








## Original Research

# Measuring the health literacy level of Arabic speaking population in Saudi Arabia using translated health literacy instruments

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### Abstract

**Background:** Health literacy is an essential predictor of health status, disease control and adherence to medications.

**Objectives:** The study goals were to assess the health literacy level of the general population in Saudi Arabia using translated Gulf Arabic version of the short-version of the Test of Functional Health Literacy in Adults (S-TOFHLA) and Single Item Literacy Screener (SILS) tests and to measure the relationship between health literacy and education level.

**Methods:** The study was a cross-sectional with a convenience sample of 123 participants from the general population in Riyadh. Data were collected using the modified (Gulf) Arabic versions of both S-TOFHLA and SILS. Fisher's Exact test was used to measure the difference of the health literacy scores according to the education degrees and Cronbach's alpha was used to measure the internal consistency of the S-TOFHLA items.

**Results:** More than half (55.4%) of the participants were male, 50.4% had a middle school or less education level, and we found that 84.4% had adequate health literacy as measured by the S-TOFHLA, compared to 49.6% as measured by SILS. The Fisher's Exact test showed a significant difference ( $P < .05$ ) in the S-TOFHLA and SILS scores according to education categories.

**Conclusions:** The level of education has a significant positive association with S-TOFHLA and SILS results. The Gulf Arabic version of S-TOFHLA is a reliable test with a good internal consistency and a significant positive correlation between the two parts of S-TOFHLA. We recommend the use of S-TOFHLA or SILS at the first patient visit.

### Keywords

Health Literacy; Cross-Cultural Comparison; Psychometrics; Reproducibility of Results; Surveys and Questionnaires; Saudi Arabia

## INTRODUCTION

Health literacy is the extent to which people have the ability to understand the basic health information needed to make suitable health decisions.<sup>1</sup> Health literacy is related to general literacy. However, it also refers more specifically to information in a healthcare context.<sup>1</sup> Health literacy has been found to be an essential predictor of health status and adherence to medications.<sup>2-4</sup> A systematic review of 35

health literacy studies found a significant positive correlation between health literacy and medication adherence.<sup>4</sup> Lack of knowledge about illness and treatment and poor medication adherence are usually associated with inadequate chronic disease control.<sup>5,6</sup> A study in a public hospital in San Francisco found significant positive relationship between education level and glycemic control among diabetes patients.<sup>7</sup>

This study used both short-version of the Test of Functional Health Literacy in Adults (S-TOFHLA) and Single Item Literacy Screener (SILS) which are important tools in the measurement of health literacy. The S-TOFHLA is relatively long test compared to the SILS which is a single short question. The Test of Functional Health Literacy in Adults (TOFHLA) was designed to measure patients' ability to read and understand the things people commonly encounter in healthcare settings using actual materials like pill bottles and appointment slips.<sup>7</sup> The TOFHLA evaluates both numeracy and reading skills. The reading part has three prose passages while the numeracy section includes 17 questions that evaluate the ability to read and understand prescription labels and appointment slips.<sup>7</sup> The S-TOFHLA is a shorter version with two prose passages and a numeracy section with four questions that evaluate understanding of glucose monitoring, prescription labels and appointment slips.<sup>7</sup> The English version of S-TOFHLA has good internal consistency and it is more practical than the full version as it takes a maximum of 12 minutes to finish instead of 22 minutes.<sup>7</sup> However, the time required to complete the test

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varies between people according to their ability to read and understand the test.<sup>7</sup> The SILS is a primary screening tool used to identify participants with inadequate reading skills who would like help reading health related information.<sup>8</sup>

According to World Federation of Public Health Associations, “the Arab World refers to the 22 countries of the Arab League” with population of 354 million.<sup>9</sup> An Arabic version of the S-TOFHLA and SILS tests was previously created and validated by Al-Jumaili and colleagues using 95 subjects in five pharmacies in Iraq.<sup>10</sup> However, in this study the Arabic language was modified to make it more understandable to the Arabic people of the gulf countries.

Arabic countries experience high prevalence of illiteracy. Saudi Arabia ranked among the top Arabic country leaders due to the advancement in the health and education with 87% of population have basic literacy (reading and writing) levels.<sup>9,11</sup> However, a recent study stated the percentage of uneducated people in Saudi Arabi ranges from 13 to 30%.<sup>12</sup> The study found prescription label misunderstanding is common among hospital patients.<sup>12</sup> Low education level may be associated with inadequate health literacy among Saudi population. The study goal was to assess the health literacy level of the general population in Saudi Arabia using translated Arabic version of the S-TOFHLA and SILS tests that represent Gulf countries and to measure the relationship between health literacy and education level.

## METHODS

### Study Design

This was a cross-sectional study conducted to translate the S-TOFHLA and SILS into formal Arabic and to assess the Arabic version of both S-TOFHLA and SILS among the Saudi population (online appendix). Additionally, the survey included basic demographic characteristics (age, gender, employment, monthly income, education level). At the end of the survey, participants were asked to give feedback regarding the newly translated version of the two tests using a five-point Likert scale (strongly agree, agree, neutral, disagree and strongly disagree) to respond to the questions. Before starting the data collection, we conducted pilot study to ensure the clarity of the modified instruments for Saudi people.

### Data Collection

A convenience sample of 123 Saudi participants from the general population in different settings such as hospital, high schools, colleges, and public places in Riyadh was used to evaluate the translation. People who unable to read Arabic and children (less than 18 years old) were excluded.

After receiving verbal consent from the participants, the researcher provided in-person a paper form of the newly translated (Gulf) Arabic versions of both S-TOFHLA and SILS. After several minutes, the participants answered the questions and returned the survey in-person. The research was approved by Institutional Review Board (IRB) at College of Medicine, Imam Mohammad Ibn Saud Islamic University (IMSIU) in Riyadh, Saudi Arabia.

### The Short-version of the Test of Functional Health Literacy in Adults (S-TOFHLA)

This study added written instructions to the participants about how to answer the S-TOFHLA. The study used the S-TOFHLA to measure both the reading and numeracy skills of the participants. The reading section includes two prose passages that describe how to prepare for an upper gastrointestinal (GI) X-ray, and Medicaid rights and responsibilities. An expert panel of eight bilingual physicians from IMSIU College of Medicine conducted forward translation (English to Arabic) and backward translation (Arabic to English) to validate the translation.<sup>13</sup> A pilot survey helped to identify the difficult words. The eight researchers translated the two S-TOFHLA sections and modified the language of the Medicaid Rights’ passage to be understandable to Gulf countries people who use a different dialect from other Arabic countries. Thus, the authors introduced few specific Gulf country terms to the Arabic validated instruments.

The numeracy section includes four questions that measure a patient’s ability to understand glucose monitoring, prescription labels, and appointment memos.<sup>7,14</sup> As Al-Jumaili and colleagues did, this study deleted the third item in the GI X-ray passage because it does not make sense in Arabic.<sup>10</sup> This study also added detailed written instructions on how to answer the S-TOFHLA questions on the first page. The two prose passages in the reading section have a total of 35 cloze items (each blank has 4 choices) totaling 70 points (two points for each item).<sup>10</sup> The reading section of the S-TOFHLA asks participants to fill the blanks with the most appropriate answer to complete the sentence grammatically and contextually from a list of four words.<sup>7,10</sup> The total score for the whole S-TOFHLA is 100 points, with 70 points for the reading section and 30 points for the numeracy section (7.5 points for each item). The score is classified into one of two health literacy levels: 0-66 indicates inadequate or marginal health literacy, and 67-100 indicates adequate health literacy.<sup>7,10</sup> The S-TOFHLA Arabic cloze items were reviewed by the same co-author who translated the items to Arabic in Iraq to assure the content validity.

### Single Item Literacy Screener (SILS)

The Single Item Literacy Screener (SILS) is a primary screening tool for patients with inadequate reading skills who may need help to read health-related information.<sup>8,14</sup> The SILS has a single question: “How often do you ask someone for help to read the instructions and leaflets from a doctor or pharmacy?” A patient can choose one of the followings (5-point Likert scale): 1-never, 2-rarely, 3-sometimes, 4-often, or 5-always. If a patient chooses sometimes, often, or always, it suggests that the patient has a limited reading ability of health materials. On the other hand, if a patient chooses never, or rarely, it indicates adequate reading ability.<sup>8,14</sup> We did minor modifications to the question and choices of Al-Jumaili’s Arabic version of SILS.<sup>10</sup>

### Statistical Analysis

Statistical Analysis System (SAS Inc., Cary, North Carolina, USA) was used to conduct data analyses. Descriptive

Characteristics	Frequency (N=123)	Percentage
Gender		
Male	62	55.4
Female	50	44.6
Age (years)		
18-40	64	52
40s – 50s	46	37.4
≥60	13	10.6
Occupation		
Employee	78	77.2
Non-Employee	23	22.8
Income Level (SAR)		
<5000	64	58.7
6000-10,000	29	26.6
≥11,000	16	14.7
Education Level		
Middle school or less	62	50.8
High school	9	7.4
College/Graduate degree	51	41.8

analysis of the participants' characteristics was conducted including mean, range and standard deviation, frequencies, and percentages. Fisher's exact test was used to measure the statistical difference in the S-TOFHLA and SILS scores according to the participants' education degree, income level, and age. The Fisher's Exact test measured the relationship between these categorical variables. The significance level was 0.05. Pearson correlation (*r*) was used to measure the relationship between the two health literacy tests, and between the numeric and reading section scores of S-TOFHLA. Cronbach's alpha, a reliability test, was conducted to measure the internal consistency of the items on the Gulf Country Arabic version of S-TOFHLA and SILS. This had also been used in three previous studies.<sup>7,10,15</sup>

## RESULTS

A total of 123 participants were recruited for the study and more than half (55.4%) were male (Table 1). Sixty-one (50%) of the participants were patients from the university hospital, 26 (20%) were students from colleges and high schools and the remaining 36 (30%) were general people from coffee shops. More than three-quarters (77.2%) of the participants were employed and the majority (58.7%) had an income level of less than 5000 Saudi riyal a month. Education level was categorized into three categories: middle school or less (50.8%), high school (7.4%), and college/graduate degree (41.8%) (Table 1).

Table 2 shows the results of S-TOFHLA and SILS according to education level, income level, and age. A Fisher's exact test showed a significant difference ( $p < 0.05$ ) in the S-TOFHLA and SILS scores according to education categories (Table 2). The participants with higher academic degrees (college/graduate degree) had higher health literacy scores according to both S-TOFHLA and SILS tests compared to the participants having lower academic degrees. More than three-quarters (84.4%) of the participants had adequate health literacy as measured by the S-TOFHLA, compared to approximately half (49.6%) as measured by SILS. According to the S-TOFHLA scores, less than half (47.2%) of the participants had a middle school or less education level, and three-quarters 74.2% of these participants had adequate health literacy. In contrast, 96% of the highly educated group (college/graduate degree) had adequate health literacy (Table 2). According to the SILS question, half (50.4%) of the participants had a middle school or less education level, and one-third (37%) of this group had adequate reading ability (Table 2). One-quarter (25%) of

A. The Results of S-TOFHLA. N (%)			
Characteristics	Inadequate-marginal (0-66)	Adequate (67-100)	p-value
<sup>a</sup> Education Level			0.0037
Middle school or less	16 (25.8)	46 (74.2)	
High school	1 (12.5)	7 (87.5)	
College/Graduate degree	2 (4)	49 (96)	
Monthly Income Level (SAR)			0.118
≤5000	13 (20.3)	51 (79.7)	
6000 ≤	4 (8.9)	41 (91.1)	
Age (Years)			0.059
18- 40	9 (14.1)	55 (85.9)	
40s – 50s	5 (11.1)	40 (88.9)	
≥60	5 (38.5)	8 (61.5)	
B. The Results of SILS. N (%)			
Characteristics	Limited (always, often, sometimes)	Adequate (rarely, never)	p-value
<sup>a</sup> Education Level			0.0005
Middle school or less	39 (62.9)	23 (37.1)	
High school	6 (75)	2 (25)	
College/Graduate degree	15 (30)	35 (70)	
Income Level (SAR)			0.0504
≤5000	37 (58.7)	26 (41.3)	
6000 ≤	17 (38.6)	27 (61.4)	
<sup>b</sup> Age (Years)			0.0012
18-40	22 (35)	41 (65)	
40s – 50s	29 (64.4)	16 (35.6)	
≥60	10 (77)	3 (23)	

<sup>a</sup> Fisher's Exact test showed significant difference ( $p < 0.05$ ) in S-TOFHLA and SILS scores according to education categories. <sup>b</sup> Fisher's Exact test showed significant difference ( $p < 0.05$ ) in SILS scores according to age categories.

Table 3. The mean and standard deviation of answers for the three participation satisfaction questions. N=67			
Participant satisfaction item	Mean (SD)	Min	Max
The questions were clear and I faced no difficulties	1.52 (0.76)	1	4
I found no grammatical mistakes or any word that needed more explanation	1.45 (0.80)	1	4
In general, the tests were clear for me	1.52 (0.68)	1	4
5-likert scale: 1-Strongly Agree, 2-Agree, 3-Neutral, 4-Disagree, 5-Strongly Disagree.			

the participants with a high school degree had adequate reading ability. The Fisher's Exact test showed significant difference ( $p < 0.05$ ) in SILS scores according to age categories (Table 2).

Sixty-seven of the participants answered the three items about the clarity of the translated S-TOFHLA and SILS tests. The participants agreed that the two tests were clear and understandable with an approximate mean of 1.50 where 1 refers to strongly agree and 2 refer to agree (Table 3). The Cronbach alpha of the 35 S-TOFHLA reading items was good ( $\alpha = 0.9$ ), and of the 4 numeric items was acceptable ( $\alpha = 0.6$ ). The validity was also assessed by the Pearson's correlations between the numeric and reading sections of S-TOFHLA, and between the two health literacy tests S-TOFHLA and SILS. The reading section of S-TOFHLA showed a significant ( $p\text{-value} = 0.008$ ) positive correlation with the numeric section (Pearson's  $r = 0.3$ ). However, the correlation between S-TOFHLA and SILS was non-significant ( $p\text{-value} = 0.089$ ). Cronbach alpha measured internal consistency while the positive correlation of S-TOFHLA results with the education level (Pearson's  $r = 0.4$ ,  $p\text{-value} = 0.0001$ ) measured the criterion validity. It means the education level (measure) predicts the S-TOFHLA scores (outcome).

## DISCUSSION

Half of the participants were highly educated (with high school diploma or higher) because public education in Saudi Arabia is free, which means everyone has the opportunity to get into school. However, children of low-income parents may leave school earlier looking for job to support their families. More than three-quarters (84.4%) of the participants had adequate health literacy according to the translated Arabic version of S-TOFHLA. The percentage of participants with adequate health literacy in this study was higher than that from an American study.<sup>7</sup> The English version of TOFHLA and S-TOFHLA showed that 54% of American participants had adequate health literacy.<sup>7</sup> The majority (74.2%) of the participants with low education levels had adequate health literacy as well. This result is comparable to the Iraqi study finding showing that 77.8% of the middle school participants had adequate health literacy.<sup>10</sup> Most of the participants with low education level had adequate health literacy may be due to the fact that is S-TOFHLA is a reading test written in Arabic and most elementary and middle schools in Saudi Arabia emphasize Arabic language teaching.

The SILS results were similar to the Iraqi study findings where the majority (83.3%) of the middle school participants was found to have limited reading ability [10]. According to the SILS test, participants with a middle school or less degree had higher health literacy (37%) than those with a high school degree (25%). The participants with lower educational levels received higher SILS scores simply

because they answered "never" or "rarely" to the question about how often they needed help. According to the SILS score, the younger participants (18-40 years) had significantly higher health literacy level than elder age participants (40 years and above). This may be because the younger generations have higher rate of school completion compared to elder generations. Because SILS depends more on self-reports (how often do you need help for medical/medication instructions?) than on an objective assessment of participant actual ability, we agree with the Iraqi study which described SILS as a subjective test.<sup>10</sup> In contrast, the S-TOFHLA is reading and numeric assessment test. In other words, the SILS is a subjective test relying on self-assessment of health literacy and S-TOFHLA is more objective test relying on the participant test scores. Therefore, the correlation between the results of the two tests was non-significant. In fact, the S-TOFHLA test, particularly the reading section had good internal consistency. In our study, half of the participants had a limited health literacy level according to SILS. In contrast to a most recent Saudi study (2017) looking for factors influencing patient's understanding of medication label instructions found that most of the participants in their study (59.5%) had a low health literacy level according to the SILS test.<sup>12</sup> Since half of the participants need help to read healthcare instructions, we recommend having Arabic versions of all medical and medication brochures to enhance medication adherence and avoid any language barriers facing Saudi patients.

The answers for the three satisfaction questions showed the participants agreed upon the clarity of the two tests (Table 3). The study has some limitations. Although the study used a convenience sample, the participants represent the general Saudi population from different settings with various levels of education. Thus, the study participants can represent the general Saudi population. Because the interview-time was short and there was no compensation, only 55% (67) of the participants answered the three satisfaction questions at the end of the tests. Finally, the study was conducted in one city.

## CONCLUSIONS

More than three-quarters of the participants had adequate health literacy as measured by the S-TOFHLA, compared to approximately half as measured by SILS. The level of education has a positive significant association with both S-TOFHLA and SILS results, which indicates the participants with higher education level have higher health literacy. According to the SILS score, the younger Saudi generations had significantly higher health literacy level than the elder generations. We successfully translated and validated the Gulf country Arabic versions of S-TOFHLA and SILS health literacy tests. These versions are appropriate for Arabic speakers in general as well as Gulf country population. The

modified (Gulf) Arabic version of the S-TOFHLA is reliable test with good internal consistency and a significant positive correlation between its two parts. In conclusion, health literacy may influence medication adherence and affect patient health outcomes. S-TOFHLA and SILS are important tools for the evaluation of health literacy among patients in healthcare settings. Therefore, we strongly recommend the use of S-TOFHLA or SILS at the first visit to clinic/hospital, and to include these tests as part of the

routine healthcare measures in Saudi Arabia to improve the quality of patient care.

#### CONFLICT OF INTEREST

There are no conflicts of interest to disclose.

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