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REVIEW

# Health literacy research in the Eastern Mediterranean Region: an integrative review

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## Abstract

**Objectives** This integrative review examines health literacy research in the Eastern Mediterranean Region (EMR) and describes: (1) assessments and screening tools used to measure levels of health literacy, and (2) the focus, methods, and findings of health literacy research in the region.

**Methods** A total of 246 records were identified through a systematic search of online databases from 1950 to 2017, to include: ProQuest Middle East and Africa, MEDLINE, PubMed, PsycINFO, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Academic OneFile, Web of Science, Scopus, and Google Scholar. The final sample included 49 full-text articles.

**Results** This research described 7 studies which used existing or new health literacy measures. Levels of health literacy in the EMR were similar to those for Europe and the United States. Low health literacy in EMR countries was more prevalent among females than males. The relationships between health literacy and knowledge, behavior and health outcomes varied across countries.

**Conclusions** To our knowledge, this study is the first in the EMR. Appropriately designed studies should better define health literacy needs due to variations in socioeconomic status within subregions. Future health literacy measures must consider stronger psychometric properties to guide development and validation.

**Keywords** Health literacy · Middle East · Review

## Introduction

Health literacy is an integral component for public health (Nielsen-Bohlman et al. 2004; Nutbeam 2008; World Health Organization 2017b). Health literacy was conceived as the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (Nielsen-Bohlman et al. 2004). Recent definitions expand the scope of health literacy to focus on health promotion and disease prevention (Dodson et al. 2016; Sørensen et al. 2012). Variations in the definition exist; yet, there is consensus that health literacy is an important component to reduce health disparities and increase health equity (Sørensen et al. 2012).

A body of health literacy research emerged from North America, Europe, Asia, and Australia (Duong et al. 2017; Osborne et al. 2013; Pleasant 2013a, b; Sørensen et al. 2012). However, little research exists to understand population level health literacy needs in the Eastern Mediterranean Region (EMR) countries (see Table 1) (World Health Organization 2017b). Our review examines health literacy research in the EMR, and we address two research questions. First, measuring health literacy is important to determine the impact of health literacy interventions (Haun et al. 2012); therefore, which assessments or screening tools do studies use to either qualitatively or quantitatively assess health literacy? Second, what are the characteristics (i.e., target populations, sample sizes, outcomes of interest,

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**Table 1** Eastern Mediterranean Region (EMR) countries, primary language(s) spoken, and 2015 population count. *Source*: World Health Organization (WHO) Eastern Mediterranean Region (EMR) countries. http://www.who.int/about/regions/emro/en/

| Country | Primary language(s) | Population (2015) |
|---|---|---|
| Afghanistan | Pashto/Dari | 34,124,811 |
| Bahrain | Arabic | 1,234,571 |
| Djibouti | Arabic/French | 865,267 |
| Egypt | Arabic/Egyptian | 93,547,000 |
| Islamic Republic of Iran | Persian | 80,314,000 |
| Iraq | Arabic/Kurdish | 36,575,000 |
| Jordan | Arabic | 6,388,000 |
| Kuwait | Arabic | 4,183,658 |
| Lebanon | Arabic | 4,965,846 |
| Libya | Arabic/Tamazight/Italian | 5,298,152 |
| Morocco | Arabic/Berber | 33,337,529 |
| Oman | Arabic | 4,310,000 |
| Pakistan | Urdu | 204,924,861 |
| Palestine | Palestinian Arabic | 2,731,052 |
| Qatar | Arabic | 2,412,483 |
| Saudi Arabia | Arabic/Tagalog/Urdu | 28,571,770 |
| Somalia | Arabic/Somali | 11,031,386 |
| Sudan | Arabic/English | 13,026,129 |
| South Sudan | Arabic/English | 37,345,935 |
| Syrian Arab Republic | Arabic | 17,064,854 |
| Tunisia | Arabic/Berber/French | 11,403,800 |
| United Arab Emirates | Arabic/English/Tagalog/Urdu/Persian | 9,400,145 |
| Yemen | Arabic | 28,036,829 |

methods, analytical approaches, and main results) of health literacy research conducted in EMR countries?

In the following sections, we briefly review the social, political, and economic context of the EMR. We call attention to the impact of modernization on population health outcomes and the increase in chronic and non-communicable diseases (NCDs) (Mokdad 2017a, b, c; Rahim et al. 2014). Next, we describe the review methodology, eligibility criteria, information sources, and risk of bias to identify health literacy research conducted in EMR countries. The results present the state of health literacy research in the EMR. We critically assess prior health literacy research and highlight a health literacy research agenda focusing on public health in the EMR.

## Background

### Context: the EMR

While there is some debate about the roster of countries that constitute the Middle East, we focus on Eastern Mediterranean Region (EMR) countries designated by the World Health Organization (2017b). Although widely known as Arabic speaking, the EMR consists of a mix of languages and cultures, particularly in the countries where expatriate communities make up much of the population (e.g., United Arab Emirates). Iran is the only non-Arabic speaking majority country where the national language is Persian. Some EMR countries experienced rapid economic growth; however, political conflict threatens the livelihood of many people in other EMR countries. The political conflict continues to occur against a backdrop of an increase in preventable chronic and NCDs (Mokdad 2017c; Rahim et al. 2014). The region is culturally diverse and consists of multinational populations with different religious beliefs and cultural practices which pose a challenge for population-based public health interventions (Ismail et al. 2013; Phillimore et al. 2013). More affluent EMR countries experienced an influx of migrant populations due to rapid modernization. For instance, the migration of expatriate work force led to an increase in the population from 287,000 in 1971, to 4.1 million in 2005, to 8.3 million in 2010 in the United Arab Emirates (Loney et al. 2013).

### Modernization and health outcomes

The discovery of oil led to increasing prosperity and modernization in some EMR countries as the region claims three of the world's top five oil exporting countries (International—U.S. Energy Information Administration

(EIA) 2017). The affluence and economic growth contributed to lifestyle changes and an increase in the rate of chronic and NCDs (Mokdad 2017c; Toselli et al. 2014). The growing prevalence of NCDs are due, in large part, to the increasing rates of diabetes (Mokdad 2018), cardiovascular disease, cancer, chronic respiratory disease, and obesity. For instance, residents in EMR countries are at increasing risk of nutrition-related deficiencies (Taleb et al. 2015), rising morbidity and mortality rates (Ng et al. 2011), and increasing prevalence of type II diabetes (Guariguata et al. 2014). Compared to other world regions, the rates of obesity are a primary reason for the increase in diabetes across the EMR. Kuwait, Saudi Arabia, Qatar, and Bahrain are among the 10 countries with the highest diabetes prevalence rates among adults in the world (Guariguata et al. 2011). EMR country leaders concluded at a United Nations meeting on NCDs that morbidity and mortality due to NCDs are preventable with behavior change interventions (Stuckler et al. 2011) which may also influence mental health outcomes (e.g., depression and anxiety) (Mokdad 2017b).

Rapid economic development and an environment of year-round dry heat also contribute to the changing nutrition habits (Aboul-Enein et al. 2016; Rahim et al. 2014). Undernutrition is a risk for vulnerable populations in the region as the shift from a traditional diet to a diet rich in carbohydrates, proteins, saturated and trans fats, sugar, and salt also increases poor health outcomes (Aboul-Enein et al. 2016; Rahim et al. 2014). Time spent indoors promotes consumption of fast food, pre-cooked foods, and lack of physical activity (Aboul-Enein et al. 2016; Klautzer et al. 2014; Toselli et al. 2014). The large consumption of tobacco products is a cultural norm throughout the region; however, tobacco use is one of the top non-dietary risk factors affecting health outcomes in the EMR (Gilmour et al. 2015).

The prevalence of obesity varies by age, gender, and socioeconomic status. Adolescents (i.e., age 10–24) compose approximately one-third of the population across the 23 EMR countries (Mokdad 2017a). Over two and a half decades, the source of adolescents' health risk shifted from communicable diseases, maternal disorders, and natural disasters to NCDs related to obesity and tobacco use (Mokdad 2017a, c). In Jordan, Egypt, Iran, Morocco, Oman, Tunisia, and Turkey, obesity among women in urban areas is higher than for women in rural areas, while the opposite is true for women in Lebanon (Toselli et al. 2014). Higher rates of obesity are also observed for Saudi Arabians, Kuwaiti, and Tunisians' who are 30–50 years of age, highly educated, married, female, unemployed, and consume fruits and vegetables less than three times a week (Klautzer et al. 2014; Toselli et al. 2014). To address the NCD epidemic, the Shanghai Declaration (World Health Organization 2017a) identifies health literacy, within the context of public health (Sørensen et al. 2012), as a key pillar of an integrative response to improve population health outcomes.

## Methods

An integrative review was conducted by two independent research teams to examine: (1) the use of health literacy measures and (2) the characteristics (i.e., target populations, sample sizes, outcomes of interest, methodological and analytical approaches, and main results) of EMR-based health literacy research. An integrative review summarizes prior empirical research to provide a comprehensive understanding of a specific occurrence or health-care concern (Whittemore and Knafl 2005). Systematic reviews often include the statistical methods of meta-analysis if primary studies meet the required assumptions for meta-analyses. However, when primary studies cannot be combined statistically, then a narrative analysis is undertaken in conjunction with vote counting or other approaches (Whittemore and Knafl 2005). Given the different health-related outcomes examined in each study, a meta-analysis was not possible; therefore, the results are presented in narrative form (Whittemore and Knafl 2005).

### Eligibility criteria

Eligible studies were included if they met the following inclusion criteria: (1) health literacy research of any design (e.g., qualitative, quantitative, or mixed methods) conducted in the EMR, (2) a research design examining the relationship between health literacy and health outcomes, health-related knowledge, and/or behaviors, (3) written in English, (4) use an existing health literacy definition or a new definition relevant to the country or the region, (5) use a theoretical or conceptual framework to propose research hypotheses, and (6) either use an existing health literacy measure, translate and validate an existing health literacy measure, or develop a new measure of health literacy.

### Information sources

The research teams initially conducted searches in ProQuest Middle East and Africa, MEDLINE, PubMed, PsycINFO, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Academic OneFile, Web of Science, Scopus, and Google Scholar between the Fall 2016 and Fall 2017. The teams first searched for relevant studies readily identifiable for health literacy by country published from 1950 to 2017. The database search used the term "health literacy" in the title, abstract, and keywords and the name

of each EMR country (Table 1). All references from the search were imported into Zotero, a citation management software, and exported from Zotero into Rayyan, a web-based application to screen article titles and abstracts (Ouzzani et al. 2016). Duplicates were removed, and the article title and abstract were screened. Full-text reviews included scanning citations within studies to capture missing missed publications. The citation scan yielded additional peer-review studies not indexed in the initial database searches used for the review.

### Risk of bias

The search results may not capture the entire scheme of health literacy research in the EMR countries. However, reviewing the citations in the eligible studies was an effective approach to locate other relevant studies from the initial search results. The search and citation review returned studies written in Persian that were not included in the review. While the studies included an English translation of the abstract, the abstracts alone did not provide sufficient detail to warrant inclusion. Therefore, the eligibility criteria and database search potentially increased the risk of bias.

## Results

From the 246 identified references, 199 publications were considered for detailed examination after exclusion based on duplication or titles. Of the 199 publications, 164 did not meet the inclusion criteria. Only 42 references met the inclusion criteria. The citation review from the 42 eligible studies produced 15 additional studies. Eight of the 15 studies were written in Persian and excluded in the review. The review includes a total of 49 studies. Figure 1 presents a flow diagram summarizing the study selection process.

### Health literacy assessments

The 49 studies were conducted in 8 of the 23 EMR countries and used 14 different health literacy assessment tools (Table 2). Iran is the largest source of health literacy studies ($n = 39$), and studies employ a diverse range of health literacy assessment ($n = 14$). The long and short versions of the Test of Functional Health Literacy in Adults (TOFHLA/STOFHLA) were the most frequently used ($n = 14$) assessment followed by the Newest Vital Signs (NVS) ($n = 5$) and Single Item Health Literacy Screener (SILS) ($n = 5$).

A number of new assessments emerged for Persian speaking populations and include: Health Literacy of Iranian Adults (HELIA) ($n = 3$) (Lamyian et al. 2016), Iranian Health Literacy Questionnaire (IHLQ) ($n = 3$) (Haghdoost et al. 2015), Health Literacy Measure for Adolescents (HELMA) ($n = 1$) (Ghanbari et al. 2016), Eastern-Middle Adult Health Literacy ($n = 1$) (EMAHL13) (Nair et al. 2016), Food and Nutrition Literacy (FNLIT) (Doustmohammadian et al. 2017), and Oral Health Literacy Adult Questionnaire ($n = 6$) (OHL-AO) (Naghibi Sistani et al. 2013a).

The 49 studies focus on a range of: target populations, sample sizes, outcomes of interest, analytical approaches, and main results provide in Online Resource 1.

### Target populations

The majority of studies focus on clinical settings to measure health literacy among patients; specifically, patients with type II diabetes (Maleki et al. 2016; Mohammadi et al. 2015; Reisi et al. 2016), women with polycystic ovary syndrome (PCOS) (Al-Ruthia et al. 2017), and cardiovascular disease (Malekzadeh et al. 2016). A small cluster of studies focused on health literacy among: health-care givers for the elderly (Rahman 2014), medical staff (Kahouei et al. 2015), medical, health science, and nursing students (Dashti et al. 2017; Mahfouz et al. 2016; Panahi et al. 2015; Tubaishat and Habiballah 2016), and nurses (Sharifirad et al. 2015). Five studies focus on children or adolescents level of health literacy (Darraj et al. 2016; Doustmohammadian et al. 2017; Khajouei and Salehi 2017; Khodadadi et al. 2016; Olyani and Peyman 2016). We point out that the studies did not examine public health literacy skills; instead, the studies focused on assessing individual level health literacy skills.

### Sample size

The total unique sample size (i.e., not using the same sample in a separate publication) from the 49 studies is 20,990 and ranged from 95 pharmacy customers in Iraq (Al-Jumaili et al. 2015) to 2254 adults attending primary health-care centers in Qatar (Bener and Ghuloum 2010; Ghuloum et al. 2010). Sample sizes are representative of the clinical or a specific subpopulation of interest. There were, however, no studies that assessed health literacy at the country or regional level.

### Outcomes

Functional health literacy level was the outcome of interest in 17 studies (Al-Jumaili et al. 2015; Al-Ruthia et al. 2017; Almaleh et al. 2017; Almutairi et al. 2016; Ansari et al. 2016; Ayub et al. 2015; Fadda et al. 2016; Ghanbari et al. 2016; Haerian et al. 2015; Haghdoost et al. 2015; Khadem-Rezaiyan et al. 2016; Khajouei and Salehi 2017; Lamyian

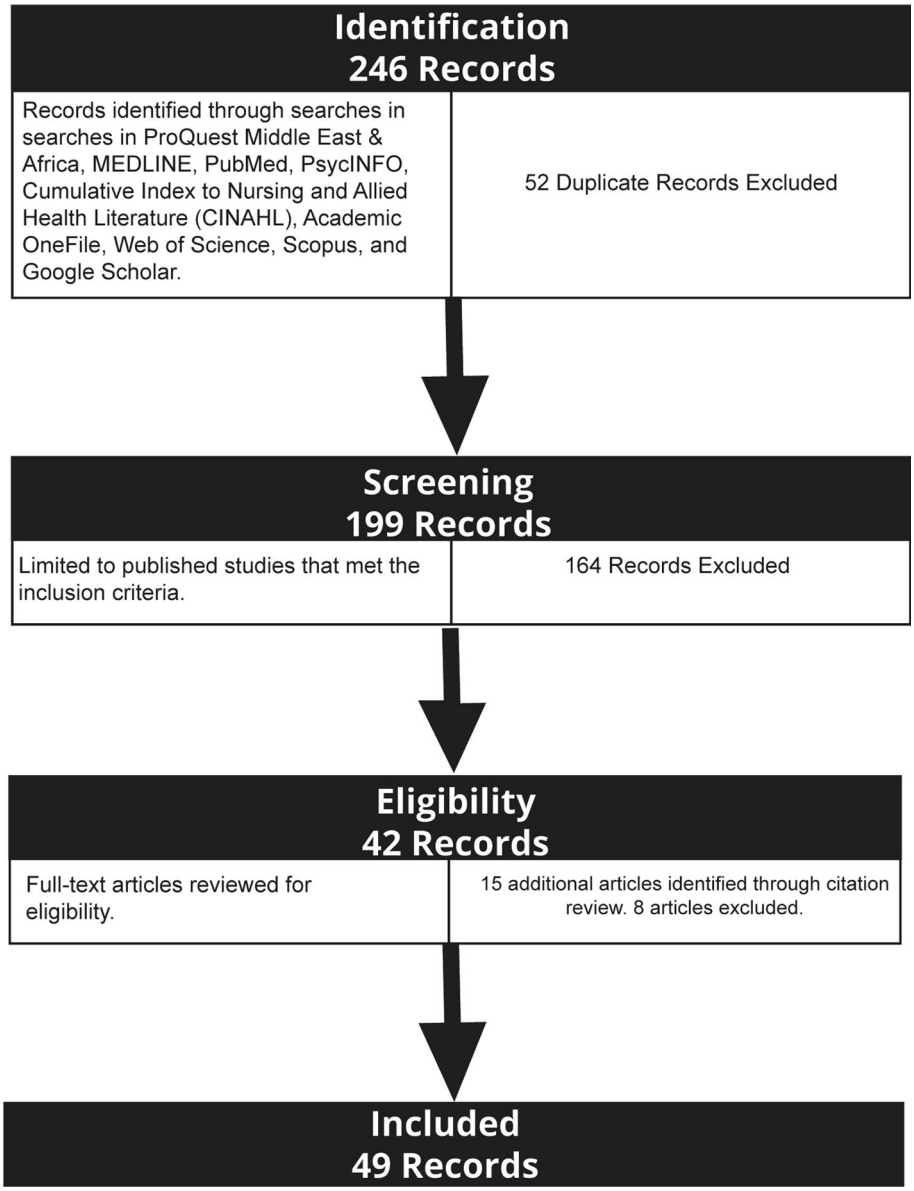


**Fig. 1** Flowchart review for health literacy research conducted in Eastern Mediterranean Region (EMR) countries from 1950 to 2017. *Note* Flowchart of search yield and records included. Initial identification based on search strategy and inclusion criteria: (1) health literacy research conducted in the Eastern Mediterranean Region (EMR), (2) a research design examining the relationship between health literacy and health outcomes, health-related knowledge, and/or behaviors in, (3) written in English, (4) use an existing health literacy definition or a new definition relevant to the country or the region, (5) use a framework to develop health literacy related hypotheses, and (6) use an existing validated or new measure of health literacy

et al. 2016; Maleki et al. 2016; Mohammadi et al. 2015; Peiravian et al. 2014; Sharifirad et al. 2015; Tehrani Banihashemi and Amirkhani 2007). Specific types of health literacy were the outcome of interest and include: mental (Essau et al. 2013; Mahfouz et al. 2016), depression (Darraj et al. 2016), oral/dental (Naghibi Sistani et al. 2013b, c; Pakpour et al. 2016; Tadakamadla et al. 2014), food and nutrition (Doustmohammadian et al. 2017), and e-health (Tubaishat and Habiballah 2016).

Studies also examined a range of health-related outcomes of interest that include: frequency and duration of hospital stay and health-related quality of life (QOL) (Rahman 2014), maternal and new born health (Kohan et al. 2007), oral/dental self-care (Naghibi Sistani et al. 2013a; Soltani et al. 2017), self-rated health status, health-care and preventive health-care use (Javadzade et al. 2012; Karimi et al. 2014), health promoting behaviors (Reisi et al. 2014), daily cell phone use (Olyani and Peyman 2016), dental caries and fillings (Khodadadi et al. 2016), preferred health information website use (Dashti et al. 2017), risky behaviors related to AIDS (Rezaei et al. 2017), iron deficiency anemia (IDA) (Ayub et al. 2015), smoking behavior (Panahi et al. 2015), and knowledge, attitudes and practices toward mental illness (Bener and Ghuloum 2010; Ghuloum et al. 2010; Mahfouz et al. 2016). There were, however, no studies that examine the efficacy of a health literacy intervention on health-related outcomes.

**Table 2** Health literacy assessments used for research conducted in Eastern Mediterranean Region (EMR) countries (1950–2017)

| Country | REALM/ REALM-R | TOFHLA/ STOFHLA | NVS | HLS-EU | SILS | BHLS | HELIA | FCCHL | IHLQ | HELMA | OHL-AQ | eHEALS/P-eHEALS | EMAHL13 | CHAP | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Afghanistan | | | | | | | | | | | | | | | |
| Bahrain | | | | | | | | | | | | | | | |
| Djibouti | | | | | | | | | | | | | | | |
| Egypt | 1 | | 1 | 1 | | | | | | | | | | | 1 |
| Islamic Republic of Iran | | 11 | 2 | | 3 | | 3 | 2 | 3 | 1 | 6 | 1 | | 1 | 6 |
| Iraq | | 1 | 1 | | 1 | | | | | | | 1 | | | |
| Jordan | | | | | | | | | | | | 1 | | | |
| Kuwait | | | | | | | | | | | | | | | |
| Lebanon | 1 | 1 | | | | 1 | | | | | | | | | |
| Libya | | | | | | | | | | | | | | | |
| Morocco | | | | | | | | | | | | | | | |
| Oman | | | | | | | | | | | | | | | |
| Pakistan | | | | | | | | | | | | | | | 1 |
| Palestine | | | | | | | | | | | | | | | |
| Qatar | | | | | | | | | | | | | | | 1 |
| Saudi Arabia | | 1 | 1 | | 1 | | | | | | | | | | 3 |
| Somalia | | | | | | | | | | | | | | | |
| Sudan | | | | | | | | | | | | | | | |
| South Sudan | | | | | | | | | | | | | | | |
| Syrian Arab Republic | | | | | | | | | | | | | | | |
| Tunisia | | | | | | | | | | | | | | | |
| United Arab Emirates | | | | | 1 | | | | | | | | 1 | | |
| Yemen | | | | | | | | | | | | | | | |

*Note*: *REALM/REALM-R* Rapid Estimate of Adult Literacy/Rapid Estimate of Adult Literacy-Revised, *TOFHLA/STOFHLA* Test of Functional Health Literacy in Adults/Short-Test of Functional Health Literacy in Adults, *NVS* Newest Vital Signs, *HLS-EU* Health Literacy Survey-European Union, *SILS* Single Item Literacy Screener, *BHLS* Brief Health Literacy Screening Items, *HELIA* Health Literacy of Iranian Adults, *FCCHL* Functional Communicative And Critical Health Literacy, *IHLQ* Iranian Health Literacy Questionnaire, *HELMA* Health Literacy Measure for Adolescents, *OHL-AQ* Oral Health Literacy-Adults Questionnaire, *eHEALS/P-eHEALS* e-Health Literacy Scale/Persian-E-Health Literacy Scale, *EMAHL13* Eastern-Middle Adult Health Literacy, *CHAP* Consumer Assessment Of Healthcare Providers And Systems

*Source*: World Health Organization (WHO) Eastern Mediterranean Region (EMR) countries. http://www.who.int/choice/demography/by_country/en/

## Analytical approaches

All 49 studies employed cross-sectional research designs, and 34 studies employed a combination of either descriptive (e.g., univariate distribution), parametric and non-parametric independence tests (e.g., Student's *t* test, analysis of variance or ANOVA, Mann–Whitney *U test*, and Chi–square test), or bivariate correlational (e.g., Pearson's *r* and Spearman's rank correlation) analyses. The remaining 15 studies used multivariate analytic approach (e.g., ordinary least squares, logistic regression, and structural equation modeling). Of the 15 studies that employ multivariate regression analyses, three reported the amount of accounted variance for the outcome of interest. Specifically, Sharifirad et al. (2015) regressed the Theory of Planned Behavior constructs (i.e., attitude, subjective norms, perceived behavioral control, and intention) on nurses' use of health literacy strategies in patient education. The full or final OLS regression model accounts for 31.9% ($R^2 = 0.319$) of the variance in nurses' use of health literacy strategies in patient education. Soltani et al. (2017) regress health literacy scores (based on the NVS), age, education, economic status, number of members in household, employment status, and marital status on oral health behaviors. The full OLS model accounts for 19.5% (Adjusted $R^2 = 0.195$) of the variance in oral health behaviors. Hashim et al. (2014) analyses reveal that education, age, and culture significantly predicted health-care symbol interpretation scores. The full model accounts for 63.5% (adjusted $R^2 = 0.638$) of the variance in health-care symbol interpretation.

Nine studies validated either an existing or new health literacy measure and assessed reliability using Cronbach alpha, intraclass correlation coefficient, principal component analysis (PCA), or confirmatory factor analysis (CFA) (Darraj et al. 2016; Doustmohammadian et al. 2017; Ghanbari et al. 2016; Haghdoost et al. 2015; Naghibi Sistani et al. 2013a; Nair et al. 2016; Pakpour et al. 2016; Reisi et al. 2017; Tadakamadla et al. 2014). Only one of study examined psychometric properties of an Arabic-translated oral health literacy measure (Tadakamadla et al. 2014) using a 1-parameter logistic (1PL) item response theory (IRT) or Rasch model.

## Distribution of health literacy

The distribution of health literacy in EMR countries is similar to patterns in the USA and Europe (Rikard et al. 2016; Sørensen et al. 2015). In general, older adults (e.g., age 60 and older) (Ansari et al. 2016; Javadzade et al. 2012; Peiravian et al. 2014), individuals with either no or low levels of education (Ansari et al. 2016; Maleki et al. 2016; Tehrani Banihashemi and Amirkhani 2007), residing in rural areas (Peiravian et al. 2014; Tehrani Banihashemi and Amirkhani 2007), and lower socioeconomic status (Peiravian et al. 2014; Tehrani Banihashemi and Amirkhani 2007) are associated with level lower levels of health literacy. However, the results from 7 studies indicate that females, compared to males, have lower health literacy levels (Almaleh et al. 2017; Bazaz et al. 2017; Bener and Ghuloum 2010; Dashti et al. 2017; Maleki et al. 2016; Rahman 2014; Tehrani Banihashemi and Amirkhani 2007).

The relationship between health literacy and health knowledge, behaviors, and outcomes varied across studies. For example, health literacy level was not a significant predictor of self-rated health status or health-care utilization (Karimi et al. 2014), smoking status (Reisi et al. 2014), and diabetic patient's HbA1c level (Mohammadi et al. 2015) in Iran. However, health literacy level was significantly associated with health promoting behaviors (Reisi et al. 2014), diabetes self-care management (Reisi et al. 2016), smoking status (Panahi et al. 2015), and knowledge, beliefs, and attitudes toward mentally ill individuals (Bener and Ghuloum 2010; Ghuloum et al. 2010; Mahfouz et al. 2016). In addition, independent of educational attainment and other socioeconomic variables, oral health literacy was a predictor for poor self-reported oral health (Naghibi Sistani et al. 2013b, c), improved oral health behavior and use of dental services (Naghibi Sistani et al. 2017) in Iran. Findings related to cell phone use offer a new contribution to the corpus of health literacy research in the EMR. Adolescents with high health literacy levels were significantly less likely to use cell phones compared to adolescents with low health literacy levels (Olyani and Peyman 2016).

# Discussion

In this study, we examine the use of health literacy assessments or screening tools and describe characteristics of health literacy research conducted in EMR countries. The majority of health literacy studies use Arabic or Persian translations of the TOFHLA/STOFHLA, NVS, and/or SILS to measure health literacy. However, employing health literacy assessments developed in majority English-speaking countries (i.e., the USA) may pose a challenge to accurately understand the health literacy needs of EMR populations. The development of new health literacy assessments such as the HELIA (Lamyian et al. 2016), IHLQ (Haghdoost et al. 2015), HELMA (Ghanbari et al. 2016), EMAHL13 (Nair et al. 2016), FNLIT (Doustmohammadian et al. 2017), and OHL-AO (Naghibi Sistani et al. 2013a) address cultural and linguistic nuances to advance health literacy research in the EMR. Results of

health literacy validation studies may be difficult to interpret in the absence of population-based studies to describe health literacy needs for this region. A number of studies employ "weak" assumptions (Baker 2001) of classical test theory (CTT) (e.g., Cronbach alpha, PCA, and CFA) to assess the psychometric properties of existing or new health literacy measures. Tadakamadla et al. (2014), in contrast, used the "strong" assumptions (Baker 2001) underlying item response theory (IRT) to evaluate the psychometric properties of an Arabic oral health literacy measure.

Several studies used correlational analyses of cross-sectional data primarily collected from patients in clinical settings. The focus on patient populations may be a result of the increasing prevalence of NCDs, particularly among adolescents who compose approximately one-third of the EMR population and experience greater health risks. A limited number of studies focused on adolescents' level of health literacy (Darraj et al. 2016; Doustmohammadian et al. 2017; Essau et al. 2013; Ghanbari et al. 2016; Olyani and Peyman 2016). No studies were identified that examine the connection between health literacy and health outcomes among adolescents, despite their known high risk for chronic disease (Adivi 2015; Loney et al. 2013; Mokdad 2017a). However, there is emerging rigorous research to develop valid and reliable food and nutrition literacy questionnaire for elementary school children (Doustmohammadian et al. 2017). Little is known about health literacy in the general populations of the EMR countries, and there is a dearth of research examining health literacy as a means to improve public health in the EMR.

Review of studies examining functional health literacy and specific types of health literacy as the outcome yield an interesting finding. Regardless of the assessment tool employed, low health literacy is more prevalent among females (Almaleh et al. 2017; Bazaz et al. 2017; Bener and Ghuloum 2010; Dashti et al. 2017; Maleki et al. 2016; Tehrani Banihashemi and Amirkhani 2007) as compared to males. The observed gender difference is in contrast to findings from Europe (Sørensen et al. 2015) and the USA (Rikard et al. 2016). We are unable to address the differential findings, but cultural norms relating to gender roles may be an important component to explain the observed gender differences.

Studies examining the relationship between health literacy and an array of health knowledge, behaviors, and outcomes provide various and inconsistent findings. For example, Mohammadi et al. (2015) found that health literacy level was not a significant predictor of HbA1c level among diabetic patients. Other results indicated health literacy levels as a significant predictor of diabetes self-care management (Reisi et al. 2016) and smoking status (Reisi et al. 2014); however, other research reveals that health literacy is not a significant of diabetes self-care management and smoking status (Panahi et al. 2015). We could not compare findings due to differences in sample size and health literacy measures. We point out that none of the studies examine health literacy as a potential mediator or moderator to understand the role and influence of health literacy on health-related outcomes.

We acknowledge the limitations of the review. First, at study and outcome level, the eligibility criteria and database search are potential sources that increase the risk of bias. The search results from the research databases may not capture the corpus of health literacy research in the EMR countries. We attempted to minimize the risk of bias by reviewing the citations in the eligible studies to locate other relevant studies. Second, at review level, the search and retrieval of the identified research may be incomplete and increases the potential for reporting bias.

In light of the potential limitations and based on the integrative review, we point out three important areas for future health literacy research and practice in the EMR. First, the 23 EMR countries will benefit from a comprehensive research and practice agenda to interpret health literacy needs of communities, patients, and health-care providers. A research and practice agenda is vital to identify viable health literacy interventions to curb the NCD epidemic in the EMR. To date, no longitudinal studies in the EMR exist that examine the impact of health literacy interventions on health outcomes, changes in health care, and utilization of health-care systems. Longitudinal research is essential to determine the efficacy of health literacy interventions to reduce the prevalence of NCDs (i.e., diabetes, cardiovascular disease, cancer, chronic respiratory disease, and obesity) particularly among children and adolescents who compose a large segment of the population in the EMR. Similar to the European Health Literacy Survey (HLS-EU) (Sørensen et al. 2015) and the National Assessment of Adult Literacy (NAAL) in the USA, regional and country level data may provide insight into health literacy status and needs across large and diverse populations in the EMR. Consideration should be given to differences between General Cooperative Council member countries (oil-rich countries) and non-member countries, due to major differences in socioeconomic status within these subregions of the EMR. Health literacy measures must possess strong psychometric properties, and existing approaches may serve to guide development and validation (Osborne et al. 2013).

Second, EMR countries can actively build awareness of health literacy that precedes health promotions activities (Adams et al. 2009). A conceptual model can be designed for health literacy in the context of health promotion and aimed at improving knowledge, understanding social determinants of health within the EMR, increasing self-

efficacy, personal empowerment, civic engagement, social interactions, and behavior change (Nutbeam 2008; Rikard et al. 2016; Sørensen et al. 2012). Ethnic and cultural differences must be considered to raise awareness and consideration for access to care, local health systems, and health policies. Health literacy must be approached in clinical and community context. The high rates of NCDs assume a higher than regular utilization of health-care services. Social, behavioral, and public health research is needed to target populations not represented in chronic disease pools.

Third, health literacy as an educational tool may serve to prepare young children to protect their health and wellness. Prevention efforts are an optimal approach to increase physical activity, dental care, and mental health outcomes. The EMR school system may target the relatively young population and create health literacy awareness of physical activity coupled with nutrition education. Partnerships between health agencies and educational systems may be effective in developing and implementing health literacy initiatives in community settings.

The global verdict is out on the critical role of health literacy on health outcomes. There remains plenty of work to be done in order to address the health literacy needs for people living in the EMR countries and with increased emphasis on education and prevention, there is hope.

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

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