

Investigating the relationship between health literacy and Covid-19 preventive behaviors: A cross-sectional study in Hormozgan, Iran

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Received: 22 May 2022

Accepted: 02 August 2022

Doi: 10.22038/jhl.2022.65679.1299

ABSTRACT

Background and Objective: A massive amount of formal and informal information about Covid-19 has become a challenge during the pandemic. Therefore, health literacy (HL) development is more important than ever to prepare society for emergent conditions. This study aimed to determine the relationship between health literacy and Covid-19 preventive behaviors in Hormozgan, Iran.

Material and Methods: The present cross-sectional study was conducted on participants over 15 years of age who resided in Hormozgan Province, Iran. A total number of 1,292 valid answers were obtained from participants selected through a convenience sampling during December 2021-January 2022. The data were collected using reliable and valid questionnaires including: The Health Literacy Instrument for Iranian Adults (a common standard questionnaire in Iran) and the researcher-made Covid-19 preventive behaviors questionnaire. Pearson's correlation coefficient and multiple linear regression analysis were used for data analysis using IBM SPSS Statistics®, version 26.0.

Results: The mean age of participants was 36.78 ± 10.44 years and their age ranged between 15 and 70 years. Among all participants, 45.7% had a high HL and 94.3% reported to have good Covid-19 preventive behaviors. The results showed a significant relationship between behavior and health literacy with age, gender, marital status, education level and source of information. The multiple linear regression findings showed that health literacy was a predictor of the preventive behaviors (p -value < 0.001).

Conclusion: The present study showed that HL is a predictor of Covid-19 preventive behaviours. Also, HCWs were regarded as the most widely used sources of Covid-19 information. Monitoring is also recommended to improve the quality of online health-related information and increase the HL of content producers.

Paper Type: Research Article

Keywords: Health Literacy, Preventive Behaviour, Covid-19, Iran.

► **Citation:** Shahabi N, Mohseni Sh, Dadipoor S, Ezati Rad R, Sayadi A, Kamalzadeh Takhti H, noruziyan F, Kashani S, Aghamolaei T. Investigating the relationship between health literacy and Covid-19 preventive behaviors: A cross-sectional study in Hormozgan, Iran. *Journal of Health Literacy*. Winter 2023; 7(4): 32-43.

Introduction

Since December 2019, the new SARS-CoV-2 coronavirus has induced the Covid-19 pandemic, known as one of the most destructive global pandemics in modern history which caused a serious public health crisis worldwide (1, 2). Covid-19 was rapidly spread directly through respiratory droplets in the host body (3) and could be transmitted by asymptomatic individuals (4). The effect of the disease on people's lives all over the world has been significantly more than previous pandemics (5).

Preventative behaviours are the best strategy to fight Covid-19 disease. These behaviours can include physical distancing; washing hands, wearing face masks, avoiding touching the face, covering the mouth and nose when coughing or sneezing and staying at home when feeling sick (6). Despite the development of Covid-19 vaccines due to insufficient supply and different vaccine qualities, many people have expressed doubts and fears about their effectiveness. Therefore, Covid-19 preventive behaviours are still the most important protective measures to reduce the prevalence of the disease (7).

The massive amount of formal and informal information about Covid-19 has become a great challenge during this time (8). The Infodemic is the term used to describe a wealth of good or bad information in digital and physical environments during a pandemic, which can be misleading or harmful. This information can also lead to mistrust of health authorities and weaken public health responses (9, 10). Community health literacy (HL) can be the right answer in these conditions (8). HL refers to the individuals' ability to seek, understand, and use information and services to make decisions and take the right health-related actions (11). Moreover, HL can help people make the right health decisions to have a better commitment and efficiency to

reduce health inequality and increase community resilience (12). Low levels of HL can lead to an inadequate understanding of health information and can be associated with less participation in preventative behaviours, late diagnosis of diseases, inadequate self-care skills, and increased hospitalization rate (13).

Therefore, the development of HL is more important than ever to prepare individuals for conditions such as pandemics that require a rapid response (14). In public health emergencies, we can intuitively identify HL levels through the objective actions that individuals take (15). Thus, appropriate conditions must be provided to investigate the relationship between HL and social responsibility and solidarity. In this process, there is a need to involve both people seeking information and information providers (14). Efforts to increase public and individual HL during the Covid-19 pandemic have become an important component of public health (16). HL can help people understand the reasons behind health recommendations and think about the outcomes of their various possible actions (14).

Since preventive behaviours is the best way to control this disease (17), identifying important factors that influence people's compliance to the preventive measures of COVID-19 is more important to the act of designing appropriate health communication programs. Previous studies in different populations showed that about behaviour, health literacy can be a significant predictor in university students, women and patients (12, 18, 19). However, in order to determine the different dimensions of this issue and the relationship between health literacy and the preventive behaviours, more extensive studies are needed in different communities. Therefore, according to the cultural and geographical characteristics of Hormozgan Province, we examined this condition

in a general population. Therefore, this study aimed to investigate the relationship between HL and Covid-19 preventive behaviours in Hormozgan, Iran.

Materials & Methods

Study design

This cross-sectional study was conducted during December 2021 -January 2022 in Hormozgan Province, Iran using an online questionnaire survey (Hormozgan Province is in the south of Iran, facing Oman, UAE and the Hormuz Strait).

Participants

The research population consisted of those above 15 years of age living in Hormozgan Province. A total number of 1,292 respondents provided valid answers from 1,345 participants. The purpose of study was clearly explained on the first page of the questionnaire and the completion of the questionnaires was completely voluntary. The participants were asked to sign the consent form. The inclusion criteria were the minimum age of 15 years, residence in Hormozgan Province and the ability to read and write. Unwillingness to participate was the exclusion criterion.

Sampling and Data Collection

Given that multivariate linear regression analysis was used to test the relationship between health literacy and Covid-19 preventive behaviours. The sample size was estimated using the following formula.

$$n \geq \left(\frac{2 - 2\rho^2 + \varepsilon}{\varepsilon} \right) (k + 1)$$

$$n \geq \left(\frac{2 - 2(0.152)^2}{0.0076} \right) (5 + 1) = 1345$$

k: Number of predictor variables

ε : A value between $0.05\rho^2$ to $0.2\rho^2$ can be considered. In this study, $0.05\rho^2$ was considered to obtain the largest sample size.

ρ^2 : square of the multiple correlation

coefficient between the dependent and independent variables which was estimated at 0.152 in the pilot study.

Due to the prevalence of Covid-19 disease and the relevant restrictions, the data collection was done using a convenience sampling. The online questionnaire was designed on the PorsLine platform (<https://survey.porsline.ir>) and its link was shared in different groups through social media (WhatsApp, Telegram, LinkedIn, Instagram). These groups included a variety of ethnic, religious, occupational, local, educational, and age groups, along with weekly reminders from the official public channels of Hormozgan University of Medical Sciences. The participants that received the questionnaire answered the questions and, at the end, were asked to share the questionnaire through social media.

Instrument

The questionnaire survey included three sections: demographic information, health literacy and Covid-19 preventive prevention behaviour.

The first section included demographic questions on age, gender, marital status, level of education and source of Covid-19 information.

The second section included the items of the Health Literacy Instrument for Iranian Adults (HELIA) developed by Montazeri et al. (20). This standard Persian questionnaire includes 33 items and 5 factors. The factors are access to information (6 items), reading (4 items), understanding (7 items), appraisal (4 items), and decision making/behavioral intention (12 items). These factors were to be rated on a 5-point Likert scale (never =1, rarely =2, sometimes =3, usually =4, always =5). The total score, ranging from 0-100, was calculated by summing up the scores of all the subscales (each subscale converted to a range of 0-100), dividing it by 5. The classification included inadequate (0-50), not very adequate (50.10-66), adequate (66.10-84), and high HL (84.10-100). A total number of 15

experts in public health were asked to assess the content validity. The test of internal consistency showed Cronbach's alpha coefficients ranging from 0.72 to 0.89. Intraclass correlation coefficient (test-retest analysis) also showed an acceptable consistency of the questionnaire (ICC=0.84). The mean health literacy score, as measured by the HELIA, was 76.3 (SD=15.1) (20). In the present study, the test-retest analysis was done. The questionnaire was sent to 15 residents of Hormozgan Province and they were asked to answer the questions carefully, then after 16 days the same questionnaire was sent to them and they were asked to complete the questionnaire. The estimated Cronbach's alpha coefficients were 0.844 for access to information, 0.793 for reading, 0.867 for understanding, 0.816 for appraisal, and 0.876 for decision making/behavioral intention. The ICC coefficient was 0.854.

The third part of the questionnaire inquired about the Covid-19 preventive behaviours designed based on similar studies (21, 22). This section was a 7-question checklist and individuals were asked to answer the Covid-19 related questions (e.g., I use mask when I am in a crowded place with more than two people). Each question is assigned scores 1 to 5 (never =1, rarely =2, sometimes =3, usually =4, always =5); therefore, the behaviour score ranged between 7 and 35. These scores were converted to a range of 0-100 and categorized as poor (0-33.30), moderate (33.31-66.30), and good (66.31-100). The validity of this section of the questionnaire was determined through content validity and consultation with 6 experts in health education. The experts were asked to check the items for relevance, clarity and simplicity and indicate the necessity of each item. Then, experts' opinions were applied to modify and adjust the final version. According to the test-retest analysis, the reliability of preventive behaviours was also

determined by evaluating the internal consistency of items and calculating the Cronbach's alpha coefficient ($\alpha=0.801$) and ICC coefficient (0.832).

Data Analysis

All the data were entered into IBM SPSS Statistics®, version 26.0. for analysis and validation. Based on the type of variables, frequencies, percentages, mean and standard deviation were estimated and reported. To test the hypotheses and explore the correlations of HL and COVID-19 preventive behaviours with the demographic characteristics, T-test and one-way ANOVA test were used. In addition, Pearson correlation coefficient was run to determine the relationship between variables. The multivariate linear regression was also used for multivariate analysis. The source of the Covid-19-related information variable, which was qualitative in type with four levels, became three dummy variables when used in the multiple linear regression model. The significance level was set at 0.05 for testing the hypotheses.

Results

The response rate in this study was 96.05%. A total number of 1,292 people participated in the present study and completed the questionnaires. The mean age of the participants in this study was 36.78 ± 10.44 years, and they were in the age range of 15-70 years. According to the age distribution of participants, the groups were divided into two groups, and the majority of participants belonged to the 36-70 year-age group (52.4%). Moreover, 60.4% of the participants were female. A total number of 74.7% of the participants were married, and the rest were single. The majority of participants (66.3%) had a university education. The majority of participants (64.6%) mentioned physicians and healthcare workers (HCWs) as the source of the Covid-19-related information. The demographic features of the participants are summarized in Table 1.

Table 1. Demographic characteristics of the participants

Demographic information	Category	Frequency N (%)	HL Mean (SD)		behavior Mean (SD)	
			Mean±SD	p-value	Mean±SD	p-value
Age	15-35	615(47.6)	80.57±12.28	.003	87.23 ±13.02	<0.001
	36-70	677(52.4)	82.51±11.07		89.82±10.60	
Gender	Male	511(39.6)	80.03±12.99	.001	85.87±14.24	<0.001
	Female	781(60.4)	82.61±10.65		90.37±9.65	
Marital status	Single	327(25.3)	80.06±13.16	.006	86.79±13.95	.002
	Married	965(74.7)	82.10±11.11		89.20±11.03	
Education level	University education	856(66.3)	82.71±11.16	<0.001	89.60±11.05	<0.001
	Non-university education	436(33.7)	79.38±12.40		86.61± 13.16	
source of the Covid-19-related information	Family and friends	22(1.7)	74.47±13.02	<0.001	80.91±18.52	<0.001
	Social media and internet	196(15.2)	78.98±13.42		84.96±14.27	
	Radio/TV	239(18.5)	81.50±11.57		89.69±10.99	
	healthcare workers (HCWs)	835(64.6)	82.41±11.11		89.33±11.06	

The results of Table 1 show a significant relationship between HL and age, gender, marital status, education level and information source. There was also a statistically significant relationship between behaviour and the aforementioned variables.

Table 2 shows a high HL in 590 (45.7%) of participants. Moreover, 9.1 percent of participants had an Inadequate and Not very adequate HL.

Of all the participants, 94.3% had good Covid-19 preventive behaviours and 5.7 percent reported a Poor and Moderate Covid-19 preventive behaviours. Understanding showed to have the highest mean in each HL subcategories (87.73±12.66) and Decision making/behavioural intention subscale had the lowest mean (78.29±13.98).

Table 2. HL and behavior scores of participants

variables		Frequency N (%)
Health Literacy	Inadequate (score: 0-50)	18(1.4)
	Not very adequate (score: 50.10-66)	100(7.7)
	Adequate (score: 66.10-84)	584(45.2)
	High (score: 84.10-100)	590(45.7)
behavior	Poor (score: 0-33.30)	5(0.4)
	Moderate (score: 33.31-66.30)	69(5.3)
	Good (score: 66.31-100)	1218(94.3)
variables		Mean±SD
behavior total score	Total score	88.59±11.88
Health Literacy	Total score	81.59±11.69
	Reading skill subscale	82.21±16.32
	Access to information subscale	80.42±14.48
	Understanding subscale	87.73±12.66
	Appraisal subscale	79.28±15.82
	Decision making/behavioral intention subscale	78.29±13.98

As Figure 1 shows, 75.8% of the participants always washed their hands with soap and water after contact with various contaminated devices, and 75.6% always disinfected their hands with alcohol, if it was not possible to wash their hands. Regarding the use of public facilities such as elevators and ATMs, only 59.8% of participants always and usually used gloves and 23.8% never and rarely used gloves. Most participants (95.6%)

always and usually wore a mask in a group of more than two people. A total number of 90.1% of the participants as described in the figure always and usually kept a safe social distancing (1 to 2 meters). Also, 62% of participants always avoided shaking hands and physical contact, and 86.7% of them contended that they did not use cash always and usually.

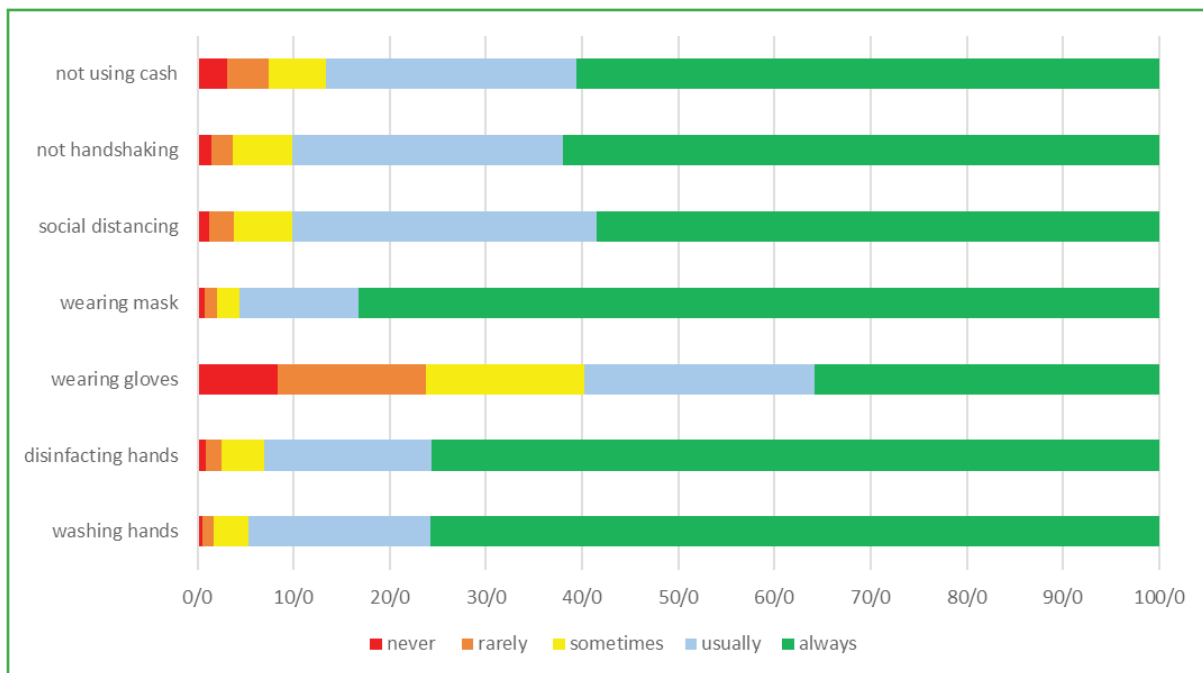


Figure 1. Participants' behaviors related to COVID-19.

Table 3 shows the correlation coefficient between HL and its dimensions with preventive behaviours (p-value <0.001). The highest and lowest correlation coefficients with behaviour were obtained for decision-making and reading components, respectively.

To describe the predictive power of factors related to behaviour, a multivariate linear regression model was constructed with demographic variables and HL subscales as the independent variable and behaviour percent score as the dependent variable. The results

showed that age, gender (women vs. men), education level (university vs. non-university education), radio and television (compared to other sources of information) and access, reading skills, decision-making and appraisal predicted the preventive behaviours of Covid 19. In total, the variables included in the regression model explained 38.3% of the behaviour percent changes (Table 4).

In the second multivariate linear regression, only HL subscales were included as the predictor variables (Table 5). In this case, the predictor variables included

Table 3. Correlation between HL and its dimensions and Covid-19 preventive behaviors.

	behavior	access	reading	understanding	appraisal	decision	HL
behavior	1						
access	.338**	1					
reading	.306**	.495**	1				
understanding	.381**	.570**	.668**	1			
appraisal	.310**	.572**	.491**	.649**	1		
decision making	.576**	.468**	.462**	.557**	.554**	1	
Health Literacy	.526**	.750**	.729**	.834**	.780**	.852**	1

** . Correlation is significant at the 0.01 level (2-tailed).

Table 4. Multivariate linear regression analysis of predictor factors of preventive behaviors (HL and demographic characteristics)

Variable	B	Std. Error	Beta	P value	95 % CI
age	.381	.192	.046	.047	.005 to.757
gender	1.454	.193	.171	.000	1.076 to1.833
Marital status	.402	.218	.042	.066	-.026 to.830
Education level	.524	.197	.060	.008	.137 to.910
Social media and internet	.391	.742	.034	.598	-1.064 to 1.846
Radio/TV	1.466	.737	.137	.047	.019 to 2.912
HCWs	.923	.717	.106	.198	-.484 to 2.329
access	.075	.027	.078	.006	.021 to.128
understanding	.043	.030	.046	.151	-.016 to 0.102
decision making	.269	.014	.543	.000	.242 to.297
appraisal	.113	.042	.086	.007	.031 to.194
reading	.070	.035	.044	.046	.001 to.138

Adjusted R Square: .383 R: .624 R Square: .389

Table 5. Multivariate linear regression analysis of predictor factors of preventive behaviors (HL)

Variable	B	Std. Error	Beta	P value	95 % CI
access	.082	.028	.085	.004	8.954 to.137
understanding	.092	.030	.098	.003	.027 to.151
decision making	.267	.014	.539	.000	.032 to.295
appraisal	.130	.043	.099	.002	.239 to.213
reading	.075	.036	.047	.037	.046 to.145

Adjusted R Square: .344 R: .589a R Square: .347

in the regression model explained 34.4% of the preventive behaviour percent score (Table 5).

Therefore, by comparing the two multivariate linear regression models, it can be concluded

that demographic factors predict only 3.9% of changes in behaviour score, while HL subscales have remarkable role in performing the preventive behaviours of Covid 19.

Discussion

The main results of the present study showed a significant relationship between HL and Covid-19 preventive behaviours among people above 15 years of age in Hormozgan Province. The results of regression analysis also showed HL to be a stronger predictor than demographic factors for Covid-19 preventive behaviours. Therefore, people with HL perform preventive behaviours more frequently. Consistent with the present study, many studies have shown a relationship between HL and preventive behaviours (12, 23-25) and reported that HL is an important predictor of Covid-19 preventive behaviours (26, 27). A higher HL is positively associated with improved health status, especially among patients (26). A review article indicated that people with poor HL show a poor adherence to preventive behaviours, such as hand hygiene, vaccination, and self-care measures, in other infectious diseases such as influenza and hepatitis (28). These findings can be explained by the fact that having low HL means difficulty in understanding general health-related information, which affects behaviour. Such a problem may be exacerbated in the face of pandemics such as Covid-19, because in these situations, it is very important for people in community to show preventive behaviours to reduce the risk of the disease transmission.

According to the results of the present study, 45.7% of the participants had a high HL and 45.2% had an adequate HL, which was consistent with other studies (29, 30). The results of a study in Portugal showed high HL in more than 90% of cases (12), which could be due to the difference in the samples because the above-mentioned study was conducted on students who had a university education.

The results of the current study also indicated that participants had a good understanding and poor application and appraisal scores, which

is consistent with the results of other studies (31). Some research was conducted on Afghan women in 2021, and consistent with the present study, participants had the most problems with appraisal area, and the majority of them reported it was easier for them to understand health advice (18). Our findings indicated that, after appraisal and application, the lowest score belonged to access to information. Low HL level may be mainly due to the lack of access to reliable information. Therefore, it is necessary to design accessible platforms with official and reliable information on health-related issues, especially the Covid-19 pandemic, by relevant governments and organizations. Also, the regression analysis showed that Covid-19 preventive behaviours had the weakest correlation with reading and appraisal domains, which may be attributed to the mandatory national social distancing laws, for example, a person who is not even able to assess the health information, wears masks because of the existing laws and social distancing.

The findings showed that 94.3% of the participants exhibited good preventive behaviour, and the highest score was obtained for wearing masks in a group of more than two people. This may be due to two reasons. There are strict mask mandates, especially in public places, and on the other hand, the formal and informal information and training mainly focused on the importance of and how to properly wear a mask. The least frequently reported behaviour in the present study was wearing gloves when using public facilities such as elevators and ATMs. WHO recommended that, HCWs use gloves only when caring for Covid-19 patients (32). Furthermore, a Review article stated that wearing gloves by the general public may even have an unintended effect that potentially increases

the risk of transmitting the virus through the hands (33). A research on modes of disease transmission showed that respiratory secretions were regarded as the most likely cause of virus transmission and, on the other hand, the risk of contracting the infection from surfaces was low (32). These updates may be an explanation for the preventive behaviour results of the participants in the present study.

The present study shows higher HL score literacy among higher age groups. A study was conducted in Denmark in 2020 using the short form of HLS-EU-Q16, the results of which are similar to the present study (31). Older people may have a higher HL level considering their underlying diseases and more experience with the health care system. This is especially true during the Covid-19 pandemic because older people are more at the risk of the disease.

The results of the present study showed a significant difference between the two genders in terms of HL. In other words, women had a higher HL. In many studies, women had higher HL levels (34, 35). By considering the traditional role of women, family caregivers, and especially nursing sick members, it makes sense to have higher HL in this gender group.

The present study demonstrated a relationship between education level and HL and Covid-19 preventive behaviours. Studies have considered the level of education as an important predictor of adherence to Covid-19 preventive behaviour (26). Besides, studies have shown that poor HL is often associated with poor social status, and poor income, education level and social status are the strongest predictors of HL (36, 37). These results indicate the need for planning to address health inequalities in different populations, which imposes an inappropriate burden on disadvantaged groups, especially during the Covid-19 pandemic.

The results of the present study showed participants chose HCWs as a source of Covid-19-related information in more than 60% of cases, which is inconsistent with other studies (38, 39) which mentioned the Internet and social media as the most common information sources.

This difference may be due to the fact that the participants were exposed to Infodemic when obtaining information from different media during the pandemic, which made them have less trust in other available sources, even the official traditional media, than HCWs. The global epidemic of misinformation, rapidly spreading through social media platforms and other media, poses a serious threat to public health (40). This is another reason that HL is significant at this time. Misinformation about effective prevention methods is widespread and may lead to misunderstandings of Covid-19 prevention methods. This problem may lead to poor preparedness for the pandemic in people with a low HL, who may have difficulty obtaining, processing and understanding health messages, and may in turn put them at greater risks (27). A study in Vietnam indicated that a higher HL level reduces the risk of depression and enhances the quality of life during the Covid-19 pandemic. HL could especially help protect the mental health and quality of life of people suspected of Covid-19 during the pandemic (41). The results of a study in Belgium showed that the emphasis should be on helping people understand the cause of actions more than on increasing fear (42).

The present study findings that showed people's health literacy can affect preventive behaviours during epidemics such as Covid-19 can help state consultants and healthcare providers develop systematic interventions to improve preventive behaviours in Iran and other countries. It is suggested to conduct studies on the effect of the Infodemic on preventive behaviours as

well as studies on media health literacy. The present study has the following limitations: economic determinants of HL and preventive behaviours were not investigated. In addition, since the questionnaire distribution as well as survey were performed online, individuals who were not active in social networks or did not have access to the Internet, did not have the opportunity to participate in the study.

Conclusions

In conclusion, the present study showed that HL is a predictor of Covid-19 preventive behaviours. Moreover, demographic features such as age, gender and education level are related to the preventive behaviours. Also, HCWs were regarded as the most widely used sources of Covid-19 information after about a year and a half since its outbreak. According to the conditions and needs of society, it is suggested to carry out interventions to strengthen the HL capacities of different groups of society. Such measures can include empowering people to obtain, understand and validate information using appropriate interventions. Monitoring is also recommended to improve the quality of health-related information online and increase the HL of content producers.

Acknowledgements: The authors express their gratitude to the deputy of research, Hormozgan University of Medical Sciences for funding the project.

Conflict of Interest: No potential conflict of interest was reported by the author(s).

Ethical consideration: This study was approved by the Ethics Committee of Hormozgan University of Medical Sciences (#IR.HUMS.REC.1400.298). The online self-administered questionnaire was completely anonymous. Before answering the questionnaire, on the first page, information about the purpose of study was provided for

participants. No personal details such as first and last name and mobile number were recorded and a voluntary participation was warranted.

Funding Information: This research was funded by Hormozgan University of Medical Sciences grant number: 4000082.

Authors contributions: N.SH and T.A. contributed to the study design and was a major contributor in writing the manuscript. SH.M. analysed and interpreted the data. N.SH. and S.D. and R.ER. and A.S. wrote the manuscript and conducted data collection and developed the study protocol and questionnaires, and supervised data collection, F.N. and S.K. conducted data collection and data curation. H.KT. Design online questionnaire. All authors read and approved the final manuscript.

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