Sociodemographic Factors Associated with Health Literacy in General Population: A Systematic Review

ABSTRACT

Background and Objectives: Health literacy is a crucial indicator of health status; making it essential to identify the factors associated with it. Doing so may offer healthcare providers valuable insights for planning appropriate interventions to enhance health literacy. This study aimed at evaluating the sociodemographic factors related to health literacy worldwide.

Materials and Methods: This systematic review was conducted according to a five-stage approach including designing a research question, identifying relevant evidence, quality assessment of retrieved evidence, preparing a summary of included evidence, and interpretation of the findings. The preferred reporting items for systematic reviews and meta-analysis guideline (PRISMA) was utilized to locate relevant evidence and produce valuable results. Six national and international scientific databases including SID, Magiran, PubMed, Medline, Scopus, and Google Scholar were assessed applying inclusion criteria such as being a cross-sectional study, having a sample size more than 500 people, study on general population and wrote in English/ Persian; and using keywords including health literacy, determinants and factors. Qualified studies were examined through Joanna Briggs Institute checklist for cross-sectional studies and EndNote software was used to screen data.

Results: Overall, 5739 records from different databases were obtained. After removing duplicates and screening the articles, 283 studies were identified appropriate for full-text assessment. After examination of shortlisted studies, finally 32 articles were included in the qualitative synthesis, of them 27 items were at international level and the remaining were national studies, encompassing a total of 217933 individuals. On average, 53% of participants at the international level and 59% at national level were identified with inadequate health literacy. Common factors associated with inadequate health literacy were: male gender, older age, low education, and unemployment, being single, and living in rural areas, whereas among the national studies factors such as older age, male gender and low education were more frequent.

Conclusion: In general, sociodemographic factors such as male gender, older age, low education, unemployment, being single and living in rural areas were commonly linked to inadequate health literacy both at the international and national levels. Therefore, developing proper interventions to improve health literacy targeting high risk groups such as older males, people with low education, unemployed individuals and single people should be addressed.

Paper Type: Research Article

Keywords: Health Literacy, Determinants, Sociodemographic Factors, Iran, Systematic Review

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Introduction

According to the World Health Organization (WHO), health literacy (HL) refers to social and cognitive skills that influence an individual's ability and motivation to access, understand, and apply health related information for the purpose of health maintaining and enhancing their health (1). Evidence suggests that any investment in promoting HL among the global population may lead to improvements in people's health status and overall quality of life; making it a significant social determinant of health (2). While the levels of HL performance may range from lower than basic to basic, intermediate and proficient, investigations indicate the number of people with proficient HL is limited, so that around 10% of adults in US and less than 5% of general populations in some developing countries reaching this level (3-6). Studies also showed among Asian countries, particularly those that are located in the Middle-East including Iran, high prevalence of insufficient HL, indicating the urgent need to identify contributing factors and develop interventions to address barriers to improving HL (7, 8).

Low HL may lead to a host of health problems and should be recognized as a significant contributor to negative health outcomes (9). For example, low HL has been linked to higher mortality rate, frequent hospitalization, non-adherence to medical treatments, poor self-care practices, and neglect of essential health screenings and underestimation of preventive health measures (10, 11). The HL is a crucial instrument to address different levels of prevention within communities and it should be prioritized as a key strategy to improve quality of health care services (12). Therefore, as recommended by the WHO, communities should aim to improve health literacy levels and utilize HL programs as essential tools to foster sustainable developments (1).

Therefore, identifying influential factors of health literacy should be the first step in developing effective plans to promote community health. Previous studies have recognized several factors associated with HL (13, 14). For instance, lower economic status may have a significant negative impact on HL, leading to individuals with lower incomes being at higher risk of poor HL (15). Moreover, people with lower levels of education, irrespective of their actual HL level may encounter difficulties in understanding medical terms and treatment plans, hindering them from achieving optimal health status (16). Paasche-Orlow and Wolf believed that HL is affected by different factors, including social and demographic ones that may influence an individual's cognitive and physical capacities (17). Some authors also argue that sociocultural variables as well as prior knowledge and skills, may affect HL (18). Nevertheless, many of these factors are context-based, and their effectiveness in determining HL may vary across different studies conducted in various regions and countries (19). Therefore, performing systematic reviews to summarize such factors can offer decision makers and health authorities more accurate information. This can help them focus on the most prevalent and influential factors associated with HL and allocate resources efficiently towards addressing the most critical determinants of HL.

Among a few review studies that assessed factors influencing HL, Shahrahmani et al. conducted a scoping review and discovered individual factors such as gender, education level, age, academic major, marital status, job, work experience, ethnicity, health related conditions, as well as situational factors including internet/social network use, social support and participation in educational sessions, may be effective in HL level among Iranian population. Additionally, socio-environmental factors like living location and having medical insurance were found to potentially impact HL levels among this population (13).

In a recent systematic review by Pinto Lima et al., factors related to poor HL in older adults were investigated. They found several factors including sociodemographic, economic, and health- related factors as significant determinants of HL in this population (14). In another related review Shi et al. examined electronic HL and its influencing factors among older adults in China. They also noted low rates electronic HL across various studies, with sociodemographic factors, physiological status and participants' perceptions of Internet use and online health resources being recognized as influencing factors (20). These factors also have been investigated in specific subgroups, such as individuals with human immunodeficiency virus, or those affected by cancer (21, 22).

In pervious reviews on the factors related to HL, the focus was mainly on specific population categories, specific kinds of HL measurement, or scoping reviews limited to a particular country or nationality. Moreover, because there are numerous variables that

may affect HL, including all of them in a single review could result in scattered findings that might cause confusion in presenting specific results. To date, no systematic review has been conducted to address sociodemographic factors contributing to HL. So, this study aimed at identifying the most common variables that influence the HL of both Iranian people and individuals from around the world. These findings not only may clarify the impact of sociodemographic factors on HL, but may also provide a foundation for developing more effective interventions to enhance community HL.

Materials and Methods

This was a systematic review that ethically approved and registered with the Iranian Academy of Medical Sciences under ID# IR.AMS.REC.1402.020. The review followed the steps suggested by Khan et al. (23), which comprised five stages outlined as follow:

1. Framing the study question

To craft a structured and clear research question, four components must be defined: population, intervention, study design and outcomes. As such, we formulated the study question as follows: what sociodemographic factors are associated with health literacy as assessed in cross-sectional studies of general populations?

2. Identifying relevant publications (search strategy)

Various databases including PubMed, MEDLINE, Scopus, and Google Scholar for International resources, as well as national databases such as the Iranian database of magazines (Magiran) and Scientific Information Database (SID) for articles published in Persian were searched for relevant data from January 2013 to

December 2023. Terms such as "health literacy", "determinant(s)", and "factor(s)" were used in conjunction with Boolean operators "AND" and "OR" to search the Title/Abstract fields. For example, terms like "health literacy" and either "factors" or "determinants" were searched in title/abstract fields of PubMed and the results were refined using filters for parameters like publication date, language, and article type. Inclusion criteria were: cross-sectional studies that focused on general health literacy, with target groups including the general population and university students, a sample size of 500 participants or more, publication between the beginning of 2013 and the end of 2023; and availability in English/Persian. Excluded from the study were irrelevant articles, those that focused on specific types of HL, those without full-text accessibility, and articles targeted at specific target groups such as patients, occupational groups, minorities, pregnant women, etc. All relevant resources were included in EndNote X9 software, through which duplicates were identified and subsequently removed. Two researchers independently assessed the relevance of the articles based on their titles and abstracts. They then retrieved and screened the available full-texts in term of inclusion/exclusion criteria. Also, they performed a manual search of the references in relevant resources to find any additional articles. Any conflicts between these researchers were resolved through discussions with other team members until a consensus was achieved. This process was considered as a kind of inter-rate reliability.

3. Quality assessment

The quality of selected articles was assessed using the Joanna Briggs Institute appraisal checklist for analytical cross-sectional studies (24). This checklist comprises eight items that inquire about clear descriptions of inclusion criteria, participants and setting, validity and reliability of exposure measurement, utilization of standard criteria to measure conditions, confounding factors and strategies to address them, validity and reliability of outcome measurement, and appropriate statistical methods. Each item has options including yes, no, unclear, and not applicable. Articles that received more than five "yes" responses were classified as high quality, those with 3-5 yeses as moderate quality, and those with less than 3 yeses as low quality.

4. Summarizing the findings

Two researchers independently extracted the data and reached a consensus through discussion. A data extraction form was developed to include specific characteristics of the studies. This form categorized the extracted data under headings such as the name of first author, year, country, study design, setting, and study population, measure of HL, HL level, outcomes and associated factors. The data were summarized through descriptive and narrative synthesis. Due to heterogeneity of the findings and descriptive outcomes, a meta-analysis was not possible to conduct.

5. Interpreting the findings

To mitigate the risk of publication bias when interpreting the results, the researchers used strategies suggested by Chalmers and Reitman (25). Their approach focused on ensuring rigorous research practices. So, only

peer reviewed articles were included, legitimate studies regardless of their results were extracted, and any conflicts of interest were assessed via double reviews. Then, the findings were compared and discussed against related studies, and based on our findings practical suggestions were provided to apply the findings in the field and for further research endeavors.

Results

According to search conducted using online databases and bibliographic assessment, a total of 5739 records were initially identified. After screening by inclusion/exclusion criteria and removing duplicates based on title/abstract review, 5456 files were excluded. Subsequently, the full-texts of the remaining 283 articles were sought, leading to the exclusion of 251 articles at this stage. Finally, 32 articles were deemed suitable for final review. Of these, 27 articles originated from international studies, while only 5 articles were sourced from Persian literature and included in the analysis. The process of identifying and screening the articles is illustrated in the Figure 1.

Findings of the quality assessment, based on Joanna Briggs Institute appraisal checklist, are presented in the Table 1. Our analysis revealed that over half of the articles included in the study received scores of 7 and 8, classifying them as high quality articles. Those that obtained scores of 5 and 6 were recognized to be of acceptable quality. Notably, none of the articles assessed were classified as being of low quality (i.e., scoring less than 5).

Results of descriptive assessment of the included articles are presented in the Table 2 (international studies) and table 3 (national studies). Of the international ones, 10 studies were conducted in the China, with the rest being carried out in different countries such as Turkey, Taiwan, Italy, and Portugal. Sample sizes varied from 521 to 78546 participants in both categories (International and national studies). In general, 193749 individuals across international studies, and 24184 Iranian people assessed by the studies. A considerable number of international studies (>40%) utilized European Health Literacy Survey (HLS-EU) or scales developed based on this scale, while all national studies used Persian version of Health Literacy Instruments for Adults (HELIA).

Assessing the level of HL across different studies showed that 52.6% of participants in the international studies, and about 58.5% of Iranian samples lacked an acceptable level of HL. Important demographic factors associated with low HL in international studies were: male gender, older age, low level of education, lower income, unemployment, single marital status, and residing in the rural areas, respectively. Meanwhile, in the national studies, these factors were identified as: older age, male gender, and lower education level. In addition to demographic factors, other variables such as insufficient knowledge and skills related to healthcare, along with unhealthy lifestyle habits were identified as factors related to low HL at both national and international levels.

Discussion

This systematic review was conducted to find sociodemographic factors associated with health literacy (HL) among Iranian and international studies. The findings from both national and international studies showed

demographic factors were commonly reported factors in relation to HL. The most important factors associated with poor HL that identified in the international studies were: male gender, older age, low education, and low income, unemployment, being single, and living in the marginal areas. However, among national studies only some of these factors such as older age, male gender, and low education were emphasized.

Therefore, people with such characteristics are expected to be at higher risk of poor health literacy. Another important finding related to HL level in different studies was that in both international and national studies more than half of the participants had inadequate level of HL. Following, we more discussed these findings along with other related reviews that explored HL and its associated factors.
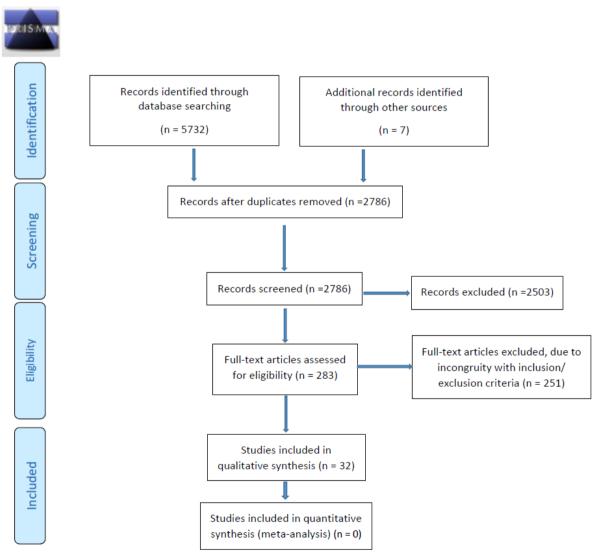

Figure 1. PRISMA 2009 Flow Diagram

Table 1. Quality assessment using Joanna Briggs Institute appraisal checklist for analytical cross-sectional studies

No. First Author, year, country	Clearly definition of inclusion criteria	Describing subjects and setting in detail	Measuring exposure in a valid and reliable way	Using objective/ standard criteria to measure	Identifying confounding factors	Strategies to deal with confounding factors	Valid and reliable outcome measurement	Using appropriate statistical analysis	Score
1. Sultan AA. 2021/Turkey(29)	☑	☑	☑	☑	□	□	☑	☑	6
2. Alahmadi YM. 2023/ Saudi Arabia (30)	☑	☑	☑	☑	□	☑	☑	☑	7
3. Pandl D. 2023/ Austria (31)	☑	☑	☑	☑	☑	☑	☑	☑	8
4. Garcia-Codina O. 2019/ Spain (32)	☑	☑	☑	☑	☑	☑	☑	☑	8
5. Yiğitalp G. 2021/ Turkey (33)	☑	☑	☑	☑	☑	☑	☑	☑	8
6. Chu-Ko F. 2021/ Taiwan (34)	☑	☑	☑	☑	□	☑	☑	☑	7
7. Xie Y. 2019/ China (35)	☑	☑	☑	☑	☑	☑	☑	☑	8
8. Ye X. 2014/ China (36)	☑	☑	☑	☑	☑	☑	☑	□	7
9. Vasan S. 2023/ Australia (37)	☑	☑	☑	☑	□	☑	☑	☑	7
10. Yang P. 2021/ China (38)	☑	☑	☑	☑	☑	□	☑	☑	7
11. Ayaz-alkaya S. 2021/ Turkey (39)	☑	☑	☑	☑	☑	□	☑	☑	7
12. Wu Y. 2017/ China (40)	☑	☑	☑	☑	□	☑	☑	☑	7
13. Duplaga M. 2020/ Poland (41)	☑	☑	☑	☑	□	☑	☑	☑	7
14. Wang W. 2020/ China (42)	☑	☑	☑	☑	☑	□	☑	☑	7
15. Azlan AA. 2021/ Malaysia (43)	☑	☑	☑	☑	☑	□	☑	☑	7
16. Prihanto JB. 2021/ Indonesia (44)	☑	☑	☑	☑	□	☑	☑	☑	7
17. Duplaga M. 2021/ Poland (16)	☑	☑	☑	☑	☑	☑	☑	☑	8
18. Zanobini P. 2021/ Italy (15)	☑	☑	☑	☑	☑	□	☑	☑	7
19. Costa A. 2023/ Portugal (45)	☑	☑	☑	☑	□	□	☑	☑	6
20. Liu Y. 2015/ China (46)	☑	☑	☑	☑	☑	□	☑	☑	7
21. Wang C. 2020/ China (47)	☑	☑	☑	☑	□	□	☑	☑	6
22. Wang C. 2021/ China (48)	☑	☑	☑	☑	□	□	☑	☑	6
23. Yang Q. 2021/ China (49)	☑	☑	☑	☑	□	□	☑	☑	6
24. Asokan G. 2020/ Bahrain (50)	☑	☑	☑	☑	□	□	☑	☑	6
25. Kuyinu Y. 2020/ Nigeria (51)	□	☑	☑	☑	□	□	☑	☑	5
26. Uysal N. 2020/ Turkey (52)	☑	☑	☑	☑	□	☑	☑	☑	7
27. Wang X. 2015/ China (53)	☑	☑	☑	☑	□	☑	☑	☑	7
28. Joveini H. 2019/ Iran (54)	☑	☑	☑	☑	□	□	☑	☑	5
29. Saei M. 2019/ Iran (55)	☑	☑	☑	☑	□	□	☑	☑	6
30. Sharbatian M. 2020/ Iran (56)	☑	☑	☑	☑	□	□	☑	☑	6
31. Ahmadi F. 2018/ Iran (57)	□	☑	☑	☑	□	□	☑	☑	5
32. Tavoosi M. 2015/ Iran (58)	☑	☑	☑	☑	□	□	☑	☑	6

Table 2. General characteristics of international studies included in the review

No. First Author, year, country	Aim/ setting	Sample size/ population study/ age average (SD)	Measures	Health literacy level/ factors associated with poor HL
1. Sultan AA. 2021/Turkey (29)	Determining nutritional-physical behaviors, health literacy and associated factors in adolescents/ High school	810/ students grades 6 to 8/ 12.98 (0.92)	Health Literacy for School- Aged Children Scale	Low =21%; moderate= 64%; high= 15%/ male gender, low income, overweight, inadequate physical activity
2. Alahmadi YM. 2023/ Saudi Arabia (30)	Assessing health literacy among adults in Saudi Arabia/ community	568/ adults above 18 years old/ unknown	Health Literacy Instrument for adults (HELIA)	Inadequate HL= 54%/ female gender, older age, private occupations
3. Pandl D. 2023/ Austria (31)	Assessing students' perception on their health literacy and its correlations to interpersonal or demographic variables/ High school	544/ 12-14 years old students/ 12.9 (0. 88)	European Health Literacy Survey (HLS-EU)	Unknown/ female gender, less online study, lower age
4. Garcia-Codina O. 2019/ Spain (32)	Identifying social factors related to health literacy in general population to improve individual-centered healthcare/ community	2433/ 18-98 years old people/ 45.9 (18.0)	Shortened version of the European Health Literacy Questionnaire (HLS-EU-Q16)	Adequate HL= 84.6%; inadequate HL= 10.3%; poor HL= 5.1%/ older age, lower social class, unemployment, lower education, physical disability
5. Yiğitalp G. 2021/ Turkey (33)	Association between health literacy and health perception and health status in different ethnic groups/ community	600/ people aged between 18 to 65 years old in Mardin province/ Unknown	European Health Literacy Scale Turkish Adaptation (EHLS-TR)	Problematic or inadequate HL= 80.7%/ Kurdish race, lower age, living in un-nuclear family, low education, low income, not seeking for healthcare, smoking, alcohol use, inappropriate perception of self-health
6 Chu-Ko F. 2021/ Taiwan (34)	Identifying demographic factors related to health literacy, health promoting lifestyle profile, and health status among adolescents in Taiwan/ university	918/ freshman students/ 15.49 (0.52)	European Health Literacy Survey (HLS-EU)	Inadequate or problematic HL= 30.2/ low family income, low frequency of doing physical activity and sport
7. Xie Y. 2019/ China (35)	Applying a structural modelling to find factors associated with HL level in rural areas in mainland China/ community	1164/ rural people/ unknown	self-designed questionnaire	Unknown/ in adequate knowledge, inappropriate health related behaviors, insufficient skills for healthcare, inadequate socioeconomic status, old age, high BMI, inadequate education, low income
8. Ye X. 2014/ China (36)	Assessing the situation and determinants of HL among school going adolescents in Guangdong, China/ schools	3821/ students between 13 to 25 years old/ 18.9 (3.5)	Questionnaire prepared by the Ministry of Health of China	Inadequate HL= 85.6%/ being under education in low quality schools, low education level in parents, male gender
9. Vasan S. 2023/ Australia (37)	Inclusive effects of loneliness on HL and associated factors in young adults/ community	521/ young adults/ 25.2 (5.0)	Health literacy questionnaire(HLQ)	Unknown/ depression, social isolation symptoms, loneliness

No. First Author, year, country	Aim/ setting	Sample size/ population study/ age average (SD)	Measures	Health literacy level/ factors associated with poor HL
10. Yang P. 2021/ China (38)	Prevalence of factors associated with HL level in different age groups across COVID-19 pandemic / community	54706/ people aged between 15 to 69 years old/ unknown	The Chinese Citizen Health Literacy Questionnaire	Unknown/ old age, low education, low income, living in urban areas
11. Ayaz-alkaya S. 2021/ Turkey (39)	Determining HL levels and the associated factors in women who were presented in family centers of a municipal area / municipality	837/ women/ unknown	Turkish Health Literacy Scale-32 (THLS-32); and the Adult Health Literacy Scale (AHLS)	Poor HL= 45.9%, inadequate HL= 30.6, adequate= 16%, High HL= 7.4%/ age higher than 40 years old, elementary education, having audiovisual problems, low income, not using internet
12. Wu Y. 2017/ China (40)	Prevalence of poor HL and associated factors in Shanghai, China community	1360/ people aged between 15 to 69 years old/ unknown	Basic Knowledge and Skills of People's Health Literacy	Poor HL= 84.5%/ low education, unemployment, low family income
13. Duplaga M. 2020/ Poland (41)	Identifying the history and outcomes of limited HL in a national sample of Poland's population/ community	1000/ citizens/ 45.9 (16.2)	16-item questionnaire developed within the European Health Literacy Project (HLS-EU)	Unknown/ inadequate self-appraisal of health, obesity, disability, low physical activity, less use of vegetables and fruits, frequent hospitalization
14. Wang W. 2020/ China (42)	Assessing HL situation and its likely determinants in rural and urban areas of Honan, China/ community	78646/ citizens/ 48.2 (13.0)	The Chinese Resident Health Literacy Scale	Unknown/ low education, living in rural areas, old age, private occupations
15. Azlan AA. 2021/ Malaysia (43)	Recognizing HL status in Malaysia and its social or demographic factors/ community	866/ general population in rural and urban areas/ unknown	HLS-M-Q18 short version of the health literacy questionnaire	Inadequate HL= 17.85%, marginal HL= 40.4%, adequate HL= 32.95, optimum HL= 9.1%/ inappropriate self-health appraisal, having health problems, being single, low age
16. Prihanto JB. 2021/ Indonesia (44)	Identifying the association between health behaviors, comprehensive and functional HL, school's health promotion programs, and socioeconomic factors in high school students in Surabaya, Indonesia/ school	960/ students between 14 to 19 years old/ 16.2	HLS-EU-16 a short version of HLS-EU-47	Inadequate HL= 5%, problematic HL= 31%, adequate HL= 64%/ poor personal hygiene, substance abuse, inadequate physical activity, poor academic performance, low education
17. Duplaga M. 2021/ Poland (16)	Analyzing HL level and related factors in high school students in southern areas of Poland/ schools	2223/ students aged between 15 to 20 years old/ 17.0 (1.0)	Polish version of the 47-item tool developed in the European Health Literacy Survey Project (HLS-EU- Q47)	Insufficient HL= 4.6%, problematic HL= 36.8%, adequate HL= 45.2%, and optimal HL= 13.4%/ low education in parents, female gender, low education in participants, less social support, improper socioeconomic status, inadequate housing, insufficient study, less mobile use
18. Zanobini P. 2021/ Italy (15)	Assessing roles of HL and sociodemographic factors in predicting physical activity and using fruits and vegetables/ community	7157/ citizens aged 18 to 69 years old/ 45.1 (14.0)	Italian version of the 6-item European Health Literacy Survey Questionnaire (HLS-EU-Q6)	Limited HL= 47%/ female gender, poor economic status, being immigrant, low

No. First Author, year, country	Aim/ setting	Sample size/ population study/ age average (SD)	Measures	Health literacy level/ factors associated with poor HL
				education, ages between 50-69 years old, unemployment
19. Costa A. 2023/ Portugal (45)	Assessing the HL level in old Portuguese people and its associated factors	613/ general population aged 65 years and older/ 72.8 (5.8)	HLS19-Q12, developed within the "HLS19—the International Health Literacy Population Survey 2019–2021	Inadequate HL= 25.4%, problematic HL= 55.2%, adequate HL= 15.6%, and optimal HL= 3.7%/ old age, male gender, being single, being immigrant, living in urban areas, unprofessional jobs, low education, poor economic status, inappropriate self-health appraisal, primary healthcare dissatisfaction
20. Liu Y. 2015/ China (46)	Assessing HL and its related influencing factors among the elderly in retirement institute of Xinjiang, china/ nursing home	1396/ old people aged over 60 years old/ 77.4 (8.5)	The Chinese citizen health literacy survey questionnaire	Unknown/ unemployment, unskilled professions, low education, being single, low family income, older age, being minority, less knowledge or negative attitude toward healthcare
21. Wang C. 2020/ China (47)	Assessment of poor HL prevalence and its related correlates in people living in Anhui province of China/ community	5120/ citizens between 18 to 69 years old/ unknown	The 2012 Chinese Resident Health Literacy Scale	Inadequate HL= 40%, moderate HL= 41.3%, and adequate HL= 18.7%/ older age, male gender, low education, low income, and settlement in rural areas
22. Wang C. 2021/ China (48)	Assessing prevalence of inadequate HL and its related factors in Xingtai, China/ community	904/ general population aged between 16 and 75 years old/ unknown	The 2012 Chinese Resident Health Literacy Scale	Inadequate HL= 83%/ male gender, low education level, low annual income, living in rural areas, having unhealthy lifestyle, inappropriate healthcare skills, and older age
23. Yang Q. 2021/ China (49)	Assessment the poor HL and its demographic or social risk factors in Hebei province of China/ community	10560/ citizens between 16 and 75 years old	he 2012 Chinese Resident Health Literacy Scale	Poor HL= 81%/ older age, male gender, living in rural areas, low education, low family income
24. Asokan G. 2020/ Bahrain (50)	Assessment the HL and its related factors in Bahraini population using an standard scale of HL and finding its shortcomings to better policymaking/ community	836/ adults Bahraini citizens/ 26.6 (12.2)	All Aspects of Health Literacy Scale (AAHLS)	Unknown/ age higher than 30 years old, male gender, being single, low education, unemployment, and poor self-report health status
25. Kuyinu Y. 2020/ Nigeria (51)	Measuring HL and its determinative factors among people living in Lagos state of Nigeria/ community	1831/ citizens above 18 years old/ 31.7 (10.5)	Brief Health Literacy Screen (BHLS)	Inadequate HL= 25.2%/ male gender, age higher than 40 years old, low education, knowing no foreign language, inadequate information on antibiotic use, less use of mass media, less use of internet, using newspapers to get information

No. First Author, year, country	Aim/ setting	Sample size/ population study/ age average (SD)	Measures	Health literacy level/ factors associated with poor HL
26. Uysal N. 2020/ Turkey (52)	Determining HL level, its influencing factors, and health promotion lifestyle behaviors among college students/ university	905/ undergraduate students/ 20.7 (2.0)	European Health Literacy Scale	inadequate HL= 59%/ study in majors other than medical sciences, smoking/ not doing periodic health status assessment, male gender, unhealthy lifestyle
27. Wang X. 2015/ China (53)	Assessing the status and related factors of HL in people living in Jiangsu province of China/ community	12450/ people aged between 15 and 69 years old living in rural or urban areas/ 44.7 (12.7)	Questionnaire of health literacy developed by the Chinese Ministry of Health	Inadequate HL= 40%, living in rural area, small family size, younger age, low education, immigrants worker, and low family income

SD, standard deviation; HL: health literacy; Unknown: there was no related information in the article

Table 3. General characteristics of national studies included in the review

No. First Author, year, country	Aim/ setting	Sample size/ population study/ age average (SD)	Measures	Health literacy level/ factors associated with poor HL
28. Joveini H. 2019/ Iran (54)	Determining HL level and its demographic related factors in literate adults living in Bardeskan city/ community	700/ adults aged between 18 to 65 years old/ 31.3 (9.3)	The Health Literacy for Iranian Adults (HELIA) questionnaire	Inadequate HL= 18.1%, marginal HL= 27.7%, adequate HL= 39.4%, and optimal HL= 14.7%/ old age, low education, being single, unemployment, being housekeeper, history of disease
29. Saei M. 2019/ Iran (55)	Measuring HL among Tehrani citizens and its related factors with focus on media literacy/ community	1181/ citizens/ 39.9 (8.6)	The Health Literacy for Iranian Adults (HELIA) questionnaire	Inadequate HL= 19.2%, marginal HL= 78.4%, and optimal HL= 2.4%/ old age, low income, low social class, less skills in data processing, poor communication skills, less skills in using modern technologies, less language skills, less media literacy
30. Sharbatian M. 2020/ Iran (56)	Determining the HL among people living in Mashhad city and its related factors/ community	800/ citizens over 18 years old/ 37.3 (4.6)	The Health Literacy for Iranian Adults (HELIA) questionnaire	Inadequate HL= 36%, Marginal HL= 60%/ Old age, low education, living in rural area, unhealthy lifestyle
31. Ahmadi F. 2018/ Iran (57)	Determination of HL among Farhangian University students and its related factors/ university	932/ university students/ 23.0 (9.6)	The Health Literacy for Iranian Adults (HELIA) questionnaire	Limited HL= 44.9%/ male gender, younger age, being single, having no child, small family size, unemployment, living in marginal area
32. Tavoosi M. 2015/ Iran (58)	Measuring HL in 18 to 65 years old Iranian people	20571/ general population/ 34.9 (11.8)	The Health Literacy for Iranian Adults (HELIA) questionnaire	Limited HL= 44%/ male gender, older age, low education, and unemployment

SD, standard deviation; HL: health literacy

In a study that performed a systematic review to find factors influencing electronic health literacy among elderly Chinese people, similar to our study, international databases alongside some databases in Chinese language were assesses over a 20 years period (from year 2000 to 2020)(20). In that review that was conducted in China using a mixed method assessment toll to evaluate the quality of included studies, only five articles were included in the final qualitative analysis. The results indicated a low rate of electronic HL among elderly people in China. Also, factors such as older age, male gender, low education, low socioeconomic status, poor physical and mental health, low rate of Internet use, being single, lack of access to caregivers, cultural and lingual barriers and credibility of online sources were identified as the key factors associated with the poor HL in this population. The structure of search strategy in this review was relatively similar to the current study and only a specific kind of HL (i.e., electronic HL) was selected as the primary outcome variable. However, the findings are still relevant indicating in both studies demographics such as age, gender, and education level may be considered as important factors that may affect HL across different communities.

In both studies, it was found that health related factors are also significant determinants for HL. Apart from demographics which are typically associated with HL, other variables such as individuals' perceptions of their health status, adherence to a healthy lifestyle as well as behaviors regarding physical activity and nutrition were highlighted as important factors in addition to physical and psychological well-being as

found in that study. In other words, high mental and physical health is expected to be associated with a better HL and existing an adequate level of HL might be seen as a factor influencing overall health status (20).

In another study, Lee and Son, assessed the factors and health outcomes related to HL and poor physical health among the elderly through a systematic review (26). In this study, Newcastle-Ottawa scale was used for quality assessment, and out of the 479 articles found, 9 articles were chosen for qualitative analysis. The most commonly associated factors were low education, comorbidity with chronic illnesses, and poor cognitive capacity. Consistent with the previous article and ours, HL was correlated with self-report negative health outcomes. Our study also highlighted the significance of low education and health status as key variables that can impact HL. As expected, the self-assessment of the health, as earlier evidence suggested, is a common determinant of HL, and those with poorer health status are likely to exhibit lower levels of HL. Although this finding may not be surprising given the role of adequate knowledge to prevent health problems, those with different health problems are expected to possess lower HL in a similar way. This finding have been confirmed through other studies that evaluated the HL among old people.

In another review, Zhang et al. tried to find the factors influencing electronic HL in people with cancer (22). In this review, the articles published between year 2000 and 2021 were sought, and 9 cross-sectional articles using the scale used in our study (Joanna Briggs institute checklist) were deemed suitable for

inclusion. They found that the e-Health Literacy Scale was the most commonly used instrument to assess electronic HL in this population. In a same way, we found that the European Health Literacy Survey and its variants were popular scales that have been used to determine HL in different countries. However, at the national level, all studies preferred to use a locally developed scale (i.e., HELIA) for such purposes (27). Therefore, there is no universally appropriate scale to use when studding HL in different regions of the world. Despite some scales may be more popular than others, developing context-based scales according to cultural and demographic variables within different communities might yield more accurate data than relying solely on a favored or popular scale. Nonetheless, the potential benefits of using globally accepted tools or using them as a basis to develop new, practical scales to produce a comprehensive approach toward HL should not be overlooked.

Regarding the scales used to assess HL across different studies, another point that should be considered is that the variability of the scales may increase inhomogeneity of the findings and this in turn will decrease the possibility to conducting a meta-analysis to reach quantitative and comparable scores on HL, as we faced in the current study. Therefore, standardizing the available instruments to examine the HL, and providing validated scales that are applicable in different cultures and communities might be a challenge for future studies that should be addressed by HL researchers.

In the study by Zhang et al. the authors found predisposing factors such as older age, low education, and limited health knowledge

may be effective on HL in people with cancers (22). This finding consistent with ours shows not only in the general population but also in the people with life threatening conditions like cancer, demographic factors are key determinants of HL. Maintaining an adequate level of HL may play a protective role in their health. Additionally, they found that the living location (rural vs. urban), health related behaviors such as low physical activity and smoking could contribute to poor HL among these people. These findings also congruent with our findings, suggest that living in urban areas and adopting a healthy lifestyle may provide better opportunities to improve HL. On the contrary, those who live in rural/marginal areas may face challenges such as limited access to the internet, healthcare consultations, exercise facilities, and nutritional resources, potentially leading to lower HL levels compared to those in urban settings. Other studies focusing on electronic HL have also underscored the importance of improving access to such resources for individuals residing in these underserved areas (11, 18, 22). This highlights the critical need to enhance access to these tools to boost HL levels in these communities.

In another review, Estrela et al. examined the social and demographic determinants of the digital HL using a meta-analysis (18). From their systematic review of 36 studies, the authors found that older age had the most detrimental effects on this type of HL, while gender didn't show any significant impact. Other factors such as higher education and income, as well as greater social support, were found to have protective effects on digital HL. While our study primarily focused on overall health literacy as the main

outcome, we observed similar contributing factors as seen in other types of health literacy. Given that many people today rely heavily on electronic and digital resources for information, it is not surprising to find similarities between our findings and those of previous studies. This indicates the importance of considering sociodemographic factors when developing strategies to promote health literacy within the community.

Among the national-level reviews conducted on the influencing factors of HL among Iranian population, we found one related article that assessed 72 HL related studies conducted in Iran (28). This article, consistent with our findings, recognized the HELIA was recognized as the most commonly used measure to assess HL in different demographic groups including the students, the elderly, and patients. While HELIA effectively evaluates the general aspects of HL within different populations, as suggested by our findings, perhaps developing new specific measures to assess particular aspects of HL especially among people with different characteristics, may be necessary to improve our knowledge of the various dimensions of HL in different layers of Iranian populations.

Study Limitations and Strengths: The current studies attempted to include most related studies at both levels of national and international tried to provide a comprehensive approach toward general HL and its contributing factors. Moreover, we covered approximately a 10-year period for retrieving relevant studies that may provide a relatively long perspective on emerging studies during the last decade. Furthermore, emphasizing on sociodemographic factors

instead of including various factors affecting HL, provided an especial approach to delve the role of these variables in HL. However, there were some limitations that should be addressed before interpreting the findings. First, the lack of access to important scientific databases like "Web of Science", due to sanctions, made it impossible to evaluate studies indexed in that resource. However, the researchers made a concerted effort by doing a comprehensive search across other pertinent databases to ensure acceptable coverage for detecting appropriate studies. The second limitation was inability to access the full-texts of certain articles due to insufficient financial resources. Nevertheless, we reached out to some authors and managed to obtain a number of full-texts or key information on their studies through email correspondence. Third, some databases particularly Persian ones may not provide a comprehensive and complete resource to all published articles that may interfere in including all national studies in this review. Forth, we focused on articles that published in English/Persian. Therefore, we couldn't assess other resources in different languages that may negatively impact on the generalizability of findings. Fifth, the cultural context of our findings is limited to the studies that published in these two languages. Therefore, further research is needed to find likely sociodemographic factors affecting HL in different cultures. Sixth, despite following the recommended guidelines to reduce publication bias, the general approach of some journals on reporting studies with significant associations between sociodemographic variables and HL may negatively affect the trustworthiness

and generalizability of findings. Finally, since there were considerable heterogeneities among the studies included, we were unable to perform a meta-analysis to evaluate the important quantities and weights of influencing factors. However, by assessing the frequency of reported factors, we could identify the most common ones.

Conclusion

This review showed, alongside some additional health-related factors found here, demographic factors such as age, gender, education, income, job status, and living region are commonly identified variables across various studies. However, other factors such as individuals' self-perception of their health status as well as healthy lifestyle and its related behaviors should also be addressed when planning to improve HL within communities. The findings showed more than half of the included populations didn't have adequate level of HL, highlighting the necessity of further interventions and programs to enhance HL in different groups of populations particularly for those with older ages, low education, and those who live in rural and marginal areas. Moreover, having more robust measurements of HL by applying the standard available measures alongside developing new specific scales to assess different aspects of HL also may be recommended. Furthermore, although the likely hypotheses on relationships between the sociodemographic variables and HL have been identified through various studies, there is insufficient knowledge in the literature on how sociodemographic factors may influence HL through direct or indirect pathways. Then, designing studies to recognize the potential pathways between such variables and HL

particularly to identify the likely mediators and moderators also would be helpful to improve our understanding on these factors and their contributions in HL among different populations. Another implication of our findings for future researchers may include measuring the impact of any sociodemographic factors presented here for special groups of people such as patients with particular conditions, people with different occupations, or people at different developmental stages. We think assessing these factors among such groups may provide new information on how different variables such as a disease and a particular job may affect role of sociodemographic factors in HL compared to general population.

the systematic review. FR and AA contributed to the critical review of the included studies and assisted in preparing the findings. CYL helped with writing the manuscript and provided critical feedback. Additionally, CYL assisted in preparing a rebuttal letter and revising the manuscript. All authors reviewed the manuscript thoroughly and were satisfied with the content.

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