

# Iranian Health Literacy Questionnaire (IHLQ): An Instrument for Measuring Health Literacy in Iran

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**Background:** Promoting Health Literacy (HL) is considered as an important goal in strategic plans of many countries. In spite of the necessity for access to valid, reliable and native HL instruments, the number of such instruments in the Persian language is scarce. Moreover, there is no good estimation of HL status in Iran.

**Objectives:** The aim of this study was to provide a valid, reliable and native instrument to measure and monitor community HL in Iran and also, to provide an estimation of HL status in two Iranian provinces.

**Patients and Methods:** By applying the multistage cluster sampling, 1080 respondents (540 from each gender) were recruited from Kerman and Mazandaran provinces of Iran, from February to June 2014 to participate in this cross-sectional study. The development of the Iranian Health Literacy Questionnaire (IHLQ) was initiated with a comprehensive review of the literature. Then, face, content and construct validity as well as reliability were determined.

**Results:** Internal consistency and test-retest reliability (ICC) of the factors was in the range of 0.71 to 0.96 and 0.73 to 0.86, respectively. In order to construct validity, Exploratory Factor Analysis (EFA) Kaiser-Meyer-Olkin (KMO) = 0.95 and Bartlett's test result of 3.017 with  $P < 0.001$  with varimax rotation was used. Optimal reduced solution, including 36 items and seven factors, was found in EFA. Five of the factors identified were reading/comprehension skills, individual empowerment, communication/decision-making skills, social empowerment and health knowledge.

**Conclusions:** It was concluded that IHLQ might be a practical and useful tool for investigating HL for Persian language speakers around the world. Since HL is dynamic and its instruments should be regularly revised, further studies are recommended to assess HL with application of IHLQ to detect its potential imperfections.

**Keywords:** Health Literacy; Instrumentation; Iran

## 1. Background

Unhealthy lifestyle has spread across the world due to commercial reasons that challenges people's health. In this situation, health systems have not adequately been able to meet individuals' needs. Therefore, the need for self-management has increased in health care systems and people should take new roles for seeking information, understanding rules and responsibilities and making correct decisions for themselves, their families as well as their community. Health Literacy (HL) is one of the major factors required for self-management and Performance of healthy behaviors (1); since, efficiency and effectiveness of health education and promotion programs are strongly influenced by HL. According to previous studies, the majority of people have poor HL

even highly educated subjects working in unrelated health jobs (2-5).

The World Health Organization (WHO) defined HL as "cognitive and social skills, which determine the motivation and ability of individuals to gain access to understand and use information in ways, which promote and maintain good health" (6, 7). The WHO also described HL as one of the most important determinants of health, lifestyle modification and healthy city traits and asked all countries to consider promoting HL in their strategic plans (3, 8). In terms of HL definitions, most scholars accentuated not only on the ability to read, write and understand the meanings of words, numbers and concepts in health fields, but also on cognitive ability to under-

stand the information provided by virtual media such as the internet and expert ideas related to health (9). The role of HL in community health is to an extent that has been considered a strong predictor of health along with age, income, employment status, education level and race; moreover, it is also regarded as one of the most important prerequisites for non-communicable diseases prevention, health and well-being improvement, and inequalities reduction. Low health literacy is related to lower use of disease prevention services, inability to communicate with health professionals, lower adherence to recommended treatment, increased mortality, hospitalization, lower knowledge on illness, lower self-care and higher medical costs (6, 8).

Health Literacy capacity may be affected by individual and social factors that are modifiable using education (10). The correct estimation of HL in communities using valid instruments is also amongst significant factors required for planning intervention programs to enhance individual and community HL. Researchers believe that an appropriate HL instrument should be able in measuring people's knowledge on disease prevention, health promotion and self-care behaviors (3, 9). The most common questionnaires that assess HL throughout the world include: 1) Rapid estimate of adult literacy in medicine (REALM): an instrument to evaluate the ability of patient in reading quickly by a physician (11), 2) Test of functional health literacy in adults (TOFHLA): a questionnaire to study patients' ability to read and understand the concepts of texts (12), 3) National assessment of adult literacy (NAAL): an instrument to measure people's information in terms of drugs, disease prevention and health care (13), yet communication skills with health care providers is not included in this questionnaire (7).

In the current investigation, Berkman and Davis's definition on HL was considered as the principle of the study. They defined HL as the person's ability to obtain, process and understand health basics, required information and services, as well as the person's effective communication skills to make appropriate decisions for his/her own health (7, 8). To the best of our knowledge, no HL survey has been implemented in Iran applying the health promotion approach while most conducted surveys have been done using the TOFHLA questionnaire (10, 14). Health Literacy promotion is considered as one of the goals of strategic plans in many countries (6), yet, unfortunately, there has been no estimation of HL status in Iran. In order to achieve such goal, a comprehensive national study designed to provide a good estimation of HL in this country is required. To do so, provision of a valid, reliable and native instrument for measuring and monitoring community HL is necessary.

## 2. Objectives

The aim of this study was to design an HL questionnaire according to Iranian culture characteristics and assess its

psychometric properties, as well. Moreover, estimation of HL status in tow Iranian provinces, Kerman and Mazandaran, was targeted. Therefore, in this study, the results of the first phase of the national study, which was designation of an appropriate instrument in accordance with Iranian culture characteristics, were reported.

## 3. Patients and Methods

### 3.1. Instrument Design

In order to develop an HL questionnaire through a cross-sectional study, a national team, including health educationist, an epidemiologist, and two specialists in oral health and community medicine was recruited by the Health Research Institute of the Academic Center for Education, Culture and Research. The aim of this team was to develop an instrument to measure not only HL in exposure to disease but also HL with a health promotion approach adjusted for the Iranian culture. Additional items of the questionnaire considering priorities in accordance with Iranian health policies and culture sensitivity were selected by the aforementioned team after conducting a literature review and investigating HL instruments such as REALM, Newest vital sign (NVS), NAAL and TOFHLA. The primordial version of the questionnaire included 400 items. After numerous meetings of the experts, the primary version of Iranian Health Literacy Questionnaire (IHLQ) with 55 items was prepared. The questionnaire investigated factors such as, access to health information sources, using of these sources, the ability to read, understand and evaluate the contents of health resources, decision-making and communication skills, and health knowledge. Sixteen out of 55 items were not included in the Exploratory Factor Analysis (EFA), because of their response format, which was yes/no. Based on the ideas of the expert panel, these 16 items were categorized into three groups named F8, F9 and F10 (Table 1). The number of items, range, minimum and maximum values for all extracted factors from EFA are presented in Table 1. Four demographic questions (gender, age, education and occupation) were considered at the end of questionnaire, as well.

### 3.2. Content and Face Validity

There are two approaches to conduct content validity; qualitative (expert panel) and quantitative (content validity ratio/index) (15). As there is no agreement on the priority between these two approaches (15), and since the authors had access to a comprehensive team of expert panel, the qualitative approach was preferred over the quantitative one. To determine face validity, readability, clarity and cultural appropriateness of the initial IHLQ, the questionnaires were completed, in the presence of the main researcher, by ten subjects, and their comments

**Table 1.** Mean, Number of Items, Range, Intra Class Coefficient and Cronbach's Alpha Coefficients of Iranian Health Literacy Questionnaire (IHLQ) Constructs (n = 980)<sup>a</sup>

Constructs	Number of Items	Range	Mean ± SD	ICC, Range	Cronbach's α
Reading/comprehension skills	13	0 - 39	16.6 ± 9.3	0.81 (0.62 - 0.89)	0.96
Individual empowerment (first aid skills)	4	0 - 12	6.4 ± 2.7	0.78 (0.76 - 0.83)	0.83
Communication/decision making skills	5	0 - 10	7.3 ± 2.4	0.79 (0.64 - 0.92)	0.74
Assessment skills of health information in virtual media	2	0 - 6	3.6 ± 1.2	0.82 (0.80 - 0.84)	0.95
Accurate assessment/judgment skills	6	0 - 18	8.9 ± 2.6	0.6 (0.41 - 0.84)	0.93
Social empowerment	3	0 - 6	3.5 ± 1.9	0.73 (0.68 - 0.82)	0.71
Individual empowerment (household medical Equipment use)	3	0 - 6	4.71 ± 3.1	0.81 (0.75 - 0.84)	0.84
Health information access	5	0 - 5	3 ± 1.2	0.81 (0.79 - 0.84)	-
Health information use	6	0 - 6	3.6 ± 1.5	0.86(0.83 - 0.91)	-
Health knowledge	5	0 - 5	3.5 ± 0.9	0.73(0.48 - 0.87)	-

<sup>a</sup> Abbreviation: SD = Standard Deviation; and ICC = Intraclass Correlation Coefficient.

were studied by the expert team and considered in the final version. After the pilot study, five questions were excluded from the questionnaire due to inconsistent results. The expert panel also decided to consider questions as three and four point Likert-type scaling due to the length of the IHLQ.

### 3.3. Setting and Participants

This stage of the study was conducted in Mazandaran and Kerman provinces of Iran. The Iranian Health Literacy Questionnaire was completed by 1080 citizens of these provinces, after visiting at the respondents' homes from February to June 2014. In total, 1080 subjects (an equal number of both genders) from rural and urban areas aged 18 to 60 years were selected using multi-stage cluster sampling from the aforementioned provinces located in north and south of Iran with approximately three million residents. Three cities were randomly selected from Mazandaran (Behshahr, Sari and Tonekabon) and Kerman (Kerman, Ravor and Jiroft) provinces. Next, one rural and three urban areas were selected from every city. During the next session, 30 samples were elected from each area. As this study was part of a national study, the ratio of at least 10 subjects per item (16) was considered to estimate the sample size. The inclusion criteria included having Iranian citizenship and being a native Persian speaker. Therefore, 1061 out of 1080 samples had the inclusion criteria and 19 samples were excluded. Educated people completed the questionnaires after receiving approval and the necessary information. For the illiterate subjects the IHLQ was completed through an interview. The purpose of the study and the rights of the participants as human subjects of the research was explained to all cases and an informed consent form was obtained for them. All questionnaires were completed in a private room in the participants' home. Incomplete questionnaires were

revised at the same place. Response time was 15 to 30 minutes. Valid response rate was 91%; therefore, 980 valid questionnaires were included in the analysis. Some of the items were not included in the factor analysis because of their response format, which was yes/no.

The original survey protocol was reviewed and approved by the Health Affairs of the Ministry of Health, Cure and Medical Education, Iran (Code: 300.12690, Date: 12.08.2012).

### 3.4. Statistical Analysis

The data were analyzed using the SPSS (ver.16) software at a significance level of 0.05. Before the analysis, the distribution of data was checked conducting the Kolmogorov-Smirnov test and the normality was approved. To test internal consistency, Cronbach's alpha (acceptable level of 0.7) was used (17). The test-retest reliability coefficient was also conducted on 30 subjects, twice, after 12 to 15 days with confidence interval (CI) of 95% and P value of < 0.05. Exploratory Factor Analysis (EFA) was used to summarize data and classify the items into groups, and for structural analysis. As the present study was the first stage of a comprehensive national project and the aim at this stage was to assess the questionnaire, the authors decided to conduct only the EFA on the questionnaire. During the next phase when a random sample will be elected throughout the country, the final instrument and analysis models will be formed. The internal consistency coefficient was assessed using Bartlett's and Kaiser-Meyer-Olkin (KMO) test; thus, the factor pattern matrix was examined using varimax rotation. The factors with eigenvalue of more than one were selected. To calculate constructs score, items with loading factor of more than 0.4 were selected and used. Pearson's correlation coefficient was used to assess the association between the factors. Sta-

tistical differences between the factors by demographic variables were analyzed using one-way Analysis of Variance (ANOVA) and independent sample t-test.

## 4. Results

### 4.1. Demographic Characteristics

Overall, 980 respondents resident in rural and urban areas of Mazandaran and Kerman provinces, Iran, were elected with the mean age of  $38.26 \pm 11.83$ . The level of formal education for 39.5% of the respondents was diploma and about 8% were illiterate. In terms of occupation, more than 40% were housekeeper. Applying a series of statistical tests including One-way ANOVA and independent sample t-test, it was found that there are statistically significant differences in most factors by demographic variables ( $P < 0.01$ ) (gender, age, education, job and residency) (Table 2).

### 4.2. Reliability

To measure reliability, Cronbach's alpha was used. The results showed that internal consistency of the factors

were acceptable in the range of 0.71 to 0.96 (Table 1). The intra-class correlation coefficients extracted from the test-retest reliability are shown in Table 1.

### 4.3. Construct Validity

All items with Likert-type scaling had acceptable internal consistency and were also suitable to conduct factor analysis (KMO = 0.95 and Bartlett's test 3.017 with  $P < 0.001$ ). Factor analysis was conducted on the 39 items with Likert-type scaling. Seven factors with eigenvalue of more than one were extracted. These factors were named "reading/comprehension skills", "individual empowerment (first aid skills)", "communication/decision making skills", "assessment skills of health information in virtual media", "accurate assessment/judgment skills", "social empowerment", "individual empowerment (household medical equipment use)", "health information access", "health information use" and "health knowledge". The first seven factors, in total, determined 67.88% of variance. Three items were not grouped with other factors and therefore factor analysis was again conducted after deleting these three items (Table 3).

**Table 2.** The Relationship Between the Respondents' Characteristics and the Mean Score of the Factors (n = 980)<sup>a</sup>

Variable	F (%)	1	2	3	4	5	6	7	8	9	10
<b>Gender (n = 980)</b>											
Male	455 (46.4)	16.6 ± 9.2	5.6 ± 1.2	7 ± 3.4	2.9 ± 0.7	13.5 ± 3.1	3.9 ± 1.1	3.2 ± 1.8	2.9 ± 1.3	3.1 ± 1.5	3.4 ± 0.9
Female	525 (53.6)	16.7 ± 9.3	5.4 ± 1.1	7.5 ± 3.4	2.7 ± 0.5	13.8 ± 3.1	3.7 ± 1.1	3.7 ± 1.9	3 ± 1.2	3.2 ± 1.5	3.6 ± 1
P Value		0.782	0.563	0.01	0.57	0.085	0.587	0.001	0.59	0.275	0.155
<b>Age (n = 980) (M = 38.26 ± 11.83)</b>											
Less than 30 y	317 (32.3)	21.5 ± 7.5	6 ± 1.2	8 ± 3	3 ± 0.4	14 ± 3	3.2 ± 1.1	3.4 ± 1.8	3 ± 1.3	3.3 ± 1.7	3.5 ± 0.9
More than 30 y	663 (67.7)	17 ± 10	5.4 ± 1.1	7 ± 4	2.8 ± 0.7	13.5 ± 3.1	3 ± 1.1	3.6 ± 2	3 ± 1.2	3.1 ± 1.4	3.4 ± 1
P Value		0.001	0.03	0.68	0.001	0.001	0.001	0.16	0.001	0.008	0.157
<b>Education (n = 980)</b>											
Illiterate	81 (8.3)	10.2 ± 8.1	4.3 ± 1.4	2.2 ± 1.7	2.2 ± 0.2	11.2 ± 1.6	2.1 ± 1.6	2 ± 2.1	2.2 ± 1.8	2.2 ± 1.9	2.6 ± 0.9
Elementary and secondary education	276 (28.2)	18.2 ± 9.5	5.1 ± 1.8	5.1 (3.2)	2.6 ± 0.8	12.4 ± 2.4	2.7 ± 1.9	3.6 ± 2	2.5 ± 1.1	2.7 ± 1.2	3.4 ± 1
High school and diploma	387 (39.5)	17 ± 9.4	5.7 ± 1	8.2 ± 2.8	2.9 ± 0.5	14.1 ± 3	2.9 ± 1.1	3.6 ± 1.8	3.1 ± 1.2	3.3 ± 1.5	3.6 ± 0.9
Higher education	236 (24.1)	16 ± 9.3	6.6 ± 1.1	9.2 ± 2.5	3.6 ± 0.3	15.4 ± 3.3	3.5 ± 1.3	3.9 ± 1.7	3.7 ± 1.2	3.8 ± 1.7	3.7 ± 0.8
P Value		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
<b>Occupation (n = 980)</b>											
Student (school/university)	68 (6.9)	24.6 ± 6.4	6.7 ± 1	8.9 ± 2.5	3.1 ± 0.4	14.4 ± 3	3.4 ± 1.1	3.3 ± 1.6	3.7 ± 1.3	3.8 ± 1.9	3.6 ± 0.8
Housewife	395 (40.3)	16.7 ± 9.3	5.3 ± 1	7 ± 3.4	2.6 ± 0.6	13.4 ± 3	2.7 ± 1	3.7 ± 2	2.9 ± 1.2	3 ± 1.4	3.5 ± 1
Retired	60 (6.1)	14.1 ± 11	5.2 ± 1.2	6.5 ± 4.2	3 ± 0.9	13.5 ± 3.4	3 ± 1.1	3.2 ± 2.1	3.1 ± 1.2	3.3 ± 1.4	3.2 ± 1.1
Half-time job	133 (13.6)	16.4 ± 9.3	5.8 ± 1.3	6.5 ± 3.6	2.7 ± 0.7	13.3 ± 2.8	2.6 ± 1	2.8 ± 1.8	2.7 ± 1.2	2.8 ± 1.3	3.2 ± 0.9
Permanent employee	277 (28.3)	21.7 ± 7.8	5.4 ± 1.2	8.1 ± 3.2	3.2 ± 2.5	14.2 ± 3.5	3.1 (1.3)	3.8 ± 1.8	3.2 ± 1.3	3.5 ± 1.6	3.6 ± 0.9
Unemployed	47 (4.8)	20 ± 8.5	5.8 ± 1.2	7.1 ± 3	2.6 ± 3	13.3 ± 2.8	2.5 ± 1.1	3 ± 2.1	2.8 ± 1.2	3 ± 1.5	3.4 ± 1
P Value		0.052	0.001	0.001	0.001	0.001	0.004	0.001	0.001	0.001	0.001
<b>Residency (n = 980)</b>											
Urban	491 (50.1)	19.7 ± 9	5.9 ± 1.2	7.6 ± 3.4	2.9 ± 0.7	14.2 ± 3.2	3 ± 1.2	3.3 ± 1.9	3.2 ± 1.3	3.2 ± 1.5	3.4 ± 1
Rural	489 (49.9)	17.5 ± 9.5	5.3 ± 1	7 ± 3.5	2.7 ± 0.6	13.2 ± 3	2.8 ± 1.1	3.8 ± 2	2.8 ± 1.2	3.1 ± 1.5	3.5 ± 1
P Value		0.06	0.001	0.001	0.001	0.001	0.003	0.1	0.003	0.001	0.09

<sup>a</sup> Abbreviations: F1, reading/comprehension skills; F2, individual empowerment (first aid skills); F3, communication/decision making skills; F4, assessment skills of health information in virtual media; F5, accurate assessment/judgment skills; F6, social empowerment; F7, individual empowerment (Household Medical Equipment Use); F8, health information access; F9, health information use; F10, health knowledge.

**Table 3.** Factor Pattern Matrix for the Variable Solution (36 items) of the Iranian Health Literacy Questionnaire (n = 980)<sup>a</sup>

Variable Solution	Factor Pattern Matrix						
	1	2	3	4	5	6	7
The ability to read written materials (books, etc.) on health and disease.	0.909						
The ability to read the written instructions of health professionals	0.917						
The ability to fill in the forms requested by health centers	0.930						
The ability to read guide boards in health centers	0.922						
The ability to read written worksheets before performing lab tests/ultrasound/radiology.	0.852						
The ability to understand the concepts of guide boards	0.918						
The ability to understand the concepts of guide worksheets before performing lab tests/ultrasound/radiology.	0.652						
The ability to understand the conversations of health experts presented on mass media	0.667						
The ability to understand the contents presented in health educational materials (newspapers, pamphlets and so on.)	0.456						
The ability to understand drug usage prescribed by the company or pharmacist on the package	0.580						
The ability to understand health care worker's recommendations	0.582						
The ability to complete forms asked by health care centers, independently.	0.415						
The ability to understand Internet and electronic resources related to health and disease	0.505						
Evaluating the health information presented on the Internet				0.953			
Evaluating the health information presented on the Radio or TV				0.935			
Evaluating the recommendations presented by physicians and/or health care workers.					-0.752		
Evaluating health information presented on handbooks, educational pamphlets and so on.					-0.795		
Evaluating health information presented in newspapers, journals and magazines					-0.572		
Evaluating recommendations presented by friends and relatives on health and disease.					-0.566		
The ability to transfer their own health information to the others.					-0.803		
Using prescribed antibiotics completely in spite of resolved symptoms.			-0.456				
Refer to physician for check up in the case of having close relatives with cancer			0.426				
Refer to physician for annual checkup even if there is no symptoms for having cancer			0.566				
Take care of own health in any situation			0.796				
The ability to communicate with health workers and ask them to re-explain their recommendations in the case of not understanding the meaning.			0.699				
The ability to measure blood pressure by sphygmomanometer						0.419	
The ability to measure blood sugar and applying a glucose-meter at home						0.751	
The ability to measure body temperature by applying a thermometer						0.595	
The ability to measure heart beat rate						0.810	
The ability to perform IM injections						0.645	
The ability to perform IV injections		0.699					
The ability to perform first aid in the case of emergency situations		0.812					
The ability to help victims in the case of an accident prior to arrival of emergency aids.		0.745					
Participation in public festivals such as public walking or environmental cleanup activities							0.814
Participation in the meetings of local health centers in the case of invitation							0.686
Paying attention to health priorities of political candidates while voting.							0.486
Initial Eigenvalues	15.34	3.13	2.61	1.55	1.44	1.21	1.16
Rotation sums of squares	12.63	5.15	5.25	5.53	10.73	4.26	6.35
Percentage of variance explained	39.37	8.03	6.71	3.98	3.70	3.10	2.97

<sup>a</sup> Abbreviations: F1, reading/comprehension skills; F2, individual empowerment (first aid skills); F3, communication/decision making skills; F4, assessment skills of health information in virtual media; F5, accurate assessment/judgment skills; F6, social empowerment; F7, individual empowerment (household medical equipment use); F8, health information access; F9, health information use; F10, health knowledge; IM, Intra Muscular; and IV, Intra venous.

**Table 4.** Pearson Correlation Coefficients Between Iranian Health Literacy Questionnaire Constructs and Total Iranian Health Literacy Questionnaire Score (n = 980) <sup>a,b</sup>

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	Total
F1	1										
F2	0.37 <sup>c</sup>	1									
F3	0.38 <sup>c</sup>	0.24 <sup>c</sup>	1								
F4	0.53	0.30 <sup>c</sup>	0.23 <sup>c</sup>	1							
F5	0.80 <sup>c</sup>	0.38 <sup>c</sup>	0.43 <sup>c</sup>	0.44 <sup>c</sup>	1						
F6	0.47 <sup>c</sup>	0.58 <sup>c</sup>	0.26 <sup>c</sup>	0.40 <sup>c</sup>	0.46 <sup>c</sup>	1					
F7	0.36 <sup>c</sup>	0.18 <sup>c</sup>	0.42 <sup>c</sup>	0.13 <sup>b</sup>	0.34 <sup>c</sup>	0.20 <sup>c</sup>	1				
F8	0.41 <sup>c</sup>	0.20 <sup>c</sup>	0.24 <sup>c</sup>	0.23 <sup>c</sup>	0.38 <sup>c</sup>	0.31 <sup>c</sup>	0.24 <sup>c</sup>	1			
F9	0.35 <sup>c</sup>	0.26 <sup>c</sup>	0.15 <sup>c</sup>	0.50 <sup>c</sup>	0.33 <sup>c</sup>	0.32 <sup>c</sup>	0.14 <sup>c</sup>	0.22 <sup>c</sup>	1		
F10	0.40 <sup>c</sup>	0.25 <sup>c</sup>	0.32 <sup>c</sup>	0.45 <sup>c</sup>	0.39 <sup>c</sup>	0.28 <sup>c</sup>	0.25 <sup>c</sup>	0.30 <sup>c</sup>	0.70 <sup>c</sup>	1	
Total	0.80 <sup>c</sup>	0.51 <sup>c</sup>	0.53 <sup>c</sup>	0.61 <sup>c</sup>	0.84 <sup>c</sup>	0.61 <sup>c</sup>	0.46 <sup>c</sup>	0.54 <sup>c</sup>	0.59 <sup>c</sup>	0.67 <sup>c</sup>	1

<sup>a</sup> Abbreviations: F1, reading/comprehension skills; F2, individual empowerment (first aid skills); F3, communication/decision making skills; F4, assessment skills of health information in virtual media; F5, accurate assessment/judgment skills; F6, social empowerment; F7, individual empowerment (household medical equipment use); F8, health information access; F9, health information use; F10, health knowledge.

<sup>b</sup>  $P < 0.01$ .

<sup>c</sup>  $P < 0.05$ .

As all the factors had a high internal consistency (Cronbach's alpha more than 0.7), no factor was removed. The reliability of the three factors including access to health information resources, health information resources use and health knowledge was calculated using test-retest reliability, for which the mean of intraclass correlation coefficient (ICC) was 0.81, 0.73 and 0.86, respectively. The correlations between HL factors are shown in Table 4. The highest and lowest correlations were found between access to health information and health information resources use (0.7) ( $P < 0.001$ ), and assessment skills of health information in virtual media and social empowerment, respectively (0.13) ( $P = 0.21$ ) (Table 4). In terms of ceiling and floor effects, the results showed that the most noted effects were in education and age variables (Table 2). The results showed that the most noted effects were in education and age variables.

## 5. Discussion

The aim of this study, as the first part of a national HL survey, was to develop a multidimensional instrument to evaluate HL in Iran. The IHLQ was designed based on Nutbeam's definition of HL who believed that it has three levels including functional, critical and communicative (18, 19). The items of IHLQ were based on the health promotion approach and similar studies in accordance with social and cultural status in Iran (3, 7, 20).

In the item provision step, we tried to consider a broader scope of HL including social and personal abilities (3, 6, 7). The final version of IHLQ was a skill-based instrument, as most of the factors extracted assessed skills of the respondents in HL. One of the strengths of this study was having the multidisciplinary team of expert panel, which included twelve different specialists in health

fields. This team provided the opportunity to develop a well-designed template applying other valid HL questionnaires. Furthermore, it is worthy to mention that the diverse expert panel resulted in a diverse HL questionnaire. The IHLQ assesses a quite broader area of HL compared to TOFHQA, functional communicative and critical health literacy (FCCHL) and NAAL and it may be used to measure HL of healthy people, as well. As answer to IHLQ is not time consuming, it encourages the respondents to participate in the study. In addition, the high percentage of valid responses to the items implies simplicity and understandability of IHLQ. Moreover, the factors extracted had an acceptable internal consistency (Cronbach's  $\alpha$  range = 0.71 - 0.96) that may be classified as good and very good based on the table of DeVellis (21).

The assessment conducted on ceiling and floor effects showed that the most noted effects were education and age variables. Therefore, the authors decided to include these variables as nominal variables in analysis of total project's data.

Seven factors were found in factor analysis, which may be defined as HL measurement determinants in Iran. The first factor (reading/comprehension skills) was so strong and decisive that determined 40% of total variance, alone. It may be concluded that in the reading skills item, understanding ability had the same importance as reading skills. In definitions and researches on HL, the abilities to read, write and understand health contents formed the basis for HL, and were the most important determinants (9, 19). In TOFHQA, as a valid and reliable HL instrument in Iran, (10) the aforementioned aspects were also categorized into the same groups. The second factor was individual empowerment (first aid skills) that determined more than 8% of the total variance. In the European HL

instrument, this area was considered as one of the HL determinants (3). Three other factors of IHLQ including communication/decision making skills, assessment skills of health information in virtual media and accurate assessment/judgment skills have also been regarded as main determinants of HL in similar studies (7, 9, 18) and definitions of Nutbeam (18), Berkman et al. (9). In these areas of HL, people's ability to communicate with health providers is measured. Berkman et al. believed that these skills play an important role in HL (9). Consistent with the results of previous studies (5, 18), the fourth factor (assessment skills of health information in virtual media), which assesses the ability of individuals in understanding and evaluating the content of Internet on health and disease was one of the IHLQ components. This factor was considered as an HL instrument due to the widespread use of Internet in Iran (31.4% of the population in 2013).

Given the emphasis on the role of self-care and HL in chronic diseases management, people's competency on using home medical equipment (like glucometer, sphygmomanometer and so on) as well as their ability to perform first aid as a determinant of HL was evaluated in IHLQ. Similar with the results of the present study, in the European HL instrument, this ability was also considered (3). A factor (social empowerment) with three items including "participation in public events such as walking and cleaning up the environment", "attending health centers" and "paying attention to health priorities of candidates when voting" was also found in EFA. In HL, there is a strong emphasis on the role of people's participation in individual and social health promotion. Moreover, the European HL committee (3) has emphasized on community empowerment, as well.

Health information resources use and access to health information resources including healthcare providers, mass media, Internet, publications, training manuals and friends have been considered as the two components of HL in IHLQ. According to the definitions of Nutbeam (18) on HL, access ability to health information is considered as a critical component of HL. Five items on people's knowledge of health issues (health knowledge) such as weight control, blood pressure, diabetes, and proper use of drugs were included in the HL questionnaire. These items were in the field of self-care and chronic diseases management and were similar to the TOFHLA questionnaire (20). In this study, there were significant relationships between factors, which are similar to the results found by the study of Banihashemi (10).

The final version of IHLQ included ten factors. As shown by the results, seven factors were extracted from the factor analysis and the other three factors (health information resources use, access to health information resources and health knowledge) were not included in the factor analysis because of their response format, which was yes/no. All these factors together, are able to assess personal and social empowerment regarding HL, which are in accordance with the World

Health Organization's definition of HL (6). According to the results of this study, the concept of HL is dynamic and influenced by many factors within which some factors are beyond the control of individuals.

It was concluded that IHLQ might be used as a native instrument to measure HL among Persian speaking communities. The reason for this conclusion is the diverse range of HL domains found in the EFA and the simplicity, accuracy, and practicability of the questionnaire. Now, IHLQ is available for health researchers, stakeholders and policy makers to help them in finding a more accurate estimation on HL among Persian speaking people. Moreover, this questionnaire may be considered as a basis to design new tools for specific diseases in Iran (such as HL measurement for patients with various chronic diseases).

As a strong point for the present study, IHLQ was designed based on the opinions of Iranian health researchers and policy makers and the citizen's comments; hence, it was derived from Iranian culture and consequently is efficient and accurate to measure different aspects of HL in Iran. Also, it seems beneficial for health promotion professionals, institutions and social organizations interested in national and population health research studies on HL of Persian speaking people. A weak point of the present study was its setting. In spite of the diverse cultures and ethnicities in Iran, the data was collected from only two provinces. However, this weak point is resolvable with Confirmatory Factor Analysis of the total data collected from all over the country.

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## Authors' Contributions

Ali Akbar Haghdoust managed the study. Fatemeh Rakhshani managed and consulted the researchers throughout the study. Mohsen Aarabi contributed to the data collection in Mazandaran. Ali Montazeri contributed to the data analysis. Mahmoud Tavousi contributed to the data analysis. Atoosa Solimanian contributed to data collection in Kerman. Fatemeh Sarbandi contributed to the literature review. Hosein Namdar contributed to the data collection in Mazandaran. Abedin Iranpour contributed as the main researcher in preparation of the proposal, data analysis and writing of the manuscript.

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