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Health literacy and related health behaviour: a community-based cross-sectional study from a developing country

Reema A. Karasneh[a], Sayer I. Al-Azzam[b], Karem H. Alzoubi[b], Lana K. Rababah[b] and Suhaib M. Muflih[b]

[a]Department of Basic Medical Sciences, Faculty of Medicine, Yarmouk University, Irbid, Jordan and [b]Department of Clinical Pharmacy, Faculty of Pharmacy, Jordan University of Science and Technology, Irbid, Jordan

Abstract

Objectives The concept of health literacy (HL) is globally evolving, and understanding its nature and impact is essential for disease prevention and treatment. Therefore, we aimed in this study to assess level of HL and predictors of inadequate HL in Jordanian population as an example case of a developing country.

Method This cross-sectional study was conducted in a public tertiary hospital and community pharmacies in Jordan. All respondents answered a questionnaire, which included demographic data, Rapid Estimate of Adult Literacy in Medicine-Revised (REALM-R), Short Test of Functional HL in Adults (S-TOFHLA), and All Aspects of HL Scale (AAHLS). Chi-square test and logistic regression analysis were conducted to determine the relationship and significant predictors for HL.

Key findings Among 310 participants, REALM-R showed that around 27.1% had limited HL. Similar findings with S-TOFHLA and AAHLS were shown with a mean score 25.6 out of 35 (SD = 3.54, Range = 16–33) for AAHLS. Functional and critical HL were comparably low. Education level, age, living area and chronic conditions were significant predictors of HL ($P < 0.05$).

Conclusions Health literacy was inadequate among Jordanians. Further research is required to assess the effect of inadequate HL on healthcare access and health outcomes. Health education programmes are required to improve HL particularly for patients with chronic diseases.

Keywords All Aspects of Health Literacy Scale; Arabic; health education, Jordan; health literacy; Rapid Estimate of Adult Literacy in Medicine-Revised; Short Test of Functional Health Literacy in Adults

Introduction

Health literacy (HL) is an evolving global concept. It is defined as 'the degree to which individuals can access, read, process, and understand basic health information and services needed to make appropriate health decisions'. The concept of HL has become a priority issue that should be evaluated and improved among general populations in order to improve public and patients' health status, enhance the understanding of disease and treatment, prevent medication errors, and decrease healthcare cost.[1,2]

People with inadequate or limited HL are more likely to misunderstand their disease and treatment, which subsequently leads to incorrect use of medications or failure of following prescribed treatment regimens and poor health outcomes.[3–5] Inadequate HL is prevalent in many countries around the world; for example, in the United States, more than one third of adult Americans were found to have limited HL skills.[6] More so, a previous study from the UAE showed good knowledge and positive attitude towards HL among community pharmacists, with a considerable proportion having below par knowledge, not so positive attitude and infrequent practices of HL strategies.[7]

Jordan is one of the developing countries in the Middle East with a population of 10 million.[8] The majority of Jordanians are educated, and literacy rate increased from 94.4% in 2010 to around 98.0% in 2016 representing one of the highest literacy rates in the world.[9] Besides, illiteracy rate had declined from 11% to 5.2% from 2000 to 2017 with higher rates found among females (7.5%) compared to males (2.9%).[10]

Correspondence: Reema Karasneh, Department of Basic Medical Sciences, Faculty of Medicine, Yarmouk University, P.O. Box 566, Irbid 21163, Jordan.
E-mail: reema.karasneh@yu.edu.jo

Notwithstanding, chronic conditions are considered one of the major causes of morbidity and mortality among Jordanian population, which accounted for 78% of deaths in 2017.[11] More than 35% of total deaths were attributed to cardiovascular diseases (CVDs), 15% to cancer, 7% to diabetes mellitus (DM) and 3% to chronic respiratory diseases.[12] Moreover, high prevalence of chronic diseases including CVDs, DM, obesity and dyslipidaemia is observed in Jordan.[13–15] For instance, prevalence of DM has approached 30.5% and is expected to increase and around one third of Jordanian adults have hypertension.[13]

Although poor management of chronic conditions is strongly associated with worsening and poor prognosis of health outcomes,[16,17] they still can be prevented by behavioural interventions and lifestyle modifications. Patient education is the cornerstone of self-care management and control over progression of chronic diseases. However, in Jordan, levels of HL have not been sufficiently studied. Thus, evaluation of HL in Jordanian population using Arabic validated tools is necessary to enhance the understanding of health-related problems. This cross-sectional study was aimed at assessing the levels of HL in Jordanian population, and identifying factors that potentially influence individuals' HL.

Methods

Study design and participants

This is a cross-sectional study that was approved by the institutional review board of Jordan University of Science and Technology, Irbid, Jordan. Participants were obtained from primary care clinics at King Abdullah University Hospital, which is a major tertiary hospital, and two community pharmacies (Alrazi Pharmacy and Almustafa Pharmacy) in Irbid, Jordan. Individuals under the age of 18 years, those who were unable to read due to vision impairment, and individuals with cognitive dysfunction were excluded from the study. The sample size was calculated according to Raosoft software program (Raosoft, Inc., Seattle, WA, USA), and the minimum estimated sample size was determined to be 267 to produce a 95% confidence interval and 5% margin of error to give reliable results. By adding 10% to adjust any dropout, so the total sample size was 294 subjects. Participants were approached using convenience sampling during waiting time either before entry to the hospital clinic or before receiving their prepared prescription at the community pharmacy. Informed consent was obtained from all eligible participants who were informed prior to starting the survey about the study purpose and that their participation will be confidential and voluntary. Face-to-face interview was conducted with each participant who agreed to complete the survey. The average completion time of the surveys was 15 min.

Data collection

Data collection was from January to May 2019. The level of HL was assessed by three common tools: REALM-R, S-TOFHLA and AAHLS. The three instruments utilized here were validated in Arabic language and used among Arabic populations by Al-Jumaili *et al*,[18] Fadda *et al*.,[19] and Siddiqui.[20] Survey instrument is provided in Appendix S1. The association between levels of HL and each predictor variables was examined. REALM-R was used to assess the ability of adults to pronounce common medical words. The total score of REALM-R is out of eight. Each word that was pronounced correctly was scored one point. Thus, a total score of six or less indicates people at risk for inadequate HL, whereas scores greater than six indicate an adequate HL among respondents.[21,22]

The S-TOFHLA included reading comprehension and numeracy tests of 36 items. It measures HL via modified cloze procedure which aims to delete the fifth or seventh word of the sentence and ask the participant to choose the correct missing word from four choices in order to complete the sentence grammatically and contextually with a 7-min time frame for scoring.[3] It included two passages (A and B) with passage A composed of 16 questions that describe the right instructions for colon endoscopy, while passage B composed of 20 questions related to health insurance programmes and modified to those exist in Jordan. The numeracy section included four questions in the following order: blood glucose monitoring, appointment slip and two questions about timing of drug administration. It measured the ability of patients to understand numerical directions given by pharmacist or other healthcare providers in real-life situations. The score for reading comprehension part (passages A and B) was out of 72 points (two points for each correct answer), and it was out of 28 for numeracy part (seven points for each item). The total score of S-TOFHLA was out of 100.

The AAHLS is a self-report scale; it measured functional, communicative and critical HL. It is composed of three functional questions (FQ): three communicative questions (CommQ), four critical questions (CritQ) and three empowerment questions (EmpQ). Each question was answered by one of three possible choices ('rarely', 'sometimes' and 'often'). The response for each HL question was scored with a range from one to three.[23] There was no cut-off point for adequate HL by AAHLS. The percentage for each response was separately calculated for appropriate interpretation of the level of HL among those individuals.

The response scale of FQ was inverted for consistent scale direction. Result of the functional and communication part was out of nine, while the critical part was out of twelve, and the empowerment part was out of five. The overall score of the AAHLS was calculated by summing the score of each part to obtain a final result of 35.[23]

Health behaviour was assessed in terms of smoking, physical activity and body mass index (BMI).[24] These factors were counted as important health behaviours that should be improved in the national health promotion movement among Jordanians. Respondents chose one of 2–3 options in response to each question. In the analysis, the original 2–3 categories were dichotomized in accordance with the most commonly provided advice on smoking, physical exercise, and in public health settings in Jordan. The smoking categories were smoker versus non-smoker. The physical exercise categories were 'active' (do more

than 3 times a week) versus 'moderate' (less than 3 times a week).

Data analysis

Descriptive statistics (percentages and means) were conducted to analyse the data. To evaluate the associations between categorical variables, Pearson chi-square test was performed. In addition, multiple linear regression models were conducted to evaluate predictors of S-TOFHLA, AAHLS and subscales of AAHLS. Multivariate logistic regression analysis was used to assess the effect of each independent variable (age, gender, BMI, marital status, education level, smoking, job, monthly income, chronic conditions, FH of chronic condition, medical insurance, physical activity and living location) on the dependent variable (REALM-R scores) after controlling for the effect of other variables included in the model. The statistical significance level was set at $P < 0.05$. Data were analysed using IBM® SPSS (Statistical Package of Social Sciences, Armonk, NY, USA) program version 22. Cronbach's alpha coefficient was applied to test the internal consistency of the survey items (REALM-R, S-TOFHLA and AAHLS).

Results

Characteristics of the sample

Participants of the study were 310. The majority were females with mean age of 38.1 years (SD = 14.22, Range = 18–72 years). Approximately, 65.8% of the participants were overweight or obese. In addition, almost half of the sample (45.8%) had bachelor degree. Moreover, 31.3% of participants had at least one chronic disease. HTN was the most frequently reported chronic disease among participants (19.7%), then hyperlipidaemia (14.5%), DM (12.9%) and CVDs (4.5%). The demographic characteristics of the sample are summarized in Table 1.

Table 1 Percentage distribution of sample characteristics ($N = 310$)

Variable	Frequency (%)
Gender	
Male	109 (35.2)
Female	201 (64.8)
BMI	
Underweight	5 (1.6)
Normal weight	91 (29.4)
Over weight	117 (37.7)
Obesity	87 (28.1)
Extremely obese	10 (3.2)
Marital status	
Single	114 (36.8)
Married	181 (58.4)
Widowed	12 (3.9)
Divorced	3 (1.0)
Smoking	
No	240 (77.4)
Yes	70 (22.6)
Education level	
Primary school	21 (6.8)
Secondary school	83 (26.8)
College degree	46 (14.8)
University degree	142 (45.8)
Postgraduate	18 (5.8)
Job	
Unemployed	137 (44.2)
Medical job	18 (5.8)
Non medical job	120 (38.7)
Retired	35 (11.3)
Monthly income (JD)	
Low <500	234 (75.5)
Medium 500–1000	69 (22.3)
High >1000	7 (2.3)
Chronic diseases	
No	213 (68.7)
Yes	97 (31.3)
Family history of chronic disease	
No	110 (35.5)
Yes	200 (64.5)
Insurance status	
No	60 (19.4)
Yes	250 (80.6)
Physical activity	
Not active	88 (28.4)
Moderate	148 (47.7)
Active	74 (23.9)
Living location	
Urban	175 (56.5)
Rural	135 (43.5)

BMI, body mass index; JD, Jordan dinar (1 JD ≈ 1.41$).

Results of HL measures

The findings of REALM-R demonstrated that 72.9% of participants had adequate HL skills, while 27.1% had inadequate HL as shown in Figure 1a. The mean score of REALM-R was 6.76 out of 8 (SD = 1.53, Range = 1–8).

Pseudo R^2 was 0.441; therefore, the explained variance in HL by REALM-R score based on current model was 44.1%. Educational level was significantly associated with HL ($P < 0.001$, OR = 2.402, 95% CI = 1.645–3.507) (Table 2). Significant differences were also found comparing scores and medical insurance status (OR = 3.144, 95% CI = 1.340–7.373). The analysis of the scores compared to living area showed statistically significant results. Those reporting living in rural areas showed lower scores than those who stated living in urban areas (OR = 0.214, 95% CI = 0.108–0.426).

The results of S-TOFHLA showed that around 71.3% of participants had adequate, 12.3% had marginal, and 16.5% had inadequate HL as shown in Figure 1b. The mean score of S-TOFHLA was 75.57 out of 100 (SD = 18.0, Range = 10–100). Figure 1c shows the percentage of correct answers for each numeracy item of S-TOFHLA. The coefficient of determination R^2 for S-TOFHLA was 0.483, explaining 48.3% of the variability in the S-TOFHLA score. A negative and significant relationship between age and S-TOFHLA scores was found ($P < 0.001$) (Table 2). Higher educational level, however, was significantly related to higher S-TOFHLA scores. Significant differences in the S-TOFHLA scores compared to presence of chronic

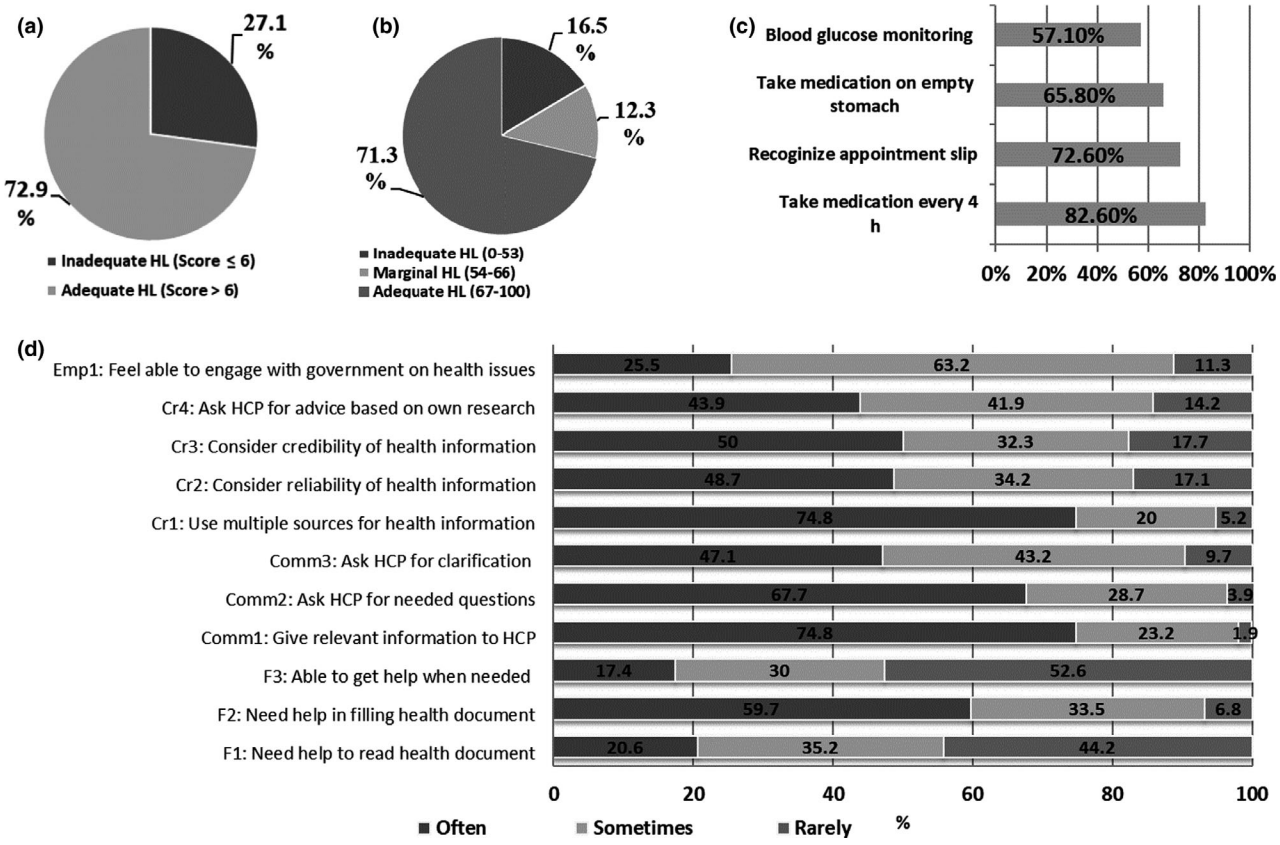

Figure 1 Health literacy in Jordanian population. (a) Health literacy by REALM-R; (b) Health literacy by S-TOFHLA; (c) Percentage of correct answers of numeracy items of S-TOFHLA; (d) The distribution of health literacy scores of AAHLS; functional (F), communicative (Comm), critical (Cr), and empowerment literacy (E). (HCP: Health care providers).

conditions and a family history of chronic disease were also shown ($P < 0.05$). About 36% of patients with chronic diseases had inadequate HL compared to 7.5% individuals who were medically free ($P < 0.05$). Significant associations were also found between living in rural areas and inadequate HL ($P < 0.001$).

The mean score of AAHLS was 25.6 out of 35 (SD = 3.54, Range = 16–33). Overall, participants showed good response on communication literacy questions with a mean score of 7.74 out of 9 (SD = 1.34, Range = 3–9). Mean scores were found to be 5.11 out of 7 (SD = 1.05, Range = 3–7) for empowerment literacy, 6.06 out of 9 (SD = 1.5, Range = 3–9) for functional HL and 9.63 out of 12 (SD = 2.0, Range = 4–12) for critical HL. The distribution of HL scores for the AAHLS sub-scales (functional, communicative, critical and empowerment literacy) is shown in Figure 1d.

Almost half of participants reported that they 'often' or 'sometimes' need help to read and fill health-related documents. In addition, most participants appeared to have the ability to effectively and easily communicate with their healthcare professionals, to critically analyse health information, and to consult multiple sources to find health-related information. For empowerment literacy, more than half of participants (59.7%) reported that they took an action within the last 12 months towards health issues that affect their family. Furthermore, more than one-third (35.5%) of study respondents chose 'information and encouragement to lead healthy lifestyles' is most important for everyone's health, while 64.2% chose 'good housing, education, suitable jobs, and good local facilities'.

The coefficient of determination R^2 for AAHLS was 0.131, explaining 13.1% variance (Table 3). Significant associations were observed between the scores, and education level as well as physical activity. Those with primary school certificate and those who were physically inactive showed the lowest scores ($P < 0.05$). Additionally, physical inactivity was significantly associated with low functional and critical HL ($P < 0.05$). Furthermore, the relationship between HL and health-related behaviours is shown in Table 4. The HL was significantly associated with physical activity ($P < 0.001$). On the other hand, no significant association was found between HL and smoking or BMI.

Internal consistency and reliability

The validated Arabic versions of REALM-R and S-TOFHLA showed acceptable internal consistency; Cronbach's alpha was 0.63 and 0.56, respectively. Additionally, Cronbach's alpha of the whole AAHLS was 0.65, which is considered acceptable.[25] Additionally, REALM-R was significantly correlated with S-TOFHLA and AAHLS with

Table 2 The association between health literacy and socio-demographic characteristics by REALM-R and S-TOFHLA

Variable	Logistic regression model results of health literacy by REALM-R					Multiple linear regression model results of continuous S-TOFHLA			
	Beta	*P*-value	OR	95% CI		Beta†	*P*-value	95% CI	
				Lower	Upper			Lower	Upper
Age	−0.008	0.636	0.992	0.958	1.026	−0.435	0.000	−0.645	−0.226
Gender	−0.182	0.715	0.833	0.314	2.215	−1.567	0.566	−6.929	3.795
BMI	0.207	0.358	1.23	0.791	1.914	2.246	0.073	−0.211	4.702
Marital status	−0.264	0.474	0.768	0.374	1.58	2.263	0.177	−1.196	6.46
Smoking	0.325	0.537	1.384	0.493	3.886	0.191	0.948	−5.554	5.937
Education level	0.876	0.000	2.402	1.645	3.507	5.824	0.000	3.665	7.982
Job	−0.143	0.393	0.867	0.625	1.203	0.176	0.851	−1.676	2.029
Monthly income	0.446	0.293	1.563	0.68	3.591	3.118	0.131	−0.932	7.169
Chronic diseases	−0.707	0.11	0.493	0.207	1.173	−5.939	0.025	−11.116	−0.762
FH of chronic diseases	−0.007	0.985	0.993	0.456	2.159	4.855	0.021	0.735	8.975
Insurance status	1.145	0.008	3.144	1.34	7.373	1.184	0.63	−3.647	6.015
Physical activity	0.161	0.537	1.175	0.705	1.96	1.768	0.215	−1.03	4.566
Living location	−1.541	0.000	0.214	0.108	0.426	−13.282	0.000	−17.183	−9.382

BMI, body mass index; CI, confidence interval; FH, family history; OR, odds ratio.
†Un-standardized beta.

Pearson's *r* of 0.66 and 0.42, respectively ($P < 0.01$). S-TOFHLA was significantly correlated with AAHLS with Pearson's *r* 0.33.

Discussion

To the best of our knowledge, this research project is the first to evaluate the level of HL and the socio-economic predictors of inadequate HL in the Jordanian population. In addition, the first time to use three common Arabic translated measures of HL (REALM-R, S-TOFHLA and AAHLS) concurrently to comprehensively evaluate HL.

Based on the HL instruments we used, around 30% of participants in this study had inadequate HL with mean score of 75.57. Therefore, more attention should be paid to HL level and socio-economic predictors of HL among Jordanians. This result is analogous to the findings of the National Assessment of Adult Literacy (NAAL) survey in which 36% of Americans have limited HL.[6,26] Similar findings were reported by a recent study on 500 participants in Saudi Arabia using REALM-R score in which 34.4% of Saudis had basic HL.[27] However, higher rates of inadequate HL were reported in a recent study on 805 subjects in Egypt with more than two-thirds (81%) had limited HL.[28]

Table 3 The association between overall and sub-scales of AAHLS and demographic variables according to linear regression models

Demographic category	Health literacy component				
	Functional ($B^{\dagger}$)	Communicative ($B^{\dagger}$)	Critical ($B^{\dagger}$)	Empowerment ($B^{\dagger}$)	AAHLS ($B^{\dagger}$)
Age	−0.002	0.002	0.009	0.009	0.012
Gender	−0.176	0.355	0.241	0.129	0.469
BMI	0.007	0.129	0.063	−0.080	0.195
Marital status	0.131	0.121	0.180	−0.073	0.428
Smoking	0.147	0.366	−0.593	0.156	−0.074
Education level	0.227*	0.167	0.214	0.024	0.653*
Job	0.057	0.048	0.029	0.057	0.117
Monthly income	0.019	0.107	−0.105	0.232	0.126
Chronic disease	−0.204	0.111	−0.121	0.287	−0.118
FH of chronic disease	0.326	0.004	0.099	−0.166	0.382
Insurance status	−0.154	−0.294	0.092	0.264	−0.280
Physical activity	0.468*	0.166	0.426*	0.038	1.119*
Living location	−0.183	−0.186	−0.408	−0.113	−0.817
R^2	0.144	0.056	0.079	0.068	0.131

*$P < 0.05$ is statistically significant in the multiple linear regression models.
†Un-standardized beta.

Table 4 The association between health literacy and health-related behaviours

Health behaviour	S-TOFHLA		REALM-R		AAHLS	
	Mean ± SD	*P*-value	Mean ± SD	*P*-value	Mean ± SD	*P*-value
BMI						
Underweight	68.8 ± 21.65	0.07	6.2 ± 1.64	0.35	23.6 ± 3.20	0.46
Normal weight	81.89 ± 16.77		7.2 ± 1.14		26.01 ± 3.22	
Overweight	78.61 ± 21.01		6.86 ± 1.43		25.53 ± 3.45	
Obese	67.84 ± 23.12		6.46 ± 1.65		25.56 ± 3.84	
Extremely obese	53.3 ± 22.34		4.60 ± 2.22		23.20 ± 3.55	
Smoking						
Yes	78.53 ± 20.46	0.94	6.90 ± 1.46	0.52	25.29 ± 3.84	0.90
No	74.71 ± 21.86		6.73 ± 1.54		25.66 ± 3.45	
Physical activity						
Inactive	65.75 ± 24.99	0.21	6.16 ± 1.72	0.53	24.01 ± 3.81	0.000
Moderate	78.81 ± 19.91		7.02 ± 1.34		26.11 ± 3.08	
Active	80.78 ± 16.24		6.97 ± 1.44		26.35 ± 3.52	

BMI, body mass index.

Our findings when utilizing AAHLS were comparable to those reported by Siddiqui.[20]

Numerical test in the current study showed that most of participants can recognize the proper timing of medications according to the given instructions, know how to correctly take medications every 4 h, are aware of their appointment slips and can seek healthcare providers regularly. These points were consistent with the findings of Al-Jumaili *et al*.[18] Furthermore, consistent with current findings, Baker *et al*.[3] have reported that majority of American participants had the ability to correctly recognize normal blood glucose level and know how to take medications on empty stomach, respectively.

Elevated literacy rate among Jordanians was observed in this study consistent with the national statistics.[10] However, low education level was significantly associated with inadequate HL ($P < 0.001$). This is predictable as low education levels reduce reading and writing ability and lead to a lesser understanding of general problems.[29] These findings were also confirmed in several studies that investigated such association.[6,18,19,27,30–33] Of these studies the results of recent Australian study of HL that found a significant association between low HL and lower levels of education.[34]

Of socio-demographic factors, older age was strongly associated with inadequate HL ($P < 0.05$). Findings showed that older participants had lower scores when compared with young individuals. This is expected as reading process requires adequate cognitive, vision, memory and attention skills and older people who have declining of these skills are more exposed to reading impairment.[35] Several studies have showed that HL was inadequate among elderly; thus, they had problems with understanding of their diseases and medication directions and increasing age was significantly associated with limited HL ($P < 0.05$).[6,31,33,36–42] Same findings were also reported among the Arabic population in a Lebanese study where older age was significantly associated with inadequate HL ($P < 0.01$).[19] Besides, presence of chronic conditions and family history of chronic conditions were significantly associated with low HL ($P < 0.05$). These findings are consistent with those reported by several studies.[42–45] This association may be affected by age as presence of chronic diseases is strongly associated with aging.[46]

Current findings indicate that inadequate HL was dominant in population living in rural areas with a statistically significant association ($P < 0.001$). This is consistent with a previous study from the United States[47] as well as Iran.[48] These results may be attributed to the nature of populations living in rural areas, since they live in areas far from healthcare centres, and they are generally older, less educated, and have low income.[47,49,50]

Employment status was associated with better functional and communicative skills ($P < 0.05$) indicating that employed individuals had better HL than unemployed. This is may be explained by the healthy worker effect (HWE) phenomenon where employees are usually educated and have good communication skills.[51,52] Similar to current findings, a Japanese cross-sectional study has reported a significant association between communicative and critical HL with employment status.[53] On the other hand, gender was not associated with inadequate HL in current study, which is similar to a previous study from Lebanon.[19] This would suggest similar access to the source of information for both males and females.[54] However, gender disparities were observed in several studies in which males were found to have lower HL compared to females.[27,39,55]

The association between low HL and health insurance status was not significant when using S-TOFHLA and AAHLS; however, significant association was found with REALM-R score ($P < 0.05$). Similar findings were observed in the NAAL study in the United States in which adults under health insurance coverage were found to have higher average HL than those who received Medicare or Medicaid and adults who had no health insurance.[6] These findings were confirmed in a study that was conducted in California suggesting that low HL predicts likelihood of being uninsured.[56]

This study examined the relationship between HL and health-related behaviours. Results of AAHLS indicated a

significant association between sedentary lifestyle and poor HL ($P < 0.001$). This is comparable to the findings of a study conducted in the Netherlands, which demonstrated that inadequate HL was significantly associated with poor compliance to physical activity.[57] Participants with higher HL scores were less likely to have negative health behaviours such as smoking, obesity and physical inactivity. Current findings are consistent with the results of a Chinese study, which found that HL was significantly associated with smoking and physical activity.[24]

The validated Arabic versions of REALM-R and S-TOFHLA used in the current study showed acceptable internal consistency and reliability among Jordanians (Cronbach's alpha 0.63 and 0.56, respectively). The reliability of used tests was comparable to previous studies.[18,27] In addition, current tests compared well to the English versions of REALM-R and S-TOFHLA.[3,22] Furthermore, Cronbach's alpha of the AAHLS was 0.65 which is considered acceptable and comparable to the study conducted on Syrian refugees by Siddiqui[20] in which the Cronbach's alpha was 0.67.

This study has some limitations. Since the participation was voluntary, individuals who refused to participate may have inadequate HL indicating the possibility to produce selection bias. Furthermore, selection bias can be produced as the sample was from health settings and people with lower HL levels are less likely to seek health care or adhere to medications. Additionally, current study sample was a convenience sample, so generalizability cannot be confirmed among Jordanian population.

In conclusion, functional and critical HL among Jordanians appear to be quite low. However, communicative HL was found to be adequate indicating effective communication with healthcare providers. Older age, low education level and living in rural areas are the most important predictors of inadequate HL. Nevertheless, presence of chronic conditions, physical inactivity and having no medical insurance were also associated with a low level of HL. Improving HL among Jordanians may be effective in changing health-related behaviours. Future research can be carried out to study the impact of HL on different health outcomes in Jordanian population. The impact of HL in relation to health promotion has not been studied in Jordan. Further studies are needed to demonstrate that HL intervention is an important aspect of health promotion. Healthcare team members should also be made aware of the HL vulnerable patient populations such as the elderly. This could be achieved via integrating HL into continuous education and professional development programmes. As well, awareness and patient education programmes are required, especially targeting those with inadequate HL in different healthcare settings. Finally, improvement of HL should be simultaneously conducted in health promotion efforts to improve healthy lifestyle.

Declarations

Conflict of interest

The Author(s) declare(s) that they have no conflicts of interest to disclose.

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Authors' contributions

Reema A. Karasneh designed the study, helped in data collection, analyzed data, results interpretation, and drafted the manuscript. Sayer I. Al-Azzam helped in study design, data collection, and manuscript drafting. Karem H. Alzoubi conceived study design, data collection, and helped in interpretation of the results and manuscript drafting. Lana K. Rababah helped in study design, collected data, and heped in manuscript writing. Suhaib M. Muflih helped in study design, data analysis, results interpretation, and manuscript drafting. All Authors state that they had complete access to the study data that support the publication.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix S1. Questionnaire.