level of 5% was adopted.

An authorization was requested, for the execution of this study, from the Municipal Health Department of Paulo Afonso and the Research Ethics Committee of the Federal University of Vale do São Francisco

(CEP/UFVASF), granted following Opinion No. 2,228,427, issued on August 19, 2017. All participants were invited to sign the Free and Informed Consent Form after the explanation about the objectives of the study. Only the researchers directly involved with the interviews had access to the data and signed a term making the commitment to maintain confidentiality and secrecy about all the information collected.

Results

372 individuals were included and divided into four distinct groups (Figure 1). The average time of diagnosis of the individuals in the group with hypertension was 11.9 ± 7.6 years, with kidney disease, 5.6 ± 5.9 years, and in the group with diabetes, 10.3 ± 8.6 years (data not shown in table).

The sample was predominantly composed of female (72.8%), and the mean age was 49.2 years (standard deviation: 15.6). Only 26.9% of the elderly have an adequate literacy level by SAHLPA-18 and 7.5% by S-TOFHLA. Individuals of economic classification D and E got worse results for the level of literacy, in both instruments. With regard to education, 39.2% of the respondents did not finish elementary school, an outcome reflected in literacy: 13% of those with less education had an adequate level using SALHPA-18, and only 11% using S-TOFHLA. On the other hand, 88.9% of individuals with higher education were successful in SALHPA-18 and 77.8% in S-TOFHLA (Table 1). Concentration of individuals with low education was found in the groups of economic classification up to stratum C, and in contrast, presence of high education in the groups classified as A and B ($p<0.001$). People with low education were common in the groups with kidney disease and diabetes ($p=0.010$), and there were no statistical differences in groups with hypertension or without a diagnosis of chronic diseases.

Nominally, 66% of individuals had an inadequate level of health literacy by SAHLPA-18 and 62% did not have adequate literacy by S-TOHLA; of these, 11% had borderline literacy and 51% inadequate literacy. It could be seen a statistically strong positive correlation between SAHLPA-18 and S-TOFHLA ($p <0.001$; $r=0.60$) (Figure 2). The instruments showed 65.3% agreement of correct answers in the identification of adequate and inadequate literacy: weak agreement (Kappa=0.35; $p <0.001$), as shown in Table 2.

Among individuals with hypertension, the agreement of correct answers in the classification as adequate or inadequate, was 65.6%, while with diabetes, 73.5%, considered regular agreement of correct answers: Kappa=0.40 and Kappa=0.45, respectively; $p <0.001$. However, participants with kidney disease and those without previous disease showed alignments of 67.4% (Kappa=0.27) and 52.9% (Kappa=0.21), respectively, considered weak agreement (Table 2).

When stratifying the analysis by the social conditions 'sex', 'age' and 'economic classification', the interaction between them and their influence on the level of agreement between the instruments was found (Table 3). Thus, the inferences took into account just this aspect of the analysis.

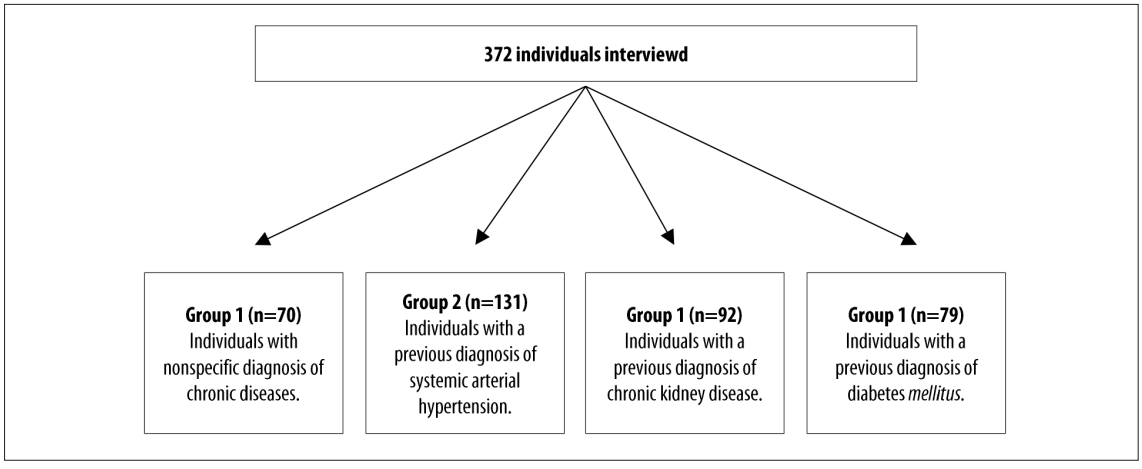


Figure 1 – Distribution of study participants (n=372), Paulo Afonso, Bahia, 2020

Table 1 – Socio-demographic and clinical characteristics and level of health literacy of the study participants (n=372), Paulo Afonso, Bahia, 2020

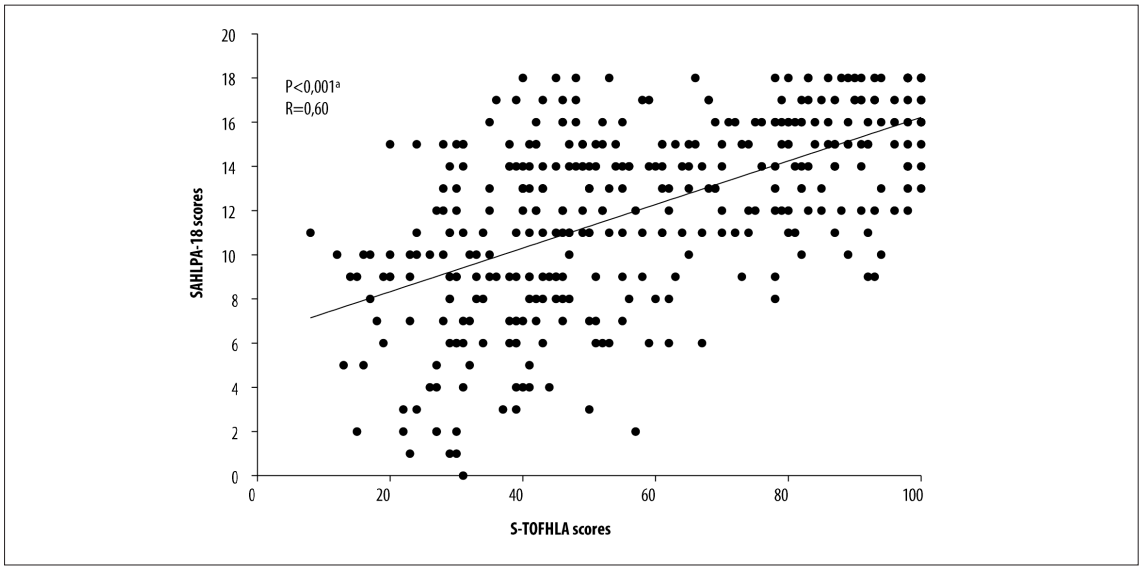
Variables	n (%)	Adequate health literacy n (%)	
		SAHLPA-18[a]	S-TOFHLA[b]
Sex			
Female	271 (72.8)	103 (38.0)	113 (41.7)
Male	101 (27.2)	24 (23.8)	29 (28.7)
Age (years)			
≤30	62 (16.7)	12 (19.4)	38 (61.3)
31-59	217 (58.3)	90 (33.2)	97 (44.7)
≥60	93 (25.0)	25 (26.9)	7 (7.5)
Education			
Incomplete elementary education	146 (39.2)	19 (13.0)	16 (11.0)
Commplete elementary education	27 (7.3)	10 (37.0)	07 (25.9)
Incomplete high school	29 (7.8)	7 (24.1)	12 (41.4)
Complete high school	124 (33.3)	52 (41.9)	70 (56.5)
Incomplete higher school	10 (2.7)	7 (70.0)	9 (90.0)
Complete higher school	36 (9.7)	32 (88.9)	28 (77.8)
Economic Classification			
A	7 (1.9)	6 (85.7)	3 (42.9)
B1	18 (4.8)	12 (66.7)	12 (66.7)
B2	66 (17.8)	34 (51.5)	38 (57.6)
C1	55 (14.8)	22 (40.0)	24 (43.6)
C2	118 (31.7)	38 (32.2)	46 (39.0)
D - E	108 (29.0)	15 (13.9)	19 (17.6)
Group			
Without chronic disease	70 (18.8)	22 (31.4)	47 (67.1)
With chronic kidney disease	92 (24.7)	21 (22.8)	20 (21.7)
With systemic arterial hypertension	131 (35.2)	52 (36.7)	55 (42.0)
With diabetes	79 (21.3)	32 (40.5)	20 (25.3)

a) SAHLPA: *short assessment of health literacy for Portuguese-speaking adults;* b) S-TOFHLA: *short test of functional health literacy in adults.*

In a group of participants without previous disease, excellent agreement could be seen in men aged 31 to 59 years of economic classification A and B (Kappa=1.00), and regular agreement in those of economic classification C, D and E (Kappa=0.50). There was also excellent agreement in classification A and B (Kappa=1.00) and regular agreement in classification C, D and E (Kappa=0.48) (Table 3), in individuals with kidney disease, still in the same age group and sex.

With regard to hypertensive patients in economic classification A and B, among women, there was regular agreement in the 31-59 age group (Kappa=0.59) and good agreement (Kappa=0.66) in those over 60 years old; among hypertensive men in the same economic classification (A and B), agreement was regular only in those over 60 years old (Kappa=0.58). In economic classification C, D and E, agreement was regular only among women between 31 and 59 years old (Kappa=0.31).

In the group of individuals with diabetes, in classification A and B, there was good agreement among women in general (Kappa=0.70). In classification C, D and E, agreement was regular among men



a) Pearson's correlation test.

Figure 2 – Correlation between the Short Assessment of Health Literacy for Portuguese-speaking Adults (SAHLPA-18) and the Short Test of Functional Health Literacy in Adults (S-TOFHLA) instruments (n=372), Paulo Afonso, Bahia, 2020

(Kappa=0.57) and among women (Kappa=0.40) between 31 and 59 years old; in participants over 60 years old, from the same economic class (C, D and E), the instruments showed excellent agreement in men (Kappa=1.00) and poor agreement in women (Kappa=0.14) (Table 3).

Discussion

SAHLPA-18 and S-TOFHLA had poor agreement in the analysis conducted with the total sample, and heterogeneous agreement when stratifying by socio-demographic subgroups and health status.

The sampling process adopted was non-probabilistic, furthermore, the number of individuals who refused to participate or were excluded from the research was not reported, limiting the representativeness of the consulted sample. The absence of sample planning for the health condition subgroups, on the other hand, restricts the capacity to minimize possible false negative errors.

Health literacy measurement instruments aim to assess the effect of various variables that contribute to the development and use of skills in the care context. The great limitation of this task is the absence of an instrument capable of assessing functional and interactive health literacy, either at the individual level, or in the context of specific groups or populations.[21,22]

The SAHLPA-18 and S-TOFHLA instruments showed statistically significant positive correlation in this study. Statistical correlation techniques only indicate whether the variation in the values of one variable follows the variation in the values of another. R can be understood as the degree of proximity of the pairs of points X and Y (the individual's score on the two literacy instruments) to a random straight line, not necessarily to the 45º line; therefore, the linear correlation found does not, by itself, mean agreement between the instruments.

In order to analyze agreement, aside from correlation, there must also be coincidence between values. Measures of agreement are generally lower than the correlation coefficients when applied to the data set.[23]

Poor agreement was found between the two instruments used. This result was probably due to the fact that the analyzed questionnaires measured different constructs of health literacy; SAHLPA focuses on word recognition and pronunciation, while TOFHLA aims to assess an individual's numerical ability and reading comprehension about health information.[22]

Advanced age is a relevant factor for level of health literacy, given that, throughout the aging process,

Table 2 – Analysis of agreement between Short Assessment of Health Literacy for Portuguese-speaking Adults (SAHLPA-18) and Short Test of Functional Health Literacy in Adults (S-TOFHLA) in individuals without previous disease, with hypertension, chronic kidney disease or diabetes (n=372), Paulo Afonso, Bahia, 2020

SAHLPA-18	S-TOFHLA			Total n (%)	Kappa	p-value[a]
	Inadequate n (%)	Adequate n (%)	Borderline n (%)			
Without previous disease						
Inadequate	17 (24.3)	27 (38.6)	4 (5.7)	48 (68.6)		
Adequate	2 (2.9)	20 (28.6)	–	22 (31.4)	0,21	0.007
Total	19 (27.1)	47 (67.1)	4 (5.7)	70 (100.0)		
Kidney disease						
Inadequate	52 (56.5)	10 (10.9)	9 (9.8)	71 (77.2)		
Adequate	8 (8.7)	10 (10.9)	3 (3.3)	21 (22.8)	0,27	0.001
Total	60 (65.2)	20 (21.7)	12 (13.0)	92 (100.0)		
Hypertension						
Inadequate	46 (35.1)	15 (11.5)	18 (13.7)	79 (60.3)		
Adequate	9 (6.9)	40 (30.5)	3 (2.3)	52 (39.7)	0,40	<0.001
Total	55 (42.0)	55 (42.0)	21 (16.0)	131 (100.0)		
Diabetes						
Inadequate	42 (53.2)	4 (5.1)	1 (1.3)	47 (59.5)		
Adequate	12 (15.2)	16 (20.3)	4 (5.1)	32 (40.5)	0,45	<0.001
Total	54 (68.4)	20 (25.3)	5 (6.3)	79 (100.0)		
Total						
Inadequate	157 (42.2)	56 (15.1)	32 (8.6)	245 (65.9)		
Adequate	31 (8.3)	86 (23.1)	10 (2.7)	127 (34.1)	0,35	<0.001
Total	188 (0.5)	142 (8.2)	42 11.3)	372 (100.0)		

a) Chi-square test.

cognitive changes may occur that interfere with the person's degree of understanding.[7] This fact was found in this study, in which a low proportion of elderly showed an adequate level of literacy, as well as having interfered in the agreement between the instruments used. Educational level, in isolation, is an inaccurate tool for assessing health literacy: it quantifies the time spent in years of study in formal education, without considering the individual's real learning.[24] An individual can master writing and reading skills without being able to put them into use in daily practice, for example, to understand a medical prescription, package insert, information poster or test results.[25] It could be seen that only a very small proportion of the participants with incomplete elementary education showed adequate literacy levels, using the SAHLPA-18 and S-TOFHLA instruments. Higher levels of education were also not a guarantee of good performance as assessed by the two instruments.

Having a high level of education does not necessarily imply adequate health literacy.[26] For individuals with kidney disease, it can be seen that the instruments examined do not show better agreement among wealthier individuals, with better educational level, such as being an expert in aviation procedures or having early childhood education does not guarantee that the individual has minimal knowledge on self-care, it just makes learning easier.

The trend of finding a better level of literacy in the higher economic classifications could be attributed to the fact that people with higher income have greater opportunities for study and intellectual development. The functional literacy indicator shows that the proportion of illiterate people and people with a

Table 3 – Agreement between the Short Assessment of Health Literacy for Portuguese-speaking Adults (SAHLPA-18) and the Short Test of Functional Health Literacy in Adults (S-TOFHLA) stratified by sex, age group and economic classification in patients without previous disease, with hypertension, chronic kidney disease or diabetes (n=372), Paulo Afonso, Bahia, 2020

Age	Sex	Without/previous disease			Kidney disease			Hypertension			Diabetes		
		Kappa	n	p-value[a]	Kappa	n	p-value	Kappa	n	p-value	Kappa	n	p-value
Economic Classification: C, D e E													
≤30	Female	0.11	33	0.100	–	9	–	0.14	4	0.240	–	1	–
	Male	0.20	4	0.500	0.11	5	0.360	–	1	–	–	–	–
	Total	0.12	37	0.070	0.11	14	0.170	0.13	5	0.170	–	1	–
31-59	Female	0.10	14	0.590	0.37	18	0.040	0.31	61	0.001	0.40	23	0.030
	Male	0.50	4	0.240	0.48	27	0.003	0.46	7	0.140	0.57	6	0.120
	Total	0.19	18	0.300	0.45	45	<0.001	0.32	68	0.001	0.43	29	0.010
≥60	Female	–	–	–	–	5	–	0.07	14	0.530	0.14	23	0.030
	Male	–	–	–	–	9	–	–	5	1.000	1.00	8	0.005
	Total	–	–	–	–	14	–	0.06	19	0.610	0.24	47	0.007
Total	Female	0.11	47	0.130	0.21	32	0.090	0.29	79	<0.001	0.27	47	0.010
	Male	0.33	8	0.200	0.44	41	<0.001	0.19	13	0.220	0.75	14	0.003
	Total	0.14	55	0.060	0.33	73	<0.001	0.27	92	<0.001	0.34	61	0.001
Economic Classification: A e B[b]													
31-59	Female	0.11	10	0.720	0.07	5	0.810	0.59	23	0.002	–	9	–
	Male	1.00	2	0.160	1.00	3	0.080	0.27	4	0.290	–	1	–
	Total	0.40	12	0.160	0.27	8	0.330	0.54	27	0.010	0.61	10	0.030
≥60	Female	–	–	–	0.14	4	0.500	0.66	6	0.080	0.57	6	0.120
	Male	–	–	–	–	6	–	0.58	5	0.050	–	2	–
	Total	–	–	–	0.08	4	0.490	0.53	11	0.010	0.33	8	0.120
Total	Female	0.11	13	0.650	0.07	9	0.730	0.66	29	<0.001	0.70	15	0.007
	Male	1.00	2	0.150	0.21	10	0.490	0.50	10	0.020	0.14	3	0.380
	Total	0.28	15	0.250	0.05	19	0.750	0.63	39	<0.001	0.55	18	0.009
Total													
≤30	Female	0.14	36	0.050	–	9	–	0.14	4	0.240	–	1	–
	Male	0.20	4	0.500	0.07	6	0.430	0.33	2	0.150	–	–	–
	Total	0.15	40	0.040	0.09	15	0.200	0.20	6	0.080	–	1	–
31-59	Female	0.21	24	0.230	0.27	23	0.090	0.43	84	<0.001	0.58	7	0.080
	Male	0.66	6	0.080	0.55	30	<0.001	0.38	11	0.070	0.59	39	<0.001
	Total	0.33	30	0.040	0.42	53	<0.001	0.42	95	<0.001	0.21	29	0.010
≥60	Female	–	–	–	0.05	9	0.700	0.32	20	0.060	0.21	29	0.010
	Male	–	–	–	0.04	15	0.680	0.24	10	0.140	0.51	10	0.020
	Total	–	–	–	0.05	24	0.570	0.29	30	0.010	0.27	39	0.002
Total	Female	0.18	60	0.030	0.14	41	0.190	0.43	108	<0.001	0.43	62	<0.001
	Male	0.44	10	0.090	0.39	51	0.001	0.32	23	0.010	0.52	17	0.010
	Total	0.21	70	0.010	0.27	92	0.001	0.40	131	<0.001	0.45	79	<0.001

a) Chi-square test; b) The ≤30 years age group and economic classification A and B did not have sufficient observations to enable statistical analysis.

rudimentary level of literacy decreases significantly as income increases.[27,28]

Despite the existence of these individual determinants, the wide range of this theme does not allow limited health literacy to be attributed solely to individual competence.[29] Sometimes health systems are overloaded, constantly resulting in the time for consultations being reduced, as such the information provided to the service user is not appropriately transmitted. Furthermore, healthcare professionals tend to use complex and technical terms that are difficult for the population to understand, especially when they are not concerned with adapting this vocabulary to the socio-educational condition of each person receiving medical care. Given these factors, we can conclude that health care involves shared responsibility, for example, between a doctor and the patient.[27] Most of the work on health literacy in Brazil is recent and highlights the need to better explore the instruments used, in the context of the country's socio-cultural reality.[30] In addition to the adequacy of the instrument for the population, it is essential to ensure that the results obtained are faithful to the proposed measurement objective, and that they can also be used in comparison with other population studies or in guiding work practices and public policies.

Poor agreement was found between SAHLPA-18 and S-TOFHLA in measuring the level of health literacy. Therefore, the use of more than one measurement instrument in research to assess the global level of health literacy is indicated. For clinical practice and use in services, the development and validation of specific instruments, appropriate to the health conditions present, that allow results to be closer to the context of individuals, is indicated.

Authors' contributions

Cangussu LR, Sartori Alho EA and Cardoso FEL designed the study, analyzed and interpreted the data and drafted the first version of the manuscript. Tenório APO and Barbosa RHA analyzed and interpreted the data and critically reviewed the manuscript. Lopes JM and Lopes MR designed the research, analyzed and interpreted the data, critically reviewed and drafted the first version of the manuscript. All authors approved the final version and are responsible for all aspects of the work, including ensuring its accuracy and integrity.

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