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Original Article

A Survey of Health Literacy among Secondary School Teachers in the City of Azarshahr, Iran

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Abstract

Introduction: Beyond empowering teachers to care for their own well-being, health literacy can shape students' lifestyles and society through role modeling. This study investigated health literacy among public secondary school teachers.

Methods: This cross-sectional survey included all public secondary school teachers (n =150) in Azarshahr, East Azerbaijan, Iran, through a census. The questionnaire link was sent via the Department of Education, with 136 teachers responding. Data were collected from July 23 to November 30, 2020, using the validated HELIA questionnaire. Data analysis was performed using descriptive and inferential statistics with the help of SPSS and Excel software.

Results: The main sources of health information were the Internet (62.5%), consulting health professionals (22.1%), and radio/television (11.8%). Dimension mean scores were 3.90 for access, 3.99 for reading, 4.23 for understanding, 3.90 for evaluation, and 3.89 for decision-making/behavior, with a total mean of 3.92 (out of 5). Health literacy levels showed 48.53% sufficient, 27.21% excellent, 18.38% not quite sufficient, and 5.88% Insufficient. No significant differences were found by gender or field of study ($P > 0.05$). Age and work experience showed a significant negative correlation with health literacy ($P \leq 0.05$).

Conclusion: Given teachers' primary reliance on the Internet for health information and their satisfactory level of health literacy, digital platforms offer promising capacity-building opportunities. The absence of significant differences in health literacy of respondents based on gender and field of study supports universal training initiatives, though older and more experienced teachers should be prioritized for health literacy training.

Introduction

Literacy is a continuum of learning and skills in reading, writing, and using numbers throughout life; it is also part of a larger set of skills, including digital skills, media literacy, education for sustainable development and global citizenship, as well as specific job skills (1). On the other hand, given that all humans are sensitive to their health, they try to obtain useful information to maintain their well-being. Therefore, by creating easy access to health information and increasing their ability to use this

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information effectively, health literacy can be the key to their empowerment (2). The World Health Organization has introduced health literacy as one of the crucial determinants of health in the 21st century (3); from the perspective of this organization, health literacy is personal knowledge and competencies that are accumulated through daily activities, social interactions, and over generations (4). Undeniably, health literacy represents a wide range of skills and resources related to individuals' ability to process health-related information (5).

Health literacy is considered a key factor in public health (6) and can be defined by six dimensions: access, reading, comprehension, evaluation, decision-making, and application. Access refers to the capacity of individuals to obtain, understand, and process basic information and services needed to make appropriate health care decisions. Reading is defined as the capacity of individuals to read and understand printed health-related materials, identify and interpret information presented in formats (pictures, graphs, and tables), and perform computational operations to make decisions appropriate to health and care. Comprehension is the ability to understand and interpret the meaning of health information in written, spoken, or digital texts and how people are motivated to pay attention or not to pay attention to health-related activities. Evaluation refers to the ability to interpret, refine, judge, and evaluate health information, or in other words, to find the value of health information. Decision-making and application are defined as a set of reading, listening, analysis, and decision-making skills to communicate, use information, and apply it in health situations to improve and maintain health (7).

Characteristics of people with low health literacy include arbitrary and excessive use of medications, failure to follow doctor's orders, and poor control of blood sugar levels; also, among this group, low health knowledge, failure to express health and hygiene concerns, and inappropriate communication with doctors are more prevalent (8). On the other hand, a national survey conducted in 2007 in five provinces of Iran on people over 18 years of age indicated that overall, the health literacy level of 56.6% of respondents was inadequate. Women's health literacy was also higher than men's (9). A study conducted in 2017 in Ardabil city also indicated poor access to health information by 76.3% of respondents; in addition, men's health literacy was higher than women's (10).

To develop health in any region or among a specific segment of society, it is essential to be aware of the level of health knowledge and the weaknesses of health literacy of individuals in that group for future planning. In order to increase the health literacy of different groups in society, teachers are considered one of the most influential groups in society. Teachers are the main pillars of the education system and the group that educates future generations, without whose support no educational transformation can be successful. This group plays a significant role in transferring information to students who represent the family. Therefore, assessing their health literacy skills is of particular importance. Low health literacy of teachers can be an obstacle to increasing the health literacy of students in schools (11). Therefore, paying more attention to health programs and improving the level of health literacy of teachers can be one of the reasons for increasing the health of the community (12).

On the other hand, ignoring the level of health literacy of teachers, as one of the most important groups responsible for educating students, will lead to great losses. Low levels of teachers' health literacy not only affect the health of students and teachers themselves, but can also negatively affect their teaching performance (13). Health literacy is the strongest predictor of teachers' health-promoting behaviors, so improving health literacy is a key goal for increasing teachers' health-promoting behaviors. In fact, teachers are both health beneficiaries and health resources in schools, and identifying factors that promote teachers' health behaviors is essential (14). UNESCO also refers to health literacy as a structural approach that includes the professional development of teachers and educational staff, organizational change and quality standards in education, and the development and investment of supportive policies (15). Indicatively, health literacy is a vital asset for 21st-century learners, given its

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positive impact on health outcomes and academic achievement (16).

A review of the research background indicates that health literacy has been studied due to its importance among various groups such as patients (17-18) and students (19). Teachers and student teachers are also among the important groups whose health literacy has been considered. For example, in a study of the health literacy level of teachers in Mashhad, Iran, the majority of teachers had sufficient health literacy; only 29% had insufficient or not quite sufficient literacy levels. Besides, a significant relationship was found between health literacy and field of study and gender (12). Furthermore, an assessment of the health literacy levels of teachers in elementary schools in Shahrekord, Iran, showed that the health literacy level of the respondents was at an average level (13). Correspondingly, in a study of the health literacy level of 932 students at Farhangian University, it was found that the students' health literacy score was 67.28. Approximately 10.5% of the respondents had an insufficient literacy level, 34.4% had a not quite sufficient literacy level, 45.1% had a sufficient literacy level, and 10% had an excellent health literacy level (20). In addition, the results of the research on teachers' lived experiences of the opportunities and challenges of health literacy education in primary school revealed four main cultural, political, economic, and structural themes in the form of opportunities and challenges. Opportunities included issues such as improving physical and mental health, reducing medical and educational costs, increasing productivity, improving governance, and institutionalization from childhood; challenges included issues such as lack of budget and infrastructure, religious and family opposition, non-acceptance by policymakers, ideological interference, and poor planning (21). A study of health literacy and oral health-related behaviors among elementary school teachers in Babol showed that more than two-thirds of elementary school teachers had sufficient oral health literacy (22). In a study of the level of health literacy and the way teachers in Jahrom schools searched for health information, about 64.9% of them had excellent health literacy. (23). A review of foreign research also indicates attention to studies in the field of health literacy. For example, a COVID-19-specific health literacy assessment among school teachers in Hong Kong found that 50.8% of school teachers had adequate health literacy, 38.3% had less than adequate health literacy, and 10.9% had inadequate health literacy (24). A survey of the determinants of mental health in 189 primary school teachers in Tanzania found that all teachers had high levels of health literacy. Results from a survey of health literacy and spiritual health indicated that providing health education, interest in reading about spiritual health issues, and engaging in spiritual health issues had an impact on teachers' spiritual health (25). On the other hand, results from teachers' experiences of professional development in health literacy in an Australian primary school after attending workshops on this topic showed that teachers found that their participation in the project had improved their confidence and competence in implementing health literacy in their lessons (16). A temporal review of domestic research on teachers' health literacy suggests that, despite these studies being conducted over similar time periods, the level of health literacy of respondents varies from excellent to borderline. This heterogeneity can be attributed to differences in measurement tools, diversity of target groups (teachers versus student teachers, or elementary teachers versus other levels), and socio-cultural conditions of different cities. However, when domestic research (mostly pre-COVID-19) is compared with foreign research (mostly post-COVID-19), the role of time becomes prominent. Seemingly, the difference in the results of domestic and foreign studies can be justified by the expansion of health content in the media in the post-pandemic era.

Since health literacy is a dynamic concept depending on the social, cultural, and economic conditions of each region, a single program or a few limited studies cannot cover the educational needs of all teachers in different cities and time periods. Furthermore, rapid changes in the health system, educational technologies, and disease patterns cause teachers' health literacy levels to change. Thus, continuous assessment of health

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literacy and identification of the current situation are essential. These periodic assessments also help policymakers design programs to promote health literacy in a targeted and evidence-based manner. As a result, training becomes more efficient, and teachers can better play their key role in promoting student health. Given the need to periodically assess health literacy among different groups in society, including teachers and principals, and the lack of research examining the health literacy of teachers in Azarshahr City, Iran, the present study aims to examine the health literacy of teachers in public secondary schools. In this regard, the sources used to obtain health information and the health literacy status of teachers will also be examined regarding demographic variables (gender, field of study, age, and work experience).

Methods

The method of the present study was a cross-sectional survey. The statistical population of the present study was all secondary school teachers of public high schools (n = 150) in Azarshahr (East Azerbaijan, Iran). In this study, due to the small number of teachers, sampling was not carried out among them, and the census method was used; the questionnaire was sent to all teachers of public schools, and 136 questionnaires were completed. The questionnaire was designed online due to time constraints and the spread of the coronavirus, and its link was provided to secondary schools through the Azarshahr City Education Department to be sent to the teachers. Data collection was carried out between August 1th and December 1th, 2020. Notably, the distribution of the questionnaire was carried out after obtaining permission from the city education department, and the questionnaire also emphasized the use of research and maintaining the confidentiality of information.

The data collection tool was the Questionnaire for the Health Literacy for Iranian Adults (HELIA), whose validity and reliability have been previously confirmed. This questionnaire is a local tool that is appropriate for cultural and social characteristics and is designed to assess the health literacy of the general population aged 18 to 65 years living in Iranian cities. The questionnaire consists of two sections: demographic information and health literacy questions. Demographic questions include gender, field of study, level of education, age, work experience, and sources used to obtain information about health literacy. Health literacy questions include 33 questions on a five-point Likert scale (1 to 5), with reading skills questions, including four items, access, including six items, comprehension seven items, evaluation four items, and decision-making and application of health information including twelve items. The average score of the dimensions and items on the Likert scale is presented in Table 1, and the total raw score that can be obtained by each individual in the five dimensions and in total is presented in Table 5. Furthermore, the raw scores obtained are converted into a range of 0 to 100 and are placed in four levels, indicating the level of health literacy; accordingly, an insufficient level is considered to be a score between 0 and 50, a score between 1.50 and 66 is considered to be a not quite sufficient level, a score between 1.66 and 84 is considered to be a sufficient level of health literacy, and a score between 1.84 and 100 is considered to be an excellent level of health literacy (26).

In the present study, in order to measure the reliability of the instrument, the Cronbach's alpha value was calculated for each of the dimensions of health literacy and also for health literacy as a whole. Cronbach's alpha coefficients above 0.7 indicate that the reliability of the research measurement instrument is at a desirable level (27). Considering the obtained values of Cronbach's alpha coefficients in the range of 0.80 to 0.94, the reliability of the instrument in the present study is also confirmed (Table 1).

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Table 1. Reliability of the research instrument

Variable	Dimension	Alpha	Questions
Health literacy	Reading skills	0.80	1 to 4
	Access	0.86	5 to 10
	Understanding	0.88	11 to 17
	Evaluation	0.86	18 to 21
	Decision making and application	0.88	22 to 33
	All Dimensions	0.94	33

Although the present study was conducted as a census in the community of secondary school teachers in Azarshahr City, appropriate statistical tests were used to examine the significance of the differences between subgroups. The Shapiro-Wilk test was used to examine the normality of the data distribution. The results ($p < 0.05$) showed that the distribution of health literacy scores in different groups was not normal. Therefore, nonparametric tests were used for group comparisons. Specifically, the Mann-Whitney test was used to examine the level of health literacy by gender, the Kruskal-Wallis test was used to examine health literacy by field of study, and the Spearman correlation test was used to examine the relationship between health literacy and service experience and age. Data analysis was performed using SPSS software (version 20) and graph drawing was done using Excel.

Results

Table 2 shows that out of 136 participants in the study, 50% were male and 50% were female. According to the information obtained, the teachers participating in the study were in the age range of 21 to 57 years. The highest percentage (39%) was in the age group of 41-50 years, and the lowest percentage (4.6%) was in the age group of 50-57 years. The service experience of the respondents was in the range of 1 to 35 years. The highest percentage (37.5%) was in the teachers with experience between one and nine years, and the lowest percentage (12.5%) was in the group of 29-35 years. 41.2% of the respondents were in the humanities, 25.7% in mathematics, 19.1% in the sciences, and 14% in other fields.

Table 2. Demographic information of respondents

Variables		Frequency	Percentage
Gender	Male	68	50
	Female	68	50
Age range	21 to 30 years	32	23.5
	31 to 40 years	45	33.1
	41 to 50 years	53	39
	50 to 57 years	6	4.4
Work experience	1 to 9 years	51	37.5
	10 to 18 years	40	29.4

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Table 2. Demographic information of respondents ... (continued)

Variables		Frequency	Percentage
Work experience	19 to 28 years	28	20.6
	29 to 35 years	17	12.5
Field of study	Humanities	56	41.2
	Mathematics	35	25.7
	Experimental sciences	26	19.1
	Other disciplines	19	14

Table 3 shows the sources used to obtain health literacy information by respondents. A large percentage (62.5%) of respondents used the Internet to obtain health information. None of the respondents mentioned channels such as voicemail, newspapers, periodicals, and magazines, as well as asking friends and acquaintances.

Table 3. Frequency and percentage of health information sources

Sources used	Frequency	Percentage
Internet	85	62.5
Ask doctors and health workers	30	22.1
Radio and television	16	11.8
Booklets, pamphlets, educational brochures	3	2.2
Satellite networks	1	0.7
I don't know where to get the information I need	1	0.7
Talking on the phone	0	0
Newspapers, periodicals, and magazines	0	0
Ask friends and acquaintances	0	0
Total	136	100

Table 4 shows the mean and standard deviation of 33 health literacy items in five dimensions based on the Likert scale. The lowest mean (3.29) was for the item “Even if I have no symptoms of illness, I visit the doctor for a check-up (periodic examinations) annually” from the decision-making and application dimension, and the highest mean (4.46) was for the item “I understand the recommendations for healthy nutrition” from the comprehension dimension. In all 33 items, the average response of the respondents was higher than the hypothetical mean of 3. Overall, the average health literacy in the access dimension was 3.90, the reading dimension was 3.99, the comprehension dimension was 4.23, the evaluation dimension was 3.90, and the decision-making and application dimension was 3.89. Overall, the average total health literacy was calculated to be 3.92 (out of 5).

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Table 4. Average score of health literacy dimensions and items based on the Likert scale

	Dimensions & Items	Items' average	SD	Dimensions' average
Reading Skills	Reading educational materials about health and hygiene (booklets, pamphlets, educational and advertising brochures) is easy for me.	4.03	0.91	3.99
	Reading specific written instructions that doctors, dentists, and health personnel give me about my illness is easy for me.	3.98	0.89	
	Reading medical and dental forms (such as patient admission forms, consent forms, registration forms, etc. in hospitals and healthcare centers) is easy for me.	3.82	1.06	
	Reading the instructions on preparation guides before undergoing tests, ultrasound, or radiology is easy for me.	3.77	1.05	
Access	I can obtain the health and medical information I need from various sources.	3.91	0.91	3.90
	I can obtain information about healthy nutrition.	4.10	0.80	
	I can obtain information about mental health, such as depression and stress.	3.75	0.99	
	I can obtain information about my specific illness/disease.	3.97	0.89	
	I can obtain the information I need about certain health problems and diseases, such as high blood pressure, as well as high blood sugar and high cholesterol.	3.93	0.87	
	I can obtain information about the harms and risks of tobacco use.	4.26	0.82	
Understanding	I understand the recommendations about healthy nutrition.	4.46	0.72	4.23
	I understand the explanations that the doctor gives about my illness.	4.43	0.71	
	I understand the meaning and content of the information written on medical and dental forms (such as patient admission forms, consent forms, medical records forms, etc., in hospitals and healthcare centers).	4.17	0.84	
	I understand the meaning and content of the signs and written information on directional signs in hospitals, clinics, and health centers.	4.24	0.72	
	I understand how to take medication as written on the medication packaging.	4.32	0.77	
	I understand the advantages and disadvantages of the treatment methods prescribed by the doctor.	4.02	0.94	
	I understand the meaning and content of the information written on the instruction sheet before undergoing laboratory tests, ultrasound, or radiology.	3.96	1.01	
Evaluation	I can evaluate the accuracy of health-related information presented on the Internet.	3.83	0.99	3.90
	I can evaluate the accuracy of health-related information presented on television and radio.	3.81	0.95	
	I can evaluate the accuracy of the health advice that friends and relatives give to me.	3.85	0.91	
	I can communicate the health information I have learned to others.	4.10	0.90	

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Table 4. Average score of health literacy dimensions ... (continued)

	Dimensions & Items	Items' average	SD	Dimensions' average
Decision Making and Application	When I see symptoms of an illness, I know where or to whom I should go for help.	4.07	0.87	3.89
	When the doctor recommends that "the antibiotic capsule should be taken three times a day on time," I observe the 8 hour interval.	4.12	0.92	
	I do not stop the medications that the doctor has prescribed for my illness without his/her permission, even if the symptoms have disappeared.	3.86	1.03	
	If one or more of my first degree relatives have been diagnosed with certain cancers (such as prostate, breast, cervical, colorectal cancer, etc.), I see a doctor for a check up.	3.65	1.18	
	I avoid doing things or consuming substances that raise my blood pressure.	3.99	0.86	
	Even if I have no symptoms of any illness, I visit a doctor for an annual check up (periodic examination).	3.29	1.22	
	In every task and situation, I take care of my health.	4.07	0.79	
	If I have any questions about my illness, I ask the medical and healthcare staff.	3.74	1.10	
	I purchase dairy products (milk, yogurt, cheese, etc.) according to their fat content.	3.68	1.22	
	I avoid doing things or consuming substances that cause weight gain.	3.77	1.02	
	While driving, I use my seat belt.	4.33	0.77	
	When buying food items, I pay attention to their nutritional value.	4.06	0.95	
	Total		3.92	

Table 5 shows that, according to the scores obtained on a scale of 0 to 100 for different dimensions of health literacy, the highest score is related to understanding and comprehension with 67.80, and the lowest score is related to the decision-making and application dimension with 15.72.

The mean and standard deviation of overall health literacy is 47.74 in total, which, considering the levels of health literacy, the health literacy of the respondents in all dimensions, as well as overall health literacy, is within the sufficient range.

Table 5. Range of scores, average, SD, and scale of 0 to 100 health literacy and its dimensions

Dimensions of health literacy	Range of scores	Raw score average	SD	Average score on a scale of 0 to 100
Reading	4-20	15.59	3.13	72.47
Access	6-30	23.91	4.11	74.63
Understanding	7-35	29.58	4.39	80.67
Evaluation	4-20	15.58	3.15	72.43
Decision Making and Application	12-60	46.63	7.99	72.15
Total Health Literacy	33-165	131.31	18.48	74.47

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Figure 1 illustrates the health literacy level of the respondents. The health literacy score of 48.53% of the respondents was at the adequate level, 27.21% at the excellent level, 18.38% at the not very adequate level, and 5.88% at the inadequate level.

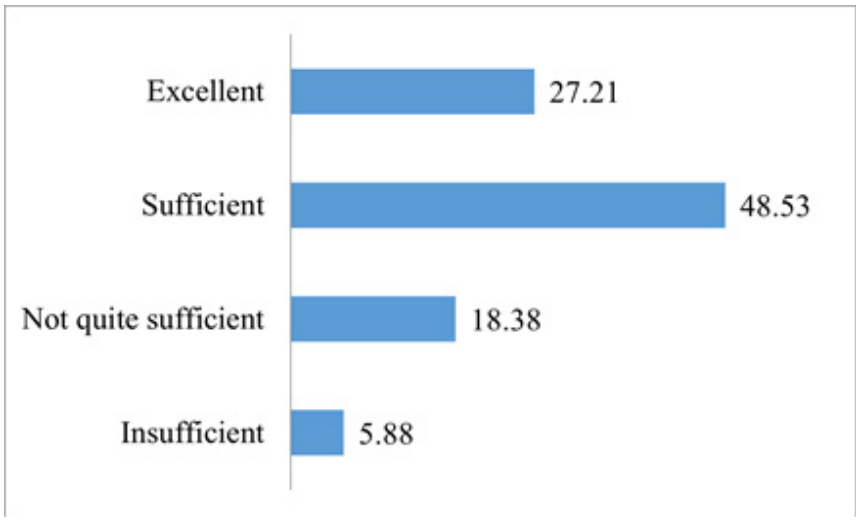

Figure 1. Health literacy levels of respondents

The nonparametric Mann-Whitney test was used to compare the health literacy scores of female and male teachers. Table 6 shows that the mean health literacy score of female teachers was not statistically significantly different from that of male teachers (p = 0.186). In addition, the results of the Kruskal-Wallis test indicated that although science teachers had the highest mean health literacy score (82.87), no significant difference was observed between teachers in different groups (p = 0.229).

Table 6. Health literacy scores by demographic variables using Mann-Whitney U and Kruskal-Wallis tests

Variables	Groups (n)	Average	Test statistic (U or χ^2)	df	P-value	Result
Gender	Male (68) / Female (68)	64.04 72.96	U = 2008.5	-	0.186	NS
Field of Study	Humanities (56) Math (35) Sciences (26) Other (19)	65.53 65.41 82.87 63.29	χ^2 = 4.324	3	0.229	NS

The results of the Spearman correlation test on the relationship between health literacy and the age of the respondents (r = -0.252, p-value = 0.003) and the relationship between health literacy and the work experience of the respondents (r = -0.277, p-value = 0.001) indicate a significant and inverse relationship between health literacy and these two variables (Table 7).

Table 7. Results of Spearman's test on the relationship between teachers' health literacy and age and work experience

Variables	R	P-value
Age	-0.252	0.003
Work Experience	-0.277	0.001

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Discussion

The present study was conducted to investigate the health literacy status of secondary school teachers in Azarshahr City (East Azerbaijan, Iran). The findings of the present study showed that the Internet is the priority, and none of the respondents mentioned channels such as voicemail, newspapers, publications and magazines, as well as asking friends and acquaintances. While in Mirzaei's study on the health literacy of teachers in Jahrom City, Iran (23) and Tavousi et al.'s study on the health literacy of adult Iranians living in cities (2), radio and television were the first reported source followed by doctors and health workers. Furthermore, in the study on health literacy by Khosravi et al. among teachers in Mashhad, Iran, the sources of health information were listed in the order of priority as doctors and health workers, the Internet, and then radio and television (12). This difference in prioritization of sources, specifically the change in the position of the Internet to the first rank in the current study, could indicate a significant increase in access to cyberspace and social networks among educated groups or those living in urban areas. This paradigm shift highlights the need for a serious review of educational policies and health information strategies to produce and distribute credible and reliable content on digital platforms in line with the audience's information consumption patterns. However, in most of the reviewed studies, including the present study, doctors and health workers are still recognized as highly credible sources, which indicates the deep-rooted and undeniable place of face-to-face interactions in the health system and emphasizes the importance of effective and trust-based communication between the patient and the service provider. Notably, during the data collection period of the present study, the use of artificial intelligence was not common, so this option was not included among the information acquisition options. In this context, workshops should be held for teachers on obtaining information from credible sources on the Internet and also on artificial intelligence. Moreover, by preparing health news and publishing it through the website, the school administrative automation system can increase the level of health literacy of teachers.

The findings of the present study reveal that the level of health literacy in the study population was reported to be at a desirable level with an overall mean of 47.74 (out of 100), relatively more desirable compared to many similar domestic studies (2, 9, 13, 23). Similarly, in the study by Khosravi et al. in Mashhad, Iran, only 8% of teachers had high literacy, and 29% had insufficient or not quite sufficient literacy (12), while in the present study, the percentage of insufficient and not-so-sufficient literacy was about 24% in total. These differences could be due to differences in measurement tools, demographic characteristics, and socio-cultural context of the study areas. Also, these differences can be attributed to factors such as differences in education level, urban context, access to reliable information sources, diversity in health literacy measurement tools, and possibly the improvement of public awareness in recent years, particularly during the COVID-19 pandemic.

In the present study, among the dimensions of health literacy, the highest mean is related to the comprehension and understanding dimension, followed by the access dimension. In addition, the acquired mean for the other three dimensions (reading, evaluation and decision-making, and application) was at a lower level and almost similar. In line with the present study, Mirzaei in the study of health literacy of teachers in Jahrom City, Iran (23), and also the study by Tavousi et al. on the urban population of Iran (2) showed that the highest mean is related to the comprehension and understanding dimension. Seemingly, the respondents have a relatively better performance in receiving and understanding basic health information. However, they have performed poorly in other higher skills such as finding reliable sources, assessing the accuracy of information, and making practical decisions based on available and understood information. In other words, there is a performance gap between understanding health information and its effective application in daily life that requires attention and training.

Moreover, in this study, about half of the respondents (48.53%) had adequate health literacy;

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27.21% were at the advanced level, and the others were at the not quite sufficient and insufficient levels of health literacy. Despite the alignment of this finding of the present study with the study by Khosravi et al. on the health literacy of teachers in Mashhad, the percentage distribution of literacy levels was somewhat different, such that in the aforementioned study, a higher percentage of people were at the adequate level. A lower percentage were at the advanced level, and about one-third of them were also insufficient and not quite sufficient (12). Similarly, in the study of the health literacy level of student teachers by Ahmadi et al., most respondents were at the adequate level, and then at the not-quite -sufficient, insufficient, and excellent levels, respectively (20). Furthermore, the COVID-19-specific health literacy levels of Hong Kong school teachers in the study by Lau et al. showed that half of the teachers had adequate health literacy, and the rest were mostly at the not quite sufficient level, and a small minority were at the insufficient level (24). This difference in health literacy levels may be due to measurement tools, study group, time, place, and other human or cultural variables.

According to the present study's findings, despite the higher average health literacy of female teachers compared to male teachers, this difference was not statistically significant, which is in line with the findings of Tehrani Banihashemi et al. (9), Rahimi and Tavassoli (13), Lau et al. (24). While contrary to the findings of the present study, Mirzapour Ermaki et al. reported that female teachers in primary schools in Babol City, Iran, had higher oral health literacy than men, this difference was also statistically significant ($P < 0.001$) (22). Furthermore, Mirzaei (23) and Ahmadi et al. (20) reported that women had significantly higher health literacy than men ($P < 0.001$). In the study of Fouladi et al. (10), men had significantly higher health literacy than women ($P < 0.001$); this different result could be due to the group of respondents in the study, who were middle-aged people aged 20 to 60 years old and were not a homogeneous group like teachers. A study of health literacy among teachers in Mashhad by Khosravi et al. also indicated a significant difference ($P < 0.005$) by gender, but there was no mention of which gender had greater health literacy (12). The alignment of the present study with the study by Lau et al. (24) conducted on teachers during and after the COVID-19 pandemic, along with the contrast with pre-COVID-19 research (10, 20, 22), may indicate that during the COVID-19 pandemic, the universal need to access health information and adhere to health protocols has diminished the role of demographic variables such as gender and has led to closer health literacy levels in different groups.

The findings of the present study indicated that the highest average score was for teachers in the field of experimental sciences compared to teachers in the humanities, mathematics, and other groups. However, this difference was not statistically significant ($P > 0.001$). In summary, indicatively, the present study and other studies regarding the absence of significant differences in health literacy concerning demographic information (gender and field of study of respondents) indicate that in the study population, other factors (measurement instrument, self-declaration of respondents, cross-sectional nature of the study, location and time of the study) play a greater role in determining teachers' health literacy than demographic variables.

Based on the findings of the present study, there was a statistically significant negative relationship ($P < 0.001$) between health literacy and the respondents' age and work experience, meaning that with increasing age and experience, the level of health literacy decreased and vice versa; a result that is worth considering and requires further investigation. While Rahimi and Tavassoli (13) in their study of health literacy of teachers in Shahrekord, Iran, and Ahmadi et al. (20) in their study of health literacy of student teachers, pointed to a positive and significant relationship ($P < 0.045$) between health literacy and age (13), in other words, with increasing age, the level of health literacy also increased. It seems that in the present study, due to the better interaction of younger teachers with new media and obtaining information from the Internet, their level of health literacy was higher than that of older teachers. On the other hand, the decrease in health literacy with increasing age can be explained by the increase in physical problems and the decrease in the amount of

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reading at older ages, as well as possibly the decrease in digital skills in older groups. In this regard, it is suggested that health literacy training workshops be held for older and more experienced teachers.

As UNESCO points out, the development of health literacy begins in childhood, and schools are the most promising environment to facilitate the increase of health literacy in children and adolescents. Therefore, including health literacy in the curriculum and linking it to existing topics and themes is an essential step. Furthermore, health literacy contributes to health equity and enables children and adolescents to participate in and contribute to society (15). Teachers with a desirable level of health literacy can play a positive and effective role in these UNESCO recommendations. In addition, the research of Rahimi and Tavassoli has pointed out the relationship between the level of health literacy of teachers and the health literacy of students (13); therefore, the design, implementation, and evaluation of educational programs on health literacy seem essential. In general, it can be acknowledged that teachers are considered to be the main pillars in the field of health literacy education; therefore, to create a healthy society, it is necessary to pay special attention to health literacy programs and teacher health promotion by education planners and policymakers. Among the useful measures to promote teachers' health literacy that librarians and libraries can carry out, in the absence of school librarians in the Iranian education system, librarians of public libraries can play this crucial role. Librarians can analyze teachers' information needs in the field of health literacy and provide them with reliable resources in the appropriate format. Moreover, planning to hold webinars and virtual and in-person workshops in cooperation with health centers, introducing reliable and up-to-date health resources and databases, and teaching librarians how to search these databases can be effective in promoting teachers' health literacy.

Several limitations should be considered when interpreting the findings of this study. First, the reliance on a self-administered online questionnaire introduces potential biases inherent in self-reported data, as the research team could not monitor the completion process. Consequently, it is plausible that different outcomes might have been observed had functional health literacy been evaluated through more objective assessments. Furthermore, the cross-sectional design of this study precludes the establishment of causal relationships. Finally, the scope of this research was limited to high school teachers in Azarshahr; therefore, the generalizability of these findings to broader or more diverse urban populations warrants caution. Given these constraints, we recommend future longitudinal and qualitative studies to gain a more comprehensive understanding of teachers' health literacy.

Conclusion

This study investigated the health literacy of secondary school teachers in Azarshahr City from October to December 2020, evaluating its association with demographic variables, including gender, field of study, age, and work experience. The obtained findings indicate that, while not reaching an optimal level, the participants' health literacy was generally satisfactory. Nevertheless, approximately one-quarter of the cohort exhibited inadequate or limited health literacy. These results extend the current literature on health literacy by focusing on the teaching workforce—a demographic whose role is pivotal in fostering health literacy among students. Given UNESCO's emphasis on schools as primary venues for promoting the health literacy of children and adolescents, policymakers and educational planners should prioritize integrating health literacy content into both pre-service curricula and in-service professional development programs. Furthermore, since teachers predominantly rely on the Internet for health-related information, there is significant potential to leverage digital platforms for capacity-building within this group. The absence of statistically significant differences in health literacy across gender and subject areas simplifies the development of standardized, large-scale educational interventions. However, the observed inverse correlation between health literacy and both age and years of service suggests that interventions should be specifically tailored to target older, more experienced educators. Finally, we recommend that

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educational initiatives—combining virtual and in-person workshops—focus on enhancing digital health literacy, specifically training teachers in navigating reliable scientific databases to ensure the dissemination of evidence-based health information.

Declaration

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Conflict of Interest

The authors declare no conflicts of interest.

Ethical Statement

This article is an excerpt from the first author's master's thesis, completed and defended under the guidance of the second author at Azarbaijan Shahid Madani University, and is supported by the university. In addition, this study does not have a code of ethics.

Use of Artificial Intelligence

The authors utilized the DeepSeek AI tool as an assistant in preparing this manuscript, particularly for literature searching and refining the presentation of findings. The authors remain solely responsible for the scientific content, data accuracy, and overall integrity of this study.

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