



Factors Predicting Health Literacy and Factors Associated to it; A Systematic Review



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ABSTRACT

Aims Health literacy includes a range of critical skills that allow individuals to empower themselves to promote health behaviors. This study aimed to review the articles related to health literacy in the last 20 years and explain the factors associated with health literacy or predict it.

Information & Methods This systematic review examined quantitative research articles published from 2002 to 2022 and indexed in Scopus, PubMed, and Web of Science databases. 887 articles were retrieved, and based on inclusion/exclusion criteria, 55 articles were reviewed.

Factors with the most frequent were reported and discussed. The role (prediction or association) was determined based on the highest frequency. The PRISMA 2009 framework was used to conduct a transparent process.

Findings Younger people, white people, females, people with higher education levels, good social status, occupation, especially lifetime main occupations, higher individual income, higher knowledge level, and healthy people had high levels of health literacy. Also, the factors that had a significant relationship with health literacy (predictive or related) were different in patients and healthy people.

Conclusion Health literacy includes various constructs and is related to different factors (as predictors or associated with health literacy). It may differ based on socio-economic and demographic characteristics in different communities.

Keywords Health Behavior; Health Literacy; Health Promotion; Population Health; Social Determinants of Health

CITATION LINKS

[1] Health promotion ... [2] Literacy and health outcomes ... [3] The PRISMA 2020 statement: an ... [4] Health literacy in adolescents with ... [5] An exploratory study of health literacy and ... [6] Brief report: screening items ... [7] Health literacy, health disparities, and ... [8] Measurement variation across health ... [9] Factors associated with health literacy ... [10] Health literacy in Indigenous people ... [11] Measuring functional, interactive ... [12] Health literacy among visitors of ... [13] Health literacy in familial ... [14] Exploring knowledge and experience of ... [15] Health literacy in Europe: comparative ... [16] Roles of interpersonal and ... [17] In search of 'low health literacy': Threshold ... [18] Associations between working ... [19] Testing the utility of the ... [20] Health literacy and its sociodemographic ... [21] Health literacy of ... [22] Health literacy and functional ... [23] Assessing adult health literacy in ... [24] An investigation of the relationship ... [25] Health literacy ... [26] Factors associated with health ... [27] Low health literacy, limited English ... [28] Health literacy and barriers to ... [29] Health literacy levels and predictors ... [30] Health literacy instrument in ... [31] Identifying elderly at greatest ... [32] Evaluation of e-health literacy ... [33] Health literacy among medically ... [34] Screening questions to predict ... [35] A life course approach to ... [36] Measuring Health Literacy in ... [37] Cognition, educational attainment ... [38] The relationship between ... [39] A descriptive analysis of ... [40] Strengthening the case for ... [41] Making Europe health literate ... [42] Health literacy in Europe: the ... [43] Health literacy in Europe: the ... [44] Health literacy and ethnic ... [45] Developing predictive models ... [46] Distribution of health literacy ... [47] National indicators of health ... [48] The impact of health literacy and ... [49] Health literacy and ... [50] Health promotion in pediatric ... [51] Associations between health literacy ... [52] The influence of masculine ... [53] The association of health literacy ... [54] Parents of children with epilepsy ... [55] Determinants of health literacy in ... [56] Creating a screening measure of ... [57] Validation of the integrated model ... [58] Detecting limited health literacy in ... [59] Contextualized language intervention ... [60] Social influence scale

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Introduction

Health Literacy (HL) is a rapidly growing topic in healthcare. In the past few years, the Information and Communication Technology (ICT) revolution has renovated the creation and sharing of health-related information, and people can live in the flow of health-related information. The World Health Organization (WHO) defines health literacy as: "The cognitive and social skills that determine the motivation and ability of individuals to access, understand, and use information in ways that maintain and promote good health" [1]. HL includes a range of critical skills that allow individuals to empower themselves to promote health behaviors. Individual and social behavior can be changed towards a healthy lifestyle. This is recognized as shared health responsibility, which is significantly associated with HL.

Low Health Literacy (LHL) is recognized as a global problem that can result in difficulty reading and understanding health information, lower medication compliance, higher rates of hospitalization, and 1.5 to 3 times greater poor health status [2]. Healthcare professionals may not recognize factors associated with HL and may not be sufficiently aware of their impact on health outcomes. LHL can lead to failure to acquire or correctly understand health information. It will have negative impacts on individual's health and can lead to health disparities. So, it is crucial to

identify the factors related to HL. It can help to better understand HL and improve health status and quality of life. Although the effects of HL have been widely studied, only a few have investigated the factors associated with HL. Environmental, political and social factors can determine health. They include a wide range of skills that people acquire throughout their lives to search for, evaluate, and use health information. They can use the right information to make better decisions, reduce health risks, and improve quality of life. These skills can be influenced by cultural beliefs, understanding of the health system, and health information. Health literacy skills are essential as contemporary health care systems, and people are commonly expected to make the best decisions regarding health care.

This study aimed to review the articles related to health literacy in the last 20 years and explain the factors associated with health literacy or predict it.

Information and Methods

This systematic review examined quantitative research articles published from 2002 to 2022 to explore factors that predict or are associated with HL. Scopus, PubMed, and Web of Science (WoS) databases were searched. Table 1 shows the search reports in all databases and the number of retrieved records.

Table 1. Database search construction

Database	Query	Results
Scopus	(TITLE ("health literacy") AND TITLE-ABS-KEY ("health literacy" AND predict) OR TITLE-ABS-KEY ("health literacy" AND associate)) + publication date from 2002 to present + Full text + English	412
PubMed	("health literacy"[Title/Abstract]) AND (predict [Title/Abstract]) AND (associate [Title/Abstract]) + publication date from 2002 to present + Full text + English	205
WoS	("health literacy"[Title]) AND ("health literacy"[Abstract]) AND (predict [Title]) AND (predict [Abstract]) AND (associate [Title]) AND (associate [Abstract]) + publication date from 2002 to present+ Full text + English	270

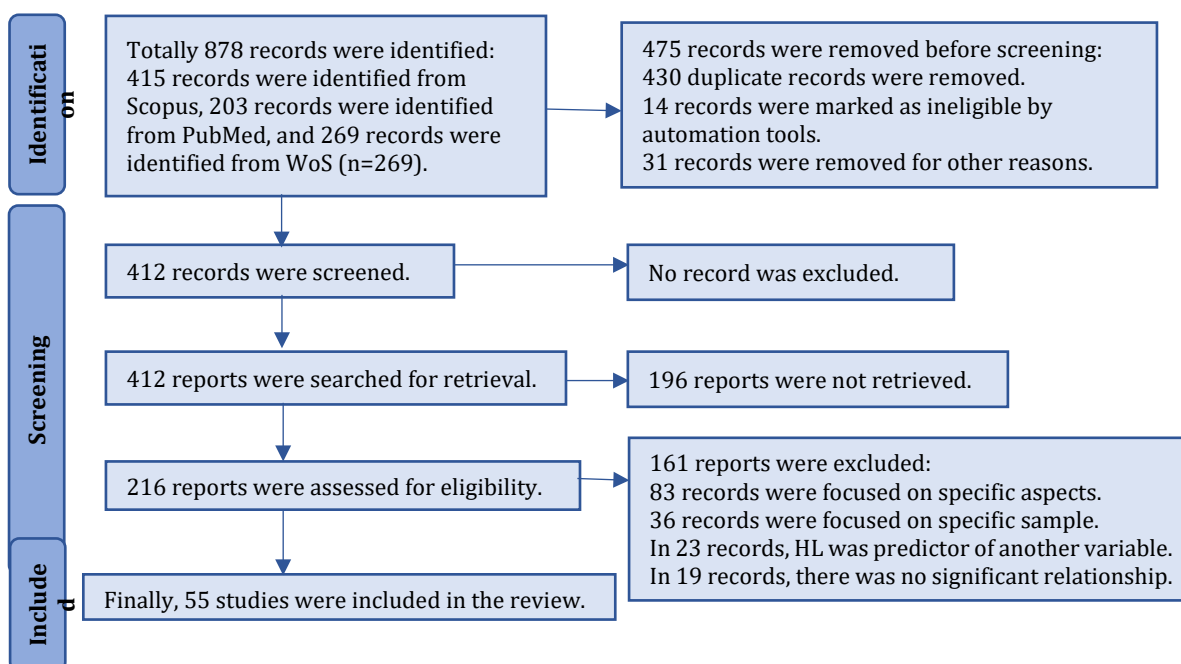


Figure 1. PRISMA flow chart for new systematic reviews

The inclusion criteria were:

1. Research articles
2. Quantitative method
3. Focusing on factors that can predict HL or associate with it
4. English full-text is available.
5. Focusing on adults in sampling
6. Publication date between 2002 to 2023

The exclusion criteria were:

1. Articles that focused on specific aspects of HL (e.g., oral HL, media HL).
2. Articles that focused on specific sample (e.g., nurses, immigrants, women).
3. Articles that HL was a predictor of other variables.
4. Articles with no significant relation

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses framework (PRISMA) [3] was used to conduct a transparent process. Figure 1 shows the final item reporting process.

The role of factors (prediction or association) was

determined based on the most repeated. For example, race/ethnicity role was predictor in 7 articles and association in 5 articles. So, it was considered as a predictor. The most frequent factors had a prediction role.

Findings

55 articles were reviewed considering the inclusion and exclusion criteria. Most participants were patients, adults, immigrants, nurses, and parents. The most frequent methods were "cross-sectional correlation" and "exploratory and modeling". The most frequent tools were National Assessment of Adult Literacy (NAAL), the Newest Vital Sign (NVS), The Rapid Estimate of Adult Literacy in Medicine (REALM), Test of Functional Health Literacy in Adults (TOFHLA), short version of TOFHLA (s-TOFHLA), Health Literacy Questionnaire (HLQ), and Health Literacy Survey (HLS). Table 2 shows the results of this review.

Table 2. Factors that predict or are related to health literacy

No.	Author(s)	Participants (Sample size)	Measurement	Method	Year	Factor	Prediction/Association
1	Caldwell [4]	Patients (n=59)	NVS	Correlational Cross-sectional	2020	- Age - Caregiver income - Caregiver education level	P A A
2	Manganello & Sojka [5]	Adults (n=48)	Semi-structured interviews	Exploratory study	2016	- Health information sources	A
3	Wallace <i>et al.</i> [6]	Patients (n=305)	REALM	Correlational Cross-sectional	2006	- Education level	P
4	Cutilli <i>et al.</i> [7]	Adults (n=2668)	NAAL	Correlational Cross-sectional	2018	- Income - Education level - Getting help filling out forms and reading newspaper articles - Overall health - Health information sources	P P P P P
5	Haun <i>et al.</i> [8]	Adults (n=378)	s-TOFHLA REALM BRIEF	Correlational Cross-sectional	2012	- Age - Education level - Minority status - Reading level	A A A A
6	Azreena <i>et al.</i> [9]	Patients (n=360)	Self-administrated questionnaire	Correlational Cross-sectional	2016	- Ethnic group - Level of education - Knowledge scores	P A P
7	Rheault <i>et al.</i> [10]	Adults (n=200)	HLQ	Correlational Cross-sectional	2019	- Age - Number of chronic diseases - Gender - Education - Income	P P P P A
8	Guo <i>et al.</i> [11]	Adults (n=650)	HLAT-8: 8-item Health Literacy Assessment Tool	Correlational Cross-sectional		- Social support - Self-efficacy - School environment	P P P
9	Kayupova <i>et al.</i> [12]	Adults (n=1000)	HLS-EU	Correlational Cross-sectional	2017	- Social status - Ability to pay for medications - Watching TV programs related to health - Community involvement	A A A A
10	Hagger <i>et al.</i> [13]	Patients (n=1524)	HLS	Correlational Cross-sectional	2020	- Income - National group membership - Age - Gender	P A A A
11	Chang <i>et al.</i> [14]	Nurses (n=430)	HLKE: Health Literacy Knowledge and Experience	Correlational Cross-sectional	2020	- Education level - Job category - Working years - Attending in-service - Patient education programs	P P P P P
12	Sørensen <i>et al.</i> [15]	Adults (n=8000)	HLS-EU-Q	Comparative study	2015	- Gender - Age - Education - Financial deprivation - Social status	P P P P P
13	Paek <i>et al.</i> [16]	Adults (n=452)	Self-administrated tools	Paper-and-Pencil survey	2011	- Health information - Gender - Health status - Smoking - Drinking - Reading magazines - Internet use	A P P A A A A

Continue of Table 2 from the last page.

14	Wolf <i>et al.</i> [17]	Adults (n=2956)	S-TOFHLA	Correlational Cross-sectional	2010	- Age - Income - Education level - Underweight	A A A A
15	Ganzer <i>et al.</i> [18]	Adults (n=56)	S-TOFHLA	Correlational Cross-sectional	2012	- Education level	A
16	Patel <i>et al.</i> [19]	Adults (n=62)	S-TOFHLA	Correlational Cross-sectional	2011	- Education level - Age	P P
17	Garcia-Garcia & Perez-Rivaz [20]	Patients (n=166)	HLQ	Correlational Cross-sectional	2022	- Health status - Appraisal of health information - Ability to find good health information - Understanding health information - Social support for health	P A A A A
18	Caldwell & Melton [21]	Adults (n=150)	NVS	Correlational Cross-sectional	2020	- Race/ ethnicity - Income	P A
19	Wolf <i>et al.</i> [22]	Adults (n=2923)	S-TOFHLA	Correlational Cross-sectional	2005	- Age - Race/ethnicity - Income - Education - Smoking - Alcohol use - BMI: Body Mass Index	A A A A A A A
20	Downey & Zun [23]	Patients (n=536)	S-TOFHLA	Correlational Cross-sectional	2008	- Education level - Age	P P
21	Hester [24]	Adults (n=63)	S-TOFHLA	Correlational Cross-sectional	2008	- Social communication skills	P
22	Diemer <i>et al.</i> [25]	Adults (n=99)	REALM	Correlational Cross-sectional	2017	- Gender - Education	P P
23	Xie <i>et al.</i> [26]	Adults (n=1164)	HL Questionnaire	Cross-sectional	2019	- Age - BMI - Residence - Income - Occupation - Education	P P P P P P
24	Sentell & Braun [27]	Adults (n=51,048)	CHIS: California Health Interview Survey	Cross-sectional	2012	- Race/ethnicity - Education level - Age	A A A
25	Jeong & Kim [28]	Adults (n=1000)	NVS	Correlational Cross-sectional	2016	- Age - Education level - Living in the capital city - How to get information and access to book and magazine	P P P P
26	Bouclaous <i>et al.</i> [29]	Adults (n=587)	TOFHLA and HLS-EU-Q	Correlational Cross-sectional	2021	- Education - Income - Ability to pay for treatment - Self-perceived health - Presence of long-term illness	A A A A A
27	Shah <i>et al.</i> [30]	Adults (n=1014)	NVS	Correlational Cross-sectional	2010	- Age - Education level - Health class participation - BMI - Gender - Race	P P P P P P
28	Miller <i>et al.</i> [31]	Adults (n=3260)	MHLS NALS	Modeling based on data sets	2007	- Age - Gender - Race	P P P
29	Rasouli <i>et al.</i> [32]	Patients (n=223)	P-eHEALS	Correlational Cross-sectional	2018	- Gender - Age - Education level - Searching the web - Access to online health information resources - Smoking	A A A A A A
30	Christy <i>et al.</i> [33]	Adults (n=416)	REALM	Correlational Cross-sectional	2017	- Gender - Race/ethnicity - Job status - Social influence - Religious belief	P P P P P
31	Jeppesen <i>et al.</i> [34]	Patients (n=225)	S-TOFHLA	Correlational Cross-sectional	2009	- Self-rated reading ability - Education - Gender - Race/ethnicity	P P P P
32	Clouston <i>et al.</i> [35]	Adults (n= 2122)	NVS	Correlational Cross-sectional	2016	- Educational level - Adolescent cognitive - Cognitive skills	P P P
33	Coman <i>et al.</i> [36]	Adults (n=1622)	HLS-EU-Q	non-experimental, cross-sectional	2022	- Age - Gender - Education - Self-reported health status	P P P P
34	Chen <i>et al.</i> [37]	Adults (n=222)	S-TOFHLA	Cross-sectional	2022	- Educational level - Cognition - Age	A A A
35	Almoajel <i>et al.</i> [38]	Adults (n=366)	Self-administrated tools eHEALS	Cross-sectional	2022	- Age - Education	A A

Continue of Table 2 from the last page.

36	Sun <i>et al.</i> [39]	Adults (n=123)	CHECC-uP: community-based health literacy intervention for cancer control	Randomized controlled trial	2022	- Age - Education	A A
37	Feinberg <i>et al.</i> [40]	Adults (n=520)	HLQ	Correlational Cross-sectional	2022	- Rural county - Health insurance	A A
38	Gustafsdottir <i>et al.</i> [41]	Adults (n=175)	HLS-EU-Q	Correlational Cross-sectional	2022	- Education - Resiliency - Driving a car - Access to healthcare - Medical service - Age - Income - Depression	A A A A A A A A
39	Van der Heide <i>et al.</i> [42]	Adults (n= 5617)	HALS: Health Activities and Literacy Scale HLS-EU-Q	Cross-sectional	2016	- Education - Age - Working status	P P P
40	Omariba & Ng [43]	Adults (n=22,818)	HALS	Cross-sectional	2015	- Education - Income - Employment	A A A
41	Wang <i>et al.</i> [44]	Adults (n=913)	CAHLQ: Chinese Adult Health Literacy Questionnaire	Cross-sectional	2013	- Race/ethnicity	A
42	Martin <i>et al.</i> [45]	Adults (n=17,466)	NAAL	Correlational Cross-sectional	2009	- Gender - Age - Race/ethnicity - Education - Income	P P P P P
43	Beauchamp <i>et al.</i> [46]	Adults (n=813)	HLQ	Cross-sectional	2015	- Health insurance - Living status (alone/ family) - Education	A A A
44	Bo <i>et al.</i> [47]	Adults (n=29,473)	HLQ	Cross-sectional	2014	- Living status (alone/ family) - First language - Income - Education	A A A A
45	Jayasinghe <i>et al.</i> [48]	Adults (n=739)	HeLMS: Health Literacy Management Scale	Cross-sectional	2016	- Education - Economic status	A A
46	Tsai <i>et al.</i> [49]	Adults (n=347)	THL: Taiwan Health Literacy Scale	Cross-sectional	2014	- Age - Education - Income	A A A
47	Davis <i>et al.</i> [50]	Adults (n=75)	REALM-R	Cross-sectional	2013	- Education	A
48	Griva <i>et al.</i> [51]	Patients (n=221)	HLQ	Observational study	2020	- Age - Ethnicity - Relationship status - Education	A A A A
49	Milner <i>et al.</i> [52]	Adults (n=16,021)	HLQ	Cross-sectional	2019	- Gender - Depression symptoms - Race/ethnicity	A A A
50	Kale <i>et al.</i> [53]	Patients (n=235)	S-TOFHLA	Cohort study	2015	- Marriage - Income - Education	A A A
51	Tschamper <i>et al.</i> [54]	Adults (n=254)	HLQ	Cohort study	2022	- Self-efficacy - Age - Education - Levels of mental distress	P A A A
52	Garcia-Codina <i>et al.</i> [55]	Adults (n=2433)	HLS-EU-Q	Cross-sectional	2019	- Education - Socioeconomic status - Physical limitation to perform everyday activities	A A A
53	Champlin & Mackert [56]	Adults (n=2904)	Health literacy screening measure	Population-based survey	2016	- Race/ethnicity - Age - Education	A A A
54	Hou <i>et al.</i> [57]	Patients (n=511)	HLQ	Cross-sectional	2018	- Age - Education - Cancer stage and duration - Occupation	P P P P
55	Apolinario <i>et al.</i> [58]	Patients (n=322)	S-TOFHLA	Correlational Cross-sectional	2014	- Educational - Mother's educational - Major lifetime occupation - Frequency of use of computers - Writing skills - Reading skills	P P P P P P

There were more than 20 factors associated with HL, with the most frequent factors (3 times or more) were reported and discussed. These factors were age, race/ethnicity, gender, education, social status, occupation status, individual income, knowledge level, and health status.

26 studies showed that age can predict HL [4, 8, 10, 13, 15, 17, 19, 22, 23, 26-28, 30-32, 36-38, 41, 42, 45, 49, 51, 54, 56, 57]. 11 studies showed that race/ethnicity can predict HL in adults [9, 21, 22, 27, 33, 34, 44, 45, 51, 53, 56]. 12 studies demonstrate that there is a significant relationship between gender and HL [10, 13, 15, 16, 25, 30, 31, 33, 34, 36, 45, 52] and, most of

them show a strong relationship that gender can predict HL. There were 39 studies that found a direct and significant relationship between education level and HL [4, 7, 8, 10, 14, 15, 17-19, 22, 23, 25, 27-30, 32, 34-39, 41-43, 45-51, 53-58], and it is able to predict HL. Six studies showed that there is a direct significant relationship between social status and HL [11, 12, 15, 20, 24, 33], and can predict HL. There were seven studies that showed a significant direct relationship between occupational status and HL [11, 14, 26, 33, 42, 57, 58], and most of them can predict HL. In 14 studies, there was a significant direct relationship between individual income and HL scores [7, 10, 13, 17, 21, 22, 26, 29, 41, 43, 45, 47, 49, 53]. Five studies found that knowledge was associated with HL [9, 16, 20, 28, 32]. Ten studies concluded that health status was significantly associated with HL [7, 10, 16, 17, 22, 29, 30, 36, 54, 55], and most of them showed that it can predict HL.

Discussion

This is a systematic review of 56 articles on factors associated with or predicting HL. Many factors (individual or social) are associated with HL. The most frequent factors significantly associated with HL were age, race/ethnicity, gender, education, social status, occupational status, individual income, knowledge level, and health status.

There was an indirect relationship between HL and age, indicating that the youngest participants had higher HL scores. Online information sources such as the Internet and social media can be related to literacy. Therefore, using the Internet to search for health care information can be considered the development of HL skills. Since the use of the Internet and other online information sources is less in older age groups and older adults, it can be one of the influential. Some researchers concluded that older adults are less confident in their ability to use online health information to make health decisions and their ability to distinguish between high-quality and low-quality online health resources. In addition, the decline in cognitive ability associated with aging may reduce health literacy. Some indicators such as "abstract reasoning", "verbal memory", and "individual declines" [21, 28] in abstract reasoning can be related to HL.

The researchers focused on different races and ethnic groups (e.g., Asian, American, Hispanic, Korean, Chinese, white, and non-white). Most of them focused on race/ethnicity as a social inequality leading to disparities in health-related outcomes. Two important findings were that racial/ethnic differences influenced self-reported health and that HL was significantly associated with health status. In people whose native language is not English, Limited English proficiency (LEP) can be an essential factor in explaining differences in self-reported health status. On the other hand, discordance between the language used for data collection and the native language

should be considered. In immigrants, some factors, such as differences in education, employment status, income, and health support services, in addition to the difficulty of living in a foreign country, can be noticed. The results showed that white people and native people had higher scores in HL.

Women had higher HL scores than men. Some studies asked women to read and interpret food labels, instructions for using medicines, the best way to deal with children's fever, the best action to deal with a heart attack, how to deal with epileptic attacks, etc., and it was shown that they have good skills. It may be because of being more familiar due to traditional gender roles regarding healthcare and nutrition. Other possible reasons for the higher HL scores in women could be the greater respect for health standards in women, more attention to health/medical recommendations such as periodic examinations, and women's greater interest in acquiring, learning, and using health information.

People with higher education have better levels of HL and can understand health instructions better. These people have higher health information and perform better in applying health recommendations. Education level can contribute to the understanding of spoken instructions and is very important in health care. Although there is an extensive literature on spoken information processing (in the fields of education, communication studies, cognitive psychology, and gerontology), relatively little is known about people's ability to understand common spoken instructions and the relationship to reading skills. People with a low level of education have a low ability to find appropriate health information and understand health information to know what to do [37]. The results emphasize the importance of bridging the educational gap by providing educational materials with appropriate reading levels. It is an essential concept for health care providers to ensure that their health communication and written educational materials are sufficiently simplified (especially at the reading level) to improve understanding and reduce health disparities. A low level of education can harm an individual's functional HL and other domains of HL. Clinicians and policymakers should be attuned to these factors when communicating with people and designing healthcare systems to improve outcomes.

The researchers paid attention to economic well-being, social support, socially integrated, social communication, and social influence to investigate self-assessed social status. Social support (i.e., perceived support from family, friends, and significant others) will be more important in health conditions. Solving health problems can influence the improvement of the health status of the population as a whole. People with high social support had better scores in HL. People with limited financial and social resources are more likely to have limited health literacy. People who are socially integrated are

healthier than others. Social communication and understanding the social network structure can help connect it. People who are socially well connected can receive more health services because they are informed about the health services of the community. HL can be distributed through social networks. Social communication skills allow a person to comment, explain, question, request, clarify, respond, and inform in a social context ^[59]. Social influence has seven principles, which are social learning, social comparison, social norms, social facilitation, social cooperation, social competition, and social cognition ^[60].

Researchers investigated occupation status, considering job categories, employment type, and job history. There is a significant difference between different job categories and HL scores ^[14]. Health resources should be rationally allocated to different occupational groups to enhance the efficiency of their utilization ^[26] and can promote HL. Employment type (e.g., employed, not employed, retired, and disabled) was strongly associated with HL, and those who were employed had higher HL scores. In addition, lifetime main occupation was associated with HL, and individuals with lifetime main occupation had higher scores on HL ^[58]. Occupation status can play an essential role in decision-making and self-rated health status and can finally affect HL.

Researchers considered income as an important factor associated with HL. Some researchers focused on total income (family income), and others on individual income. There were two limitations to the income survey: Some participants preferred not to declare individual income ^[10], and homemakers did not have a certain income (considering the role of gender in HL and higher HL in women). People with higher income have high level of HL. Higher income is associated with having adequate health information ^[10], and they can make better health decisions. Low-income people have more restrictions on accessing health care and are less likely to seek health care ^[13]. This finding should be paramount in the health policy by politicians. They should have some interventions, such as additional support in lower-income communities for health management ^[7]. It can help low-income people take care of their health and potentially prevent health disparities.

Knowledge is awareness, understanding, or information obtained by experience or study, which can be in a person's mind ^[29]. In the field of health, knowledge can be used to know and understand health information and the ability to find good health information and understanding enough to know what to do (decision making). It can be noted that mostly in patients, for example in diabetic patients, diabetes knowledge scores were predictive of HL level ^[7]. The crucial role of socialization factors such as interpersonal factors (e.g., parents, friends) and media (e.g., traditional and non-traditional) in the distribution of health information and the teaching of

health-related skills should be considered. This information is positive for the perception of HL ^[16]. HL is the capacity to understand basic health information, and the use of valid information can enhance the level of knowledge and promote HL.

Health is a state of body, mind, or spirit that is related to all aspects of human life. As sickness is a different situation, it may affect the quality of life and health literacy. Researchers considered self-reported health status, number of chronic diseases, underweight, BMI, depression, and distress. In healthy people, education, age, health status, gender, social status, BMI (fit or underweight), race/ethnicity, and job status are the most predictors of HL. Therefore, online health information and the ability to find good information, income, healthcare insurance, and social support are the most critical factors associated with HL. However, in patients, age, education, race/ethnicity, knowledge, and income are predictors of HL, and gender and online health information is associated with HL. So, it can be said that health status determines the predictors of HL.

This study concluded that younger people, white people, females, people with higher education levels, good social status, occupation, especially lifetime main occupations, higher individual income, higher knowledge level, and healthy people have high levels of HL. Regarding lower levels of HL in older adults, it can be said that addressing health literacy at an early age can develop the ability to understand health information and promote interactions with the healthcare system, leading to positive health outcomes later. It should be said that the specific vulnerable groups, e.g., non-whites, older adults, males, and social status in communities, should be considered in the HL survey. It is an essential implication for health care providers to ensure that their health communication and written educational materials are sufficiently simplified (especially at the reading level) to improve patient understanding and reduce health disparities. The health system can pay attention to the improvement of the health status of people with a low social base and low income by providing information and holding health education courses at no cost or a small cost. Increasing the levels of HL can develop more capacity in each person in health behaviors, realizing shared responsibility for their health, developing the person to improve the quality of life individually. Socially, increasing health literacy will contribute to the development of equity and sustainability of changes in public health.

Conclusion

Many factors (individual or social) are associated with health literacy. The most common factors significantly associated with health literacy are age, race/ethnicity, gender, education, social status, occupational status, individual income, knowledge level, and health status. Health literacy includes

different constructs and may vary based on socio-economic and demographic characteristics in different communities (e.g., men/women, black/non-black, patient/healthy, employed/unemployed, young/adult, different social status, different individual income).

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