

## RESEARCH ARTICLE

# Assessment of psychometric properties of the Health Literacy Short-Form 12 among hypertensive patients from a barangay in Manila

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## ABSTRACT

**Background:** Health literacy is important in the self-management of hypertension. It is, thus, necessary to assess the health literacy of hypertensive patients to identify health literacy gaps and make appropriate interventions. A prerequisite to health literacy assessment is an accurate and efficient measurement of health literacy.

**Objective:** This study examined the psychometric properties of the Filipino version of Health Literacy Short-Form 12 (HLS-SF12) among adult patients with hypertension.

**Methodology:** A cross-sectional study was conducted among 47 hypertensive patients from a selected barangay who were registered in the local health center. Data were analyzed using correlation analysis, Cronbach's alpha test, and Mann-Whitney U test.

**Results:** The acceptability was demonstrated by the absence of missing data, lack of significant floor and ceiling effects, and adequate distribution of scores. Cronbach's alpha was 0.78, and most corrected item-total correlations ranged from .31 to .58, which suggested satisfactory reliability. The pattern of interdomain correlations ( $r = .38-.69$ ) and domain score-total score correlations ( $r = .76-.91$ ) supported the construct validity of the instrument. Known-groups validity was also exhibited by the lower health literacy scores among those with primary education than those with secondary or tertiary education (median: 22.22 vs 29.17,  $p = 0.04$ ).

**Conclusion:** Satisfying the set criteria, the Filipino version of HLS-SF12 is an acceptable, reliable, and valid instrument to measure the health literacy of adult hypertensive patients in a selected barangay in Manila.

**Keywords:** health literacy, psychometric properties, hypertension, health literacy short-form 12 (HLS-SF12), Filipino

## Introduction

The increasing recognition of health literacy in public health has prompted numerous initiatives across different countries around the world [1]. Several studies have demonstrated a link between health literacy and health outcomes [2]. It has been shown that limited health literacy is associated with poor health status [3], greater use of health care services [4, 5], and higher health care costs [5]. Its growing importance in the local setting is exemplified by the inclusion of health literacy in the National Unified Health Research Agenda 2017-2022 [6].

Health literacy has been comprehensively defined as the “knowledge, motivation, and competencies to access, understand, appraise, and apply health information in order to

make judgments and take decisions in everyday life concerning healthcare, disease prevention, and health promotion to maintain or improve quality of life during the life course” [7]. The concept of health literacy highlights the ability to make sound health decisions that are crucial in the self-management of chronic diseases such as hypertension [8].

In the Philippines, hypertension continues to be an important public health challenge. Although hypertension increases the risk for multiple cardiovascular diseases, the rate of blood pressure control remains low [9,10]. Shi *et al.* explored the relationship between health literacy and hypertension management among patients from a community health center [11]. Compared with patients with high health literacy, those with low health literacy were

less compliant with medication use, regular physical exercise, and home blood pressure measurement. In addition, those with low health literacy tended to have poorer blood pressure control and lower quality of life. It is thus necessary to assess the health literacy of hypertensive patients to identify health literacy gaps and make appropriate interventions. A prerequisite to health literacy assessment is an accurate and efficient measurement of health literacy [12].

Several instruments have been made to measure health literacy rapidly, but these were not able to capture the encompassing definition and conceptualization of health literacy [13]. The Health Literacy Short-Form 12 (HLS-SF12) was developed using nationwide data in Taiwan and was validated in six Asian countries [14]. It can serve as a quick and comprehensive tool to assess health literacy in clinical and research settings [13,14]. However, it is necessary to investigate its performance prior to use in a different country, culture, or language. Validity and reliability assessments, along with translation and adaptation of a tool, allow for the comparison of the tool's measurements across countries and is easier to conduct as compared to creating a new tool entirely [15]. Tavakol and Dennick (2011) define validity as "the extent to which an instrument measures what it is intended to measure" [16]. On the other hand, reliability is the extent to which an instrument can get similar measurements despite random variation [16,17]. The lack of evidence of the reliability and validity of an instrument in new contexts might threaten the basis of the research findings and generalizations [18].

This study aimed to assess the psychometric properties of the Filipino version of HLS-SF12 among adult hypertensive patients in a selected barangay in Manila. Specifically, this study aimed to identify the reliability and validity of the HLS-SF12 by measuring the internal consistency, construct validity, and known-groups validity. The acceptability of the HLS-SF12 would be determined by examining missing data and score distribution.

## Methodology

### *Study Design and Sampling*

The HLS-SF12 was utilized in the assessment of health literacy components in the study of Mamangon *et al.* (2018) [19]. A cross-sectional research design was employed. The study population included 25 to 59-year-old hypertensive patients who were residing in a selected barangay in Manila and were registered in the local health center. Non-probability sampling method was applied in recruiting respondents. Recruitment flyers were distributed to all households in the barangay, and informed consent was provided by the respondents before inclusion in the study. This study was conducted in accordance with the Declaration of Helsinki. The ethical clearance for the conduct of the study was issued by the University of the Philippines Manila Research Ethics Board (UPMREB Code: 2017-507-UND), dated 08 January 2018. The study was implemented from January to February 2018.

### *Health Literacy Measurement*

The HLS-SF12 is a 12-item questionnaire for measuring health literacy. It was grounded on the conceptual model formulated by Sørensen *et al.*, which consisted of four modes of information processing (access, understand, appraise, and apply) across three health literacy domains: health care, disease prevention, and health promotion [14]. As seen in Table 1, each of the 12 questions in the HLS-SF12 represents a particular component of health literacy. Various health literacy indices can then be constructed from the framework matrix. The general health literacy index included all items to provide an overall assessment, whereas the sub-indices combined different sets of related items to represent specific aspects of health literacy [3]. Sub-indices for health literacy domains are based on the items per row in the matrix, while the sub-indices for modes of information processing are based on the items per column in the matrix. Permission to use the questionnaire was granted by the original author.

**Table 1.** Matrix of the HLS-SF12.

	Access information relevant to health	Understand information relevant to health	Appraise information relevant to health	Apply information relevant to health
<b>Healthcare</b>	Q1	Q2	Q3	Q4
<b>Disease Prevention</b>	Q5	Q6	Q7	Q8
<b>Health Promotion</b>	Q9	Q10	Q11	Q12

The perceived difficulty of each item in the HLS-SF12 was rated on a 4-point Likert scale (1 = very difficult, 2 = difficult, 3 = easy, and 4 = very easy). The scores for different health literacy indices were computed using (1):

$$Index = (M - 1) \times (50/3). (1)$$

*Index* was the health literacy score for the specific index calculated, and *M* referred to the mean of all participating items. The index scores could vary from 0 to 50 which corresponded to the lowest health literacy and the highest health literacy, respectively [13]. The index scores were classified into four levels of health literacy using the score intervals in the full-form instrument: 'inadequate' (0–25), 'problematic' (>25–33), 'sufficient' (>33–42), and 'excellent' (>42–50) health literacy. The 'inadequate' and 'problematic' categories were merged to a single category, called 'limited health literacy,' as done by the HLS-EU Consortium [3].

The Filipino version of the HLS-SF12 was tested in this validation study. The original English questionnaire underwent forward translation to Filipino and backward translation to English. The back-translated version was compared with the original version, and the discrepancies were identified and corrected. This process was repeated until equivalence between the source material and the back-translation was met. Afterwards, the Filipino version of HLS-SF12 was pretested through unstructured interviews in the barangay adjacent to the study site. It included a convenience sample of 10 hypertensive patients who were 25 to 59 years old and were registered under the local health center. The items were reviewed in terms of format, content, and understandability and were subsequently revised.

#### *Data Collection*

House visits were made to those who indicated willingness to participate in the study on the filled-out recruitment flyers. Informed consent was obtained from each respondent before participation. Face-to-face interviews were then conducted via pen-and-paper interview method. Sociodemographic characteristics consisting of age, sex, educational attainment, employment status, and family income were asked. This was followed by the administration of the Filipino version of HLS-SF12.

#### *Data Analysis*

Frequencies and proportions were used to present categorical variables, while means and standard deviations

were computed for numerical variables. The acceptability of the instrument was assessed by determining the proportion of missing data and the distribution of scores. It was recommended that the proportion of missing data should be <10%, observed scores should cover the full score range, and skewness statistics should lie between -1 and +1 [20]. Additionally, floor and ceiling effects should be kept to a minimum. A proportion of 15% of respondents who got the lowest and the highest possible scores indicated the existence of significant floor and ceiling effects, respectively [21].

Reliability analysis used Cronbach's alpha coefficients and corrected item-total correlations to estimate the internal consistency. Cronbach's alpha was considered acceptable if it is between 0.70 and 0.95. Meanwhile, the corrected item-total correlations should be greater than 0.20 [20].

For construct validity, the correlations between the scores in different domains as well as the domain score-total score correlations were reported using Pearson correlation coefficient (*r*). The absolute values were interpreted as follows:  $0 < r < 0.3$  (weak),  $0.3 < r < 0.7$  (moderate), and  $0.7 < r < 1.0$  (strong) [22]. The known-groups validity was also assessed through Mann-Whitney U test to compare the median health literacy scores between groups with different educational attainment. The anticipated difference of lower general health literacy among those with primary education than those with secondary or tertiary education was based on the findings of foreign [23,24] and local studies [25,26]. The level of significance was set at 0.05. All analyses were performed using Stata/MP 13.0.

## **Results**

### *Sociodemographic Characteristics of the Respondents*

A total of 47 hypertensive patients participated in the study. The mean age of the respondents was 50.8 years old (Min-Max = 27-59 years old). Majority were females (61.70%) and had completed at most secondary education (61.70%). In addition, 65.96% were unemployed, and 63.83% reported having a monthly family income greater than the poverty threshold (Table 2).

### *Acceptability*

The acceptability of the instrument was based on meeting the desired properties related to missing data, floor and ceiling effects, and score distributions. No item had any missing response, and the scores for different health literacy

**Table 2.** Distribution of respondents according to sociodemographic characteristics, Manila, 2018 (n=47).

Sociodemographic Characteristics	Frequency	Proportion, %
Age (Mean ± SD)	50.8 ± 7.4	
<b>Sex</b>	29	61.70
Female	18	38.30
Male		
<b>Educational Attainment<sup>1</sup></b>	19	19.15
Primary	29	61.70
Secondary	8	17.02
Tertiary		
<b>Employment Status</b>		
Employed	16	34.04
Unemployed	31	65.96
<b>Family Income<sup>1</sup></b>		
Below poverty threshold	16	34.04
Not below poverty threshold	30	63.83

<sup>1</sup>Total percentage may not add up to 100% due to missing data.

**Table 3.** Missing data, score range, floor and ceiling effects, skewness, and Cronbach's alpha of the HLS-SF12, Manila, 2018 (n=47).

Health Literacy Index	Missing Data, %	Score Range	Floor Effect, %	Ceiling Effect, %	Skewness	Cronbach's Alpha
General	0	36.11	0	0	0.02	0.78
Health care	0	37.50	0	2.13	0.22	0.44
Disease Prevention	0	41.67	0	4.26	0.01	0.55
Health Promotion	0	41.67	0	2.13	-0.35	0.60

indices could be computed for all respondents. The reported scores spanned a wide portion of the possible score ranges (36.11 - 41.67). For each of the selected indices, no significant floor and ceiling effects were detected because the proportions of respondents with a score of 0 and a score of 50 were both less than 15%. The skewness statistics of the score distributions ranged from -0.35 to 0.22 (Table 3).

### Reliability

The Cronbach's alpha of the HLS-SF12 was 0.78 for the 12 items (Table 3). Removal of any single item resulted in a lower overall value, except for item 4, which was "Call an ambulance in an emergency." If item 4 was deleted, a higher Cronbach's alpha of 0.81 was observed. Moreover, the corrected item-total correlation for item 4 was -.09, while the corrected item-total correlations for the other items ranged from .31 to .58. Table 3 presents the Cronbach's alpha of the domains of health care, disease prevention, and health promotion which were 0.44, 0.55, and 0.60, respectively.

### Validity

The result of the construct validity analysis is seen in Table 4. Each health literacy domain displayed a strong

correlation with the overall scale ( $r = .76-.91$ ), but the correlations between health literacy domains were only moderate ( $r = .38-.69$ ).

The result of the other validity assessment using known-groups validity is shown in Table 5. Those who completed primary education had lower general health literacy scores than those who finished secondary or tertiary education. Differences in the index scores of general health literacy as well as appraising and applying health information were statistically significant.

### Health Literacy Levels

The proportion of respondents with limited general health literacy was 65.96%. Majority of the respondents had limited health literacy in the domains of health care and disease prevention. Meanwhile, majority of the respondents have sufficient or excellent health literacy in the health promotion domain (Table 6).

## Discussion

The aim of this study was to assess the psychometric properties of the Filipino version of HLS-SF12 in measuring

**Table 4.** Inter-domain score correlations and domain score-total score correlations of the HLS-SF12, Manila, 2018 (n=47).

Health Literacy Index	Health care	Disease Prevention	Health Promotion	General
Health care	1.00			
Disease Prevention	0.57	1.00		
Health Promotion	0.38	0.69	1.00	
General	0.76	0.91	0.84	1.00

**Table 5.** Median scores in different health literacy indices by educational attainment of respondents, Manila, 2018 (n=46).

Health Literacy Index	Primary Education (n=9)	Secondary or Tertiary Education (n=37)	p-value
	Median (IQR)		
General	22.22 (18.06-31.94)	29.17 (26.39-34.72)	0.04 <sup>1</sup>
Access	27.78 (16.67-38.89)	33.33 (27.78-38.89)	0.40
Understand	27.78 (22.22-33.33)	33.33 (33.33-38.89)	0.08
Appraise	22.22 (16.67-22.22)	27.78 (22.22-33.33)	0.03 <sup>1</sup>
Apply	16.67 (16.67-22.22)	27.78 (22.22-33.33)	0.002 <sup>1</sup>

<sup>1</sup>Statistically significant.

**Table 6.** Distribution of respondents according to health literacy level across different health literacy indices, Manila, 2018 (n=47).

Health Literacy Index	Proportion				
	Limited			Sufficient, %	Excellent, %
	Inadequate, %	Problematic, %	Total, %		
General	29.79	36.17	65.96	29.79	4.26
Health care	46.81	21.28	68.09	29.79	2.13
Disease Prevention	44.68	14.89	59.57	36.17	4.26
Health Promotion	31.91	12.77	44.68	42.55	12.77

the health literacy of adult hypertensive patients in a selected barangay in Manila. The acceptability of the instrument was demonstrated by the absence of missing data, lack of significant floor and ceiling effects, and adequate distribution of scores. A low proportion of missing data may suggest that the items were not confusing or the questionnaire layout was not problematic [27]. However, item non-response was likely diminished by the face-to-face interview method because interviewers could motivate respondents to answer and ensure completion of the questionnaire. The minimal floor and ceiling effects indicated the ability of the instrument to detect differences between groups as well as changes in health literacy level [21,27]. Despite the mild skewness, the scores remained normally distributed, so statistical tests with normality assumptions can be done without requiring data transformation [28].

The results of this study reflected the satisfactory reliability of the HLS-SF12. The Cronbach's alpha was 0.78 for the overall instrument, which was above the recommended lower limit of 0.70 [20]. The obtained estimate is lower than that of earlier validation studies in several Asian countries (Cronbach's alpha = 0.79-0.90) [13, 14,23]. The lower value of Cronbach's alpha in this study may be attributed to the small sample size of 47. Earlier validation studies had large sample sizes ranging from 403 to 2,073 which may raise the value of Cronbach's alpha by increasing the covariance among item responses [29]. Nonetheless, internal consistency was still acceptable in this study, implying that the items of HLS-SF12 measure the same construct of general health literacy [20]. It was further supported by the corrected item-total correlations which exceeded the prescribed threshold of 0.2, except for item 4 ("Call an ambulance in an emergency").

Although deletion of item 4 may increase the Cronbach's alpha of the whole instrument, it cannot be simply removed since it solely corresponded to the dimension of applying health information in the healthcare domain.

As for the sub-indices of health literacy, Cronbach's alpha coefficients were 0.44, 0.55, and 0.60 for health care, disease prevention, and health promotion domains, respectively. Values below the recommended Cronbach's alpha of  $\geq 0.70$  were similarly found in the three health literacy domains in Indonesia [14] and Vietnam [23]. According to Tavakol and Dennick [16], the short test length and heterogeneity of items may explain the low Cronbach's alpha. Indeed, the health literacy domains in the HLS-SF12 included only four items, each representing different dimensions within a domain.

The pattern of interdomain correlations and domain score-total score correlations supported the construct validity of the instrument [30]. Construct validity refers to the extent to which the "operationalized items measure the concept intended for analysis" [18]. The interdomain correlations were only moderate which suggested some distinctness between the three health literacy domains [27]. The strong correlations of domain scores with the total scores indicated that the domain constructs were components of the broader construct of general health literacy. Therefore, each health literacy domain contributed to the overall measure of health literacy with minimum overlap [30].

In addition, known-groups validity was exhibited by the HLS-SF12. It was able to detect differences between groups expected a priori to score differently [15,17]. Consistent with previous studies [23-26], respondents with a higher educational attainment had a higher general health literacy than those with a lower educational attainment. According to Paakkari, L. and Paakkari, O. [31], formal education can equip individuals with knowledge relevant to health and develop health-related skills and critical thinking that are fundamental to health literacy.

Differences between subgroups by educational attainment were more pronounced in appraising and applying health information than in accessing and understanding health information. Appraisal and application demand higher-order cognitive skills which are more likely to be enhanced in higher levels of education. On the other hand, accessing and understanding calls upon basic reading, writing, and speech skills that should be learned at the first level of education. This may explain why those who completed up to primary

education had a disadvantage in appraising and applying but not so much in accessing and understanding. Furthermore, rapid proliferation of online health information may contribute to the greater capacity to access and understand health information [32].

In this study, general health literacy was limited in 65.96% of hypertensive patients aged 25 to 59 in a selected barangay. This obtained proportion is higher than those of prior studies wherein the proportions of limited general health literacy among different patient populations ranged from 45.5% to 65.1% [24,33-35]. Among the three health literacy domains, the proportion of limited health literacy in this study was highest in health care. This is similar to the findings of Kayupova *et al.* [33] who assessed the health literacy of visitors of district polyclinics. In contrast, studies involving inpatients or outpatients of hospitals found that the proportions of limited health literacy were lowest in the health care domain [24,34,35]. The disparity may be attributed to the health facilities utilized by the study populations. Adhikary and colleagues [36] found better interpersonal communication in higher care facilities, such as hospitals, than in community clinics and other primary care facilities. Good communication between patients and health care providers may facilitate the development of health literacy by promoting information exchange and patient engagement in the health care setting [37].

This study had some limitations. First, the cross-sectional study design cannot be used to examine test-retest reliability [13]. Second, since the respondents were recruited voluntarily, they may not be representative of the whole population. Ethical considerations also introduced constraints in the recruitment process, hence the small sample size. Recruitment was done by distributing recruitment flyers among households and only those who expressed interest in participating in the study were screened and included. The small sample size, along with volunteer bias, may confer limitations in the generalizability of the findings. Third, the sample size was deemed insufficient to provide stable estimates from factor analyses [38]. Conducting this study among a larger, random sample is therefore recommended.

The preliminary evidence of acceptability, reliability, and validity suggests that the Filipino version of HLS-SF12 can be used to measure health literacy. However, it is important to note that the study site is located in the National Capital Region (NCR), which is distinctly different from the rest of the country. Further testing is recommended if it is to be utilized outside NCR due to possible cultural and linguistic

differences. The validation of this instrument among younger and older age groups as well as other patient populations is suggested for future research.

## Conclusion

Satisfying the set criteria, the Filipino version of HLS-SF12 is an acceptable, reliable, and valid instrument to measure the health literacy of adult hypertensive patients in a selected barangay in Manila. Majority of the respondents were found to have limited general health literacy. The results of the study reinforce the call for health literacy interventions in patient care.

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## References

1. Pleasant A. (2013) Health Literacy Around the World: Part 1 Health Literacy Efforts Outside Of the United States. In: Institute of Medicine. Health Literacy: Improving Health, Health Systems, and Health Policy Around the World: Workshop Summary, Washington, DC: National Academies Press, pp. 97-206.
2. Berkman ND, Sheridan SL, Donahue KE, Halpern DJ, Crotty K. (2011) Low health literacy and health outcomes: an updated systematic review. *Annals of Internal Medicine* 155(2):97-107. doi: 10.7326/0003-4819-155-2-201107190-00005
3. HLS-EU Consortium. (2012) Comparative report on health literacy in eight EU member states (Second Revised and Extended Version).
4. Diederichs C, Jordan S, Domanska O, Neuhauser H. (2018) Health literacy in men and women with cardiovascular diseases and its association with the use of health care services - Results from the population-based GEDA2014/2015-EHIS survey in Germany. *PLoS One* 13(12): e0208303. doi: 10.1371/journal.pone.0208303
5. Vandebosch J, Van den Broucke S, Vancorenland S, Avalosse H, Verniest R, Callens M. (2016) Health literacy and the use of healthcare services in Belgium. *Journal of Epidemiology and Community Health* 70(10):1032-1038. doi: 10.1136/jech-2015-206910.
6. Philippine National Health Research System. (n.d.) National Unified Health Research Agenda 2017-2022.
7. Sørensen K, Van den Broucke S, Fullam J, *et al.* (2012) Health literacy and public health: a systematic review and integration of definitions and models. *BMC Public Health* 12:80. doi: 10.1186/1471-2458-12-80
8. Ding W, Li T, Su Q, Yuan M, Lin A. (2018) Integrating factors associated with hypertensive patients' self-management using structural equation modeling: a cross-sectional study in Guangdong, China. *Patient Preference and Adherence* 12:2169–2178. doi: 10.2147/PPA.S180314
9. Sison J, Divinagracia R, Nailes J. (2020) Asian management of hypertension: Current status, home blood pressure, and specific concerns in Philippines (a country report). *Journal of Clinical Hypertension* 22:504-507. doi: 10.1111/jch.13802
10. Castillo RR, Atilano AA, David-Ona DI, *et al.* (2019) May Measurement Month 2017: an analysis of blood pressure screening in the Philippines-South-East Asia and Australasia. *European Heart Journal Supplements* 21(Suppl D):D92-D96. doi: 10.1093/eurheartj/suz066
11. Shi D, Li J, Wang Y, *et al.* (2017) Association between health literacy and hypertension management in a Chinese community: a retrospective cohort study. *Internal and Emergency Medicine* 12(6):765–776. doi: 10.1007/s11739-017-1651-7
12. Woudstra AJ, Meppelink CS, Pander Maat H, Oosterhaven J, Franssen MP, Dima AL. (2019) Validation of the short assessment of health literacy (SAHL-D) and short-form development: Rasch analysis. *BMC Medical Research Methodology* 19(1):122. doi: 10.1186/s12874-019-0762-4
13. Duong TV, Chang PW, Yang SH, *et al.* (2017) A New Comprehensive Short-form Health Literacy Survey Tool for Patients in General. *Asian Nursing Research* 11(1):30–35. doi: 10.1016/j.anr.2017.02.001
14. Duong TV, Aringazina A, Kayupova G, *et al.* (2019) Development and validation of a new Short-Form Health Literacy Instrument (HLS-SF12) for the general public in six Asian countries. *Health Literacy Research and Practice* 3(2):e91-e102. doi: 10.3928/24748307-20190225-01
15. Yasir Arafat SM, Chowdhury H, Qusar MMA, Hafez M. (2016) Cross cultural adaptation and psychometric validation of research instruments: A methodological review. *Journal of Behavioral Health* 5(3):129-136. doi: 10.5455/jbh.20160615121755
16. Tavakol M, Dennick R. (2011) Making sense of Cronbach's alpha. *International Journal of Medical Education* 2:53–55. doi: 10.5116/ijme.4dfb.8dfd
17. Fayers PM, Machin D. (2016) Quality of Life: The

- Assessment, Analysis and Reporting of Patient-Reported Outcomes, 3rd ed. United Kingdom: John Wiley & Sons, Ltd.
18. Kim Y. (2009) Validation of psychometric research instruments: The case of information science. *Journal of the American Society for Information Science and Technology* 60(6):1178–1191. doi: 10.1002/asi.21066
  19. Mamangon MAM, Abantao DMS, Bataga KAV, *et al.* (2018) Medication adherence among diagnosed hypertensive patients aged 25-59 years old in a selected barangay in Manila [unpublished manuscript]. College of Public Health, University of the Philippines Manila.
  20. Martinez-Martin P, Forjaz M. (2012) How to evaluate validation data. In Sampaio C, Goetz CG, Schrag A (eds.). *Rating Scales in Parkinson's Disease: Clinical Practice and Research*, New York: Oxford University Press, Inc., pp. 16-41.
  21. Terwee CB, Bot SD, de Boer MR, *et al.* (2007) Quality criteria were proposed for measurement properties of health status questionnaires. *Journal of Clinical Epidemiology* 60(1):34-42. doi: 10.1016/j.jclinepi.2006.03.012.
  22. Ratner B. (2009) The correlation coefficient: Its values range between +1/-1, or do they?. *Journal of Targeting, Measurement and Analysis for Marketing* 17:139-142. doi: 10.1057/jt.2009.5
  23. Duong TV, Nguyen TT, Pham KM, *et al.* (2019) Validation of the Short-Form Health Literacy Questionnaire (HLS-SF12) and its determinants among people living in rural areas in Vietnam. *International Journal of Environmental Research and Public Health* 16(18):3346. doi: 10.3390/ijerph16183346
  24. Jovanić M, Zdravković M, Stanisavljević D, Jović Vraneš A. (2018) Exploring the importance of health literacy for the quality of life in patients with heart failure. *International Journal of Environmental Research and Public Health* 15(8):1761. doi: 10.3390/ijerph15081761
  25. Agosto HGC, Briones MVA, Palatino MC. (2018) Correlates of health literacy among Filipinos aged 50-70 years old belonging to low-income families in a selected community. *Acta Medica Philippina* 52(3):239-244.
  26. Tolabing MCC, Co KCD, Mendoza OM, *et al.* (2020) Prevalence of limited health literacy in the Philippines: First national survey [Manuscript submitted for publication].
  27. Alotaibi G, Youssef A. (2013) Development of an assessment tool to measure students' perceptions of respiratory care education programs: Item generation, item reduction, and preliminary validation. *Journal of Family & Community Medicine* 20(2):116–122. doi: 10.4103/2230-8229.11477
  28. Swaim JC. (2004) Validation of the virtue ethics importance scale [Iowa State University]. *Retrospective Theses and Dissertations*. doi: 10.31274/rtd-180813-14251
  29. Spiliotopoulou G. (2009) Reliability reconsidered: Cronbach's alpha and paediatric assessment in occupational therapy. *Australian Occupational Therapy Journal* 56(3):150–155. doi: 10.1111/j.1440-1630.2009.00785.x
  30. Derogatis LR. (2011) Derogatis interview for sexual functioning. In Fisher TD, Davis CM, Yarber WL, Davis SL (eds.). *Handbook of Sexuality-Related Measures* (3rd ed.), New York: Routledge, pp. 302-303.
  31. Paakkari L, Paakkari O. (2012) Health literacy as a learning outcome in schools. *Health Education* 112(2):133-152. doi: 10.1108/09654281211203411
  32. Tan S, Goonawardene N. (2017) Internet health information seeking and the patient-physician relationship: A systematic review. *Journal of Medical Internet Research* 19(1):e9. doi: 10.2196/jmir.5729
  33. Kayupova G, Turdaliyeva B, Tulebayev K, Duong TV, Chang PW, Zagulova D. (2017) Health literacy among visitors of district polyclinics in Almaty, Kazakhstan. *Iranian Journal of Public Health* 46(8):1062-1070.
  34. Esen I, Demirci H, Güçlü M, Esen S, Şimşek E. (2018) The relationship between health literacy, diabetic control, and disease-specific complications in patients with type 1 diabetes mellitus. *Southern Clinics of Istanbul Eurasia* 29(3):151-156. doi: 10.14744/scie.2018.77200
  35. Rolová G, Barták M, Rogalewicz V, Gavurová B. (2018) Health literacy in people undergoing treatment for alcohol abuse – A pilot study. *Kontakt* 20(4):e394–e400. doi: 10.1016/j.kontakt.2018.09.003
  36. Adhikary G, Shawon M, Ali MW, *et al.* (2018) Factors influencing patients' satisfaction at different levels of health facilities in Bangladesh: Results from patient exit interviews. *PloS One* 13(5):e0196643. doi: 10.1371/journal.pone.0196643
  37. Edwards M, Wood F, Davies M, Edwards, A. (2012) The development of health literacy in patients with a long-term health condition: the health literacy pathway model. *BMC Public Health* 12:130. doi: 10.1186/1471-2458-12-130
  38. Knekta E, Runyon C, Eddy S. (2019) One size doesn't fit all: Using factor analysis to gather validity evidence when using surveys in your research. *CBE Life Sciences Education* 18(1):rm1. doi: 10.1187/cbe.18-04-0064