



Relationship between Health Literacy and Acceptance of Rumors Related to COVID-19 Vaccination among Iranian Adult Population

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Abstract

Background: Rumors concerning various aspects of the fight against COVID-19, vaccination, in particular, have become one of the main challenges for managers and policymakers who have to deal with different aspects of the disease. This necessitates the recognition of the factors that influence the prevention and spread of these rumors.

Objectives: The current study aimed to investigate the link between health literacy among adults and their acceptance of COVID-19 vaccination rumors in Iran.

Methods: This cross-sectional study was conducted from November 15 to December 15, 2021, in different provinces of Iran. The study population included Iranian adults, aged 18 years and older, who were selected using the snowball sampling method. The data collection tools involved two questionnaires: the Health Literacy Questionnaire, which consists of 33 items, and the COVID-19 Vaccine Rumor Questionnaire which assesses 17 rumors related to COVID-19 vaccination collected from various news sources.

Results: The number of completed questionnaires was 1158 out of 2163 questionnaire visits (74% response rate). Univariate analysis showed that health literacy had a statistically significant association with sociodemographic variables of gender, marital status, ethnicity, place of residence, and level of education. The results of data analysis also demonstrated a significant correlation between the average of rumors' acceptance and the sociodemographic variables of gender, marital status, ethnicity, place of residence, and level of education. The results of the Pearson correlation coefficient test showed a significant and negative relationship between health literacy and rumor belief ($P=0.000$, $r=-0.590$), indicating that those with a higher level of health literacy had a lower level of rumor acceptance.

Conclusion: Based on the findings of the present study, health literacy has a significant effect on reducing the credibility of rumors and other misinformation among community members. Macro-level decisions and policies are needed to improve factors such as health literacy and can help individuals identify and track rumors and make decisions based on reliable information on vaccination.

Keywords: COVID-19, Health literacy, Rumor, Vaccination

1. Background

One of the major threats to the public health of any society is misinformation and rumors related to health issues (1). Rumors are generally a type of misinformation often contrary to the consensus of the scientific community about a particular phenomenon and are not confirmed by verified evidence at the time of their circulation (2, 3).

Rumors also have a potential capacity for misleading people since they spread quickly through social media and communication channels and reduce the effects of accurate information. This can adversely impact the correct understanding and behavior of society as well as the control of a particular phenomenon (4).

Various studies show that the spread of rumors can frequently increase during the outbreak of a disease, such as COVID-19. This disease, which was first reported in Wuhan city of China, in December

2019, quickly turned into the most significant health problem of the current century (5, 6).

The first COVID-19-positive case in Iran was reported on February 18, 2020, and considerable efforts were made to control and deal with it, including closing educational centers, offering public education through media and cyberspace, and imposing travel restrictions to and from other countries, neighbor countries in particular (7). According to the World Health Organization experts, efforts in the fight against this pandemic will be effective only if all governments, regions, organizations, and individuals in society, combat it with their full capacity (8).

In the meantime, people certainly have a significant role to play in controlling this epidemic. For instance, during crises such as the COVID-19 epidemic, people tend to acquire and exchange new information through various communication and information channels (9). Despite the media's efforts

to convey accurate information to the public, cases of incorrect analyses without scientific evidence were spread among the people (10). Identification of this information and its sources as well as their management can largely help those involved in the field of health to maintain public morale and provide appropriate solutions (9). In this regard, one of the worldwide problems in the fight against the COVID-19 pandemic is the bombardment of society with complex and contradictory information about the pandemic, which prevents people from accessing correct information (1).

Previous studies have shown that effective social measures are needed to overcome problems associated with COVID-19 disease as well as vaccination (11). Therefore, these rumors and inaccurate information that have been disseminated and/or published by various social networking platforms are among the existing challenges in dealing with the COVID-19 pandemic (1).

Since rumors and misconceptions can affect people's willingness to follow the advice of health and political officials on issues such as vaccinations, healthcare professionals need to seriously address these issues to control the epidemic more effectively. Therefore, finding solutions to undermine the credibility of rumors and false information is a key factor in dealing with the COVID-19 epidemic (12). Among these, the important role of community health literacy should be considered, which is a measure of an individual's ability to read, understand, and follow health instructions (13). The use of health literacy has never been more necessary than today since the crisis of this infectious disease occurred in a time of over-information and high expectations of health systems. Here, the big challenge is how individuals can integrate this information into their behaviors. It seems that the acquisition of health literacy can help communities overcome these fundamental challenges (14).

In addition, people's confusion about information in a specific area can affect health decisions and behaviors in communities and creates a challenge for health policymakers to gain the trust of people in the fight against the disease.

2. Objectives

This study aimed to investigate the relationship between health literacy and the credibility of rumors about the COVID-19 vaccination in the Iranian adult population.

3. Methods

This cross-sectional study was conducted from November 15 to December 15, 2021, in different provinces of Iran.

3.1. Participants

The study population included Iranian adults, aged 18 years and older, throughout the country who were selected using the snowball sampling method. The participants were asked to send the questionnaire to their friends and acquaintances and other members of their social network. Due to the limitations imposed on face-to-face interactions during the outbreak of the disease and the difficulty of access to members of the community, data were collected electronically from all provinces of Iran. In this regard, focal points in different provinces were identified, and the questionnaires were published on channels or pages in those focal points.

To determine the sample size, five geographical regions were considered in the country. These regions included northern provinces (Mazandaran, Gilan, Golestan), central provinces (Tehran, Alborz, Qazvin, Isfahan, Semnan, Yazd, Markazi), eastern provinces (North Khorasan, Razavi Khorasan, and South Khorasan, Sistan and Baluchestan, and Kerman), southern provinces (Hormozgan, Bushehr, Fars, Khuzestan, and Kohgoluyeh and Boyer-Ahmad), and western provinces (Ilam, Chaharmahal and Bakhtiari, Lorestan, Hamedan, Kermanshah, Kurdistan, East Azerbaijan, West Azerbaijan, Ardabil, Zanjan). Krejcie and Morgan's sample size calculation table was used to calculate the sample size for each region separately, and 384 samples were proposed for communities with a population of over 10 million people. All available samples from each province in the region who were willing to cooperate in the study were asked to complete the questionnaire.

The inclusion criteria were willingness to complete the questionnaire and the age range of 18-60 years. Those who handed out incomplete questionnaires were excluded from the study.

3.2. Data collection tool and process

The socio-demographic characteristics of participants collected in this study included gender, marital status, ethnicity, place of residence, and level of education. A total of 1158 people participated in this study.

The data collection tools consisted of two questionnaires: the Health Literacy Questionnaire (for the measurement of health literacy), and the HELIA questionnaire designed by Montazeri et al. (15). The health literacy questionnaire consists of 33 items. The validity and reliability of the questionnaire were determined by analysis of exploratory factors and calculating the internal correlation coefficient of the questionnaire, respectively. Based on the final results of the exploratory factor analysis, the questionnaire had the desired construct validity in five domains. The Cronbach's alpha of the items in the relevant structures was also found to be acceptable (between 0.72 and 0.98).

The COVID-19 Vaccine Rumor Questionnaire used

in this study includes 17 rumors related to COVID-19 vaccination that have been collected from various news outlets. The face validity of the questionnaire was assessed, and impact indicators were determined and scored by 15 experts. The content validity ratio (CVR) and content validity index (CVI) were also obtained to evaluate the content validity and were approved by 15 experts and stakeholders. Afterward, the reliability of the questionnaire was calculated and reported using a pilot sample.

Cronbach's alpha of the questionnaire was estimated to be 0.7, which was acceptable. The COVID-19 vaccine rumor questionnaire included 17 items which were scored based on a 5-point Likert scale, ranging from 1 (strongly agree) to 5 (strongly disagree). Similarly, the final questionnaire (the health literacy and the COVID-19 vaccine rumor questionnaire) included 61 items that were scored based on a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). These two questionnaires were sent to the target groups online through social communication platforms such as Telegram, WhatsApp, Instagram, and Facebook. The

The Porsline platform was used to design the online questionnaire.

Statistical software (SPSS) was used to analyze the results after the participants delivered the completed questionnaires. It was found that the level of health literacy of people was closely related to the acceptance of rumors about the COVID-19 vaccination.

3.3. Statistical analysis

Data were analyzed using SPSS software (version 23) through descriptive and analytical statistics, t-test, ANOVA, Pearson correlation coefficient, and multivariate linear regression. The level of significance (P-value) was set at 0.001.

Questionnaires items were prepared based on the literature review and interviews with experts. The psychometric evaluation of the vaccine rumor questionnaire was determined while assessing its validity (face and content) and reliability (using Cronbach's alpha and retest methods). Table 1 presents the results of face and content validity and the item analysis.

Table 1. Evaluation of face and content validity of the Vaccination Rumor Questionnaire

No.	Items	Impact Score (IS)	CVR [□]	CVI ^{□□}	Final Result
1	Getting a COVID-19 vaccine can cause COVID-19 infection.	2.6	1	0.85	Agree
2	The COVID-19 vaccine kills people two years after the injection.	3	1	1	Agree
3	Getting a COVID-19 vaccine can lead to infertility.	2.95	0.8	0.8	Agree
4	The COVID-19 vaccine creates a magnetic property in the body.	3	1	0.85	Agree
5	The COVID-19 vaccine leads to genetic alterations.	3.2	0.7	0.8	Agree
6	People will be carriers of the disease once they are vaccinated.	3.2	0.9	1	Agree
7	People get enough immunity once they get vaccinated	2.27	1	0.9	Agree
8	There is no need to follow health protocols after being vaccinated.	2.8	1	1	Agree
9	Due to the rush in production, the harms of the COVID-19 vaccine are enormous.	1.8	1	0.7	Agree
10	You do not need to be vaccinated if you have a history of COVID-19 disease.	3.2	0.9	1	Agree
11	People with underlying diseases should not be vaccinated.	3	1	0.8	Agree
12	People with suppressed immune systems should not be vaccinated.	3	0.9	1	Agree
13	Young and healthy people do not need to be vaccinated.	3.2	1	0.8	Agree
14	Vaccination is a conspiracy by other countries to control the population.	2.8	1	1	Agree
15	COVID-19 disease depends on a person's genetics.	2.8	1	1	Agree
16	Vaccines are a scam for companies to sell drugs.	3.2	0.9	1	Agree
17	The vaccine will definitely cause seizures and blood clots.	3.2	0.7	0.8	Agree

□ Content validity ratio

□□ Content validity index

3.4. Ethical considerations

The researchers presented the questionnaire electronically to the participants and explained the purpose of the study after introducing themselves and assuring them about the confidentiality of their information.

4. Results

A total of 1158 out of 2163 online visits of the questionnaire (74% response rate) completed online questionnaires. The results related to demographic variables showed that most of the participants in the study were female (56.2%), married (64.5%), Fars ethnicity (55.5%), residents of the provincial capital cities (41.7%), and holders of a bachelor degree

(35%) (Table 2).

The results showed that the mean total score of health literacy was higher in females and married people compared to males and single people. Moreover, the highest and lowest average health literacy was observed in people with the Fars ethnicity and Arab ethnicity, respectively. In terms of location, the highest scores of health literacy were obtained by people living in the capital of provinces, and the lowest scores were obtained by people living in rural areas. In addition, individuals with a master's degree or higher had the highest and those with a degree below a high-school diploma obtained the lowest health literacy score. The univariate analysis also showed that health literacy had a statistically significant relationship with socio-demographic

Table 2. Frequency of socio-demographic variables

Variable	Category	Frequency (%)
Gender	Male	485 (43.8)
	Female	622 (56.2)
Marital status	Single	397 (35.5)
	Married	722 (64.5)
Ethnicity	Kurd	75 (6.7)
	Lor	72 (6.4)
	Turk	182 (16.2)
	Fars	622 (55.5)
	Arab	25 (2.2)
	Other	108 (9.6)
Location	Baluch	37 (3.3)
	Village	96 (8.6)
	Small town	298 (26.6)
	County center	260 (23.2)
Education level	Province center	467 (41.7)
	High school	11 (9.9)
	Diploma	221 (19.7)
	Associate Degree	108 (9.6)
Total	Bachelor	394 (35.1)
	Masters or higher	288 (25.7)
Total	-	1154 (100)

variables of gender, marital status, ethnicity, place of residence, and level of education (Table 3).

The mean total score of gossip was higher in males than females and in single persons more than married ones (Table 4). Additionally, in terms of rumors' credibility, the Arab ethnicity obtained the highest, and the Fars ethnicity obtained the lowest scores. People living in the village and those living in the center of the province obtained the highest and lowest scores for the credibility of rumors. In terms of educational level, people with a diploma and those with a graduate degree obtained the highest and the lowest rumors' credibility scores, and the credibility of rumors decreased with an increase in the level of education. Univariate analysis of data also showed that the mean credibility of rumors had a statistically significant relationship with socio-demographic variables of gender, marital status, ethnicity, place of residence, and level of education (Table 4).

The results of the Pearson correlation coefficient test showed a significant and negative relationship between health literacy and rumor belief ($P=0.000$, $r=-0.590$), so the credibility of rumors decreased with the increase in the level of health literacy. In addition, based on the results, there was no significant relationship between age with health literacy and the credibility of rumors (Table 5).

The results of multivariate linear regression analysis were used to determine the simultaneous effect of health literacy and demographic variables on the credibility of rumors in the study participants. Based on the results, Arab, Kurd, and Turk ethnicity and residence in the center of the province were significant variables in the model determined by the Enter method. Table 6 presents the β values related to influential variables and the priority of variables that influence the credibility of rumors.

Those with Arab ethnicity had the highest scores

Table 3. Relationship between variables of health literacy and socio-demographic characteristics

Variable	Division	Mean	Standard Deviation	P-value
Gender	Male	-1.41	4.60	<0.001*
	Female	1.03	3.24	
Marital status	Single	-0.47	4.24	<0.001*
	Married	0.25	3.92	
Ethnicity	Kurd	-2.033	4.64	<0.001**
	Lor	0.7597	3.78	
	Turk	-1.07	4.30	
	Fars	0.95	3.38	
	Arab	-3.183	5.14	
	Other	-1.33	4.57	
Location	Baluch	-3.07	4.55	<0.001**
	Village	-1.67	4.72	
	Small town	-0.73	4.17	
	County center	0.84	4.17	
Education level	Province center	0.73	3.59	<0.001**
	High school	-4.52	5.43	
	Diploma	-2.38	4.10	
	Associate Degree	-1.64	2.89	
Total	Bachelor	1.07	2.79	<0.001**
	Masters or higher	2.23	2.93	

*Independent sample t-test, ** One-way ANOVA

Table 4. Relationship between variables of credibility of gossip and socio-demographic characteristics

Variable	Division	N.	Mean	Standard Deviation	P-value
Gender	Male	442	51.06	13.61	<0.001*
	Female	592	45.68	11.60	
Marital status	Single	361	49.95	13.24	<0.001*
	Married	686	46.89	12.36	
Ethnicity	Kurd	70	53.15	12.37	<0.001**
	Lor	70	46.30	11.77	
	Turk	161	52.16	13.28	
	Fars	595	44.86	11.47	
	Arab	20	59.20	10.99	
	Other	94	51.84	13.79	
Location	Baluch	37	55.78	13.86	<0.001**
	Village	92	52.10	11.99	
	Small town	269	49.69	13.12	
	County center	234	47.76	13.73	
	Province center	454	46.16	11.85	
Education level	High school	97	59.88	12.93	<0.001**
	Diploma	205	55.61	10.84	
	Associate degree	100	51.43	11.03	
	Bachelor	372	44.77	10.59	
	Masters or higher	276	41.12	11.02	

*Independent sample t-test, ** One-way ANOVA

Table 5. Correlation between health literacy and credibility of gossip

Variable	Test type and significance	Age	Health literacy	Credibility of gossip
Age	Pearson correlation (r_p)	1	-0.060	0.045
	p		0.69*	0.162*
Health literacy	Pearson correlation (r_p)		1	-0.590
	p			0.001*
Gossip	Pearson correlation (r_p)			1
	p			

* Pearson correlation coefficient and multivariate linear regression

of rumors' credibility (accepted rumors more easily) compared to people with Fars ethnicity, and married people were less likely to believe rumors than single ones. People having a master's degree showed lower rumors' credibility than undergraduates, and the credibility of rumors decreased with an increase in

the level of education. Moreover, people living in the center of the province gave the least credibility to rumors compared to villagers.

Given the reported confidence interval, a significant correlation was observed between health literacy and the credibility of rumors.

Table 6. Variables affecting the credibility of gossip in the adult Iranian population (18-60 years old) from the linear regression test

Variable	Division	Coefficient	P-value*	95% Confidence Interval	
				Upper	Lower
Constant		56.67	<0.001	52.07	61.28
Health literacy		-1.21	<0.001	-1.41	-1.01
Gender (male)	Female	-0.41	0.555	-1.80	0.96
Ethnicity (Fars)	Kurd	3.38	0.010	.79	5.97
	Lor	0.29	0.823	-2.26	2.85
	Turk	2.82	0.005	.86	4.77
	Arab	7.78	0.001	3.13	12.43
	Other	2.12	0.072	-.19	4.44
Marital status (single)	Baluch	3.38	0.053	-.047	6.82
	Married	-2.10	0.003	-3.48	-0.72
Education (High school)	Diploma	-1.32	0.325	-3.97	1.32
	Associate Degree	-5.16	0.001	-8.23	-2.09
	Bachelor	-7.89	<0.001	-10.54	-5.25
	Masters or higher	-10.33	<0.001	-13.17	-7.50
Location (Village)	Small town	0.17	0.889	-2.29	2.63
	County center	-0.46	0.719	-2.97	2.04
	Province center	0.54	0.654	-1.84	2.93

* Pearson correlation coefficient and multivariate linear regression

5. Discussion

The COVID-19 epidemic has become a major

international crisis. Screening rumors and providing society with accurate information are among the challenges that managers and policymakers need to

deal with in their fight against different aspects of this pandemic. This study aimed to investigate the relationship between the health literacy of adults and their beliefs in the COVID-19 vaccination.

The mean score of health literacy in this study was in the range of sufficient health literacy. The results of a study conducted in five provinces of Iran showed that only 28.1% of participants had adequate health literacy, while the rate of border health literacy and inadequate health literacy were 15.3% and 56.6%, respectively. In another study performed in Germany, The average score of health literacy was calculated using an online survey of people over the age of 16. The results showed that more than half of the German population had an “inadequate” or “problematic” level of health literacy (16). It seems that electronic data collection methods can potentially reduce the randomness of sample entry since most of the participants in this study had bachelor’s and master’s degrees and above, which can affect the average score of health literacy. Therefore, it is expected that a different health literacy score will be obtained in a study with a more random sampling method.

In the study of the relationship between demographic variables and health literacy, there was a statistically significant relationship between the mean score of health literacy and the socio-demographic variables including gender, marital status, ethnicity, place of residence, and level of education.

Regarding the relationship between health literacy and ethnicity, Michael 2005, while confirming the relationship between these two variables, reported lower health literacy rates among blacks compared to other ethnicities (17). In the present study, the mean level of health literacy was found to be lowest among Arab and Kurd ethnicities, respectively. It seems that socially and economically disadvantaged people with lower levels of access to information and knowledge have lower levels of health literacy compared to other groups. This highlights the importance of the efforts to address economic and social inequalities and their long-term impact on health, which should be considered by health policymakers.

In terms of the relationship between health literacy and education level, the present study showed that an increase in the level of education could lead to an increase in the level of health literacy. In the same line, Michael (2014) reported a similar relationship between education and level of health literacy (17). In addition, according to the results of the study conducted by Nutbeam (2000) (18), there is a fundamental and long-term connection between people’s access to education and their level of health literacy, which affects the health status of society in the long run. The results of various studies showed that poor access to education

leads to a low level of health literacy in society and can be as dangerous as the lack of access to vaccines in developing countries. Accordingly, improving the overall level of education and literacy of communities has a positive effect on “health literacy” and improves the capacity of people for making the right choices in the field of health. Consistently, based on the World Bank World Development Report 1993, access to education, especially for girls, is one of the most fundamental measures that can affect public health in the world’s poorest countries. This highlights the important role of education and health literacy in society, in the long run. Therefore, given the importance of this issue, it should be given special attention not only by the governments but also by international health policymakers.

The present study showed that the average level of literacy is higher in women than men. Hee yan lee (2015) (19) reported a relationship between health literacy and gender and showed that women had a higher level of literacy than men. The association between health literacy and gender was also confirmed in the study conducted by Ahmadi et al., in 2018 (20). Since women’s health status and health information, before and during pregnancy and during the years of growth and development, can directly affect both their children’s health and health in the community, in the long term, women’s population has often been the target of programs and policies that aimed to increase the level of health, in various countries, including Iran.

Regarding marital status, Ahmadi et al. reported a higher level of health literacy in married people compared to single persons, which was in line with the results of the present study (20).

The average level of credibility of rumors was in the average range (around 47.9 out of 100). This can be attributed to the fact that various social networking websites are one of the easiest platforms for the dissemination of information on the one hand and can be readily accessed by all participants in the study on the other. In other words, due to the capabilities of cyberspace internet, such as the possibility of transferring information with high speed, the ability to interact and repeat a rumor online, as well as their multimedia capability, such as the ability to simultaneously send photos or videos related to the rumors, these platforms can play an undeniable role in spreading and believing rumors. Therefore, it is predicted that the access of all participants in the study to the Internet and the characteristics of the social networks mentioned above can affect the credibility of individuals in the context of COVID-19 vaccination rumors.

The findings of this study on the relationship between gossip beliefs and demographic variables showed that four variables of gender, marital status, place of residence, and education level were significantly associated with accepting gossip. In line

with the findings of the present study, the findings of Lingnang Hey et al. (2021) (21) and Komi (2014) (22) confirmed the relationship between the variables of education level and the credibility of rumors. They showed that people with higher education levels were less likely to believe health-related rumors (including those related to vaccinations), whereas those with lower levels of education were more likely to believe rumors. In general, people with higher education, due to more confidence in their knowledge and higher analytical power, compared to less literate individuals, could better analyze rumors, so they often were able to resist acceptance and dissemination of rumors.

The results of the present study showed that the mean score of believing rumors was higher in men than women. In the same line, Greenhil et al. (2017) (23) in their study on the credibility of rumors, confirmed the relationship between gender and the credibility of rumors and acknowledged that the rate of credibility of rumors in men is higher than in women. This might be owing to more average time men spend outside to interact with other people in the community, compared to women. This issue can increase the likelihood of hearing rumors, which can lead to an increase in believing rumors.

Moreover, the results of the present study showed that health literacy and rumors' credibility had a significant and negative relationship. Hyun Jung (2019) (24), similar to the results of the present study, stated that health literacy is inversely related to understanding the purpose of rumors and attempts to disseminate them. These findings were also consistent with the results of the study conducted by Johri et al. (2015) (25) and Zhang (2019) (2) which showed that improving the level of health literacy led to a decrease in the credibility of rumors, and was an effective way to prevent individuals from believing in health-related rumors. Therefore, a higher level of health literacy among people will reduce the likelihood of general acceptance of rumors.

According to a study conducted by Montagni et al. (2021) (1), the tendency to be vaccinated is associated with the amount of related fake news and rumors published in society, and people with lower health literacy are more skeptical about COVID-19 vaccination. Therefore, low levels of health literacy can constantly bring about new and concerning discussions, leading to more problems and the continuation of COVID-19 outbreaks. However, an acceptable level of health literacy allows people to not only interpret and analyze issues related to their health but also employ their knowledge of health concepts more effectively to promote personal and public hygiene.

However, contrary to the findings of the present study, Corin's study (2019) (26) reports a positive association between health literacy and gossip

acceptance. They stated that people with higher health literacy and negative attitudes about their childhood vaccination find negative gossip more convincing than positive information and believe rumors more easily. According to the results of the study performed by Lorini et al. (2018) (27), the relationship between health literacy and people's desire for vaccination seems to be unclear (20). It seems that the role of health literacy in vaccination skepticism or acceptance can be influenced by several key factors, such as one's place of residency (i.e., country), age, and type of vaccine. However, there is a need for new studies in this field, especially longitudinal studies that use multiple measurement tools to facilitate a better understanding of the role of health literacy in predicting vaccine acceptance or rejection.

Failure to counter rumors can neutralize pervasive policies in different societies; therefore, strengthening the factors that can underline the spread and acceptance of rumors is a necessity. According to the findings of the present study, health literacy can have a significant effect on reducing the credibility of rumors and other misinformation by members of the community. Therefore, macro-level decisions and policies are needed to improve general health literacy and the ability to identify and track rumors and make accurate decisions on vaccination based on reliable information. This can ultimately lead to public participation in the fight against the COVID-19 pandemic and its new virus strains.

5.1. Research Limitations

Due to the restrictions imposed on face-to-face interactions caused by the COVID-19 pandemic, the researchers faced limitations in sample collection in different provinces. In addition, there were some issues related to publishing electronic questionnaires and attracting people to complete the questionnaire which could have affected the study population. Therefore, it is suggested that more random data collection methods should be used in future studies. Future studies are also recommended to investigate the relationship between risk perception and social behaviors influenced by COVID-19 on the acceptance of rumors.

6. Conclusion

To increase the level of public health literacy, there is a need for interoperability between ministries and organizations that are involved in maintaining and ensuring public health. Social media play a crucial role in this regard. Eventually, it seems that due to the importance of health literacy, healthcare providers in all countries should design and implement short-term, medium-term, and long-term plans to address this issue (with the help of the media) to increase the level of health literacy among people.

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Footnotes

Conflicts of Interest: The authors have no conflict of interest to declare.

Authors' Contribution: All authors were responsible for the study design and supervised the study. The authors have prepared the first draft of the manuscript, analyzed the results, and supervised the study together. The authors have read and approved the final manuscript.

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References

- Montagni I, Ouazzani-Touhami K, Mebarki A, Texier N, Schück S, Tzourio C, et al. Acceptance of a Covid-19 vaccine is associated with ability to detect fake news and health literacy. *J Public Health*. 2021;**43**(4):695-702. doi: [10.1093/pubmed/fdab028](https://doi.org/10.1093/pubmed/fdab028). [PubMed: [33693905](https://pubmed.ncbi.nlm.nih.gov/33693905/)].
- Zhang F, Or PPL, Chung JWY. The effects of health literacy in influenza vaccination competencies among community-dwelling older adults in Hong Kong. *BMC Geriatr*. 2020;**20**(1):1-7. doi: [10.1186/s12877-020-1504-5](https://doi.org/10.1186/s12877-020-1504-5). [PubMed: [32171262](https://pubmed.ncbi.nlm.nih.gov/32171262/)].
- Cheng M, Wang S, Yan X, Yang T, Wang W, Huang Z, et al. A COVID-19 rumor dataset. *Front Psychol*. 2021;**12**:1-10. doi: [10.3389/fpsyg.2021.644801](https://doi.org/10.3389/fpsyg.2021.644801). [PubMed: [34135812](https://pubmed.ncbi.nlm.nih.gov/34135812/)].
- Na K, Garrett RK, Slater MD. Rumor acceptance during public health crises: Testing the emotional congruence hypothesis. *J Health Commun*. 2018;**23**(8):791-9. doi: [10.1080/10810730.2018.1527877](https://doi.org/10.1080/10810730.2018.1527877). [PubMed: [30325720](https://pubmed.ncbi.nlm.nih.gov/30325720/)].
- Hotez PJ. COVID19 meets the antivaccine movement. *Microbes Infect*. 2020;**22**(4):162-4. doi: [10.1016/j.micinf.2020.05.010](https://doi.org/10.1016/j.micinf.2020.05.010). [PubMed: [32442682](https://pubmed.ncbi.nlm.nih.gov/32442682/)].
- Ammar A, Trabelsi K, Brach M, Chtourou H, Boukhris O, Masmoudi L, et al. Effects of home confinement on mental health and lifestyle behaviours during the COVID-19 outbreak: insights from the ECLB-COVID19 multicentre study. *Biol Sport*. 2021;**38**(1):9-21. doi: [10.5114/biolsport.2020.96857](https://doi.org/10.5114/biolsport.2020.96857). [PubMed: [33795912](https://pubmed.ncbi.nlm.nih.gov/33795912/)].
- Peyravi M, Soltani A, Ahmadi M, Marzaleh MA. Iran's coping experiences with covid-19: strategies and recommendations. *Disaster Med Public Health Prep*. 2020:1-2. doi: [10.1017/dmp.2020.441](https://doi.org/10.1017/dmp.2020.441). [PubMed: [33203494](https://pubmed.ncbi.nlm.nih.gov/33203494/)].
- Rahmani Moghadam E, Zarrin V, Keshipour H, Raei M. Crisis Management in COVID-19 Pandemic. *J Mar Med*. 2020;**2**(1):61-2.
- Shahamatinejad S. The Relationship between health anxiety and emotion regulation with rumors on social networks during the COVID-19 Pandemic. *J Couns Psychol*. 2021;**3**(1):38-48. doi: [10.52547/jarcp.3.1.38](https://doi.org/10.52547/jarcp.3.1.38).
- Nooraei S, Entezari M, Hushmandi K, Raei M. Stress and anxiety caused by COVID-19 in the communities. *J Mar Med*. 2020;**2**(1):65-6.
- Lai K, Xiong X, Jiang X, Sun M, He L. Who falls for rumor? Influence of personality traits on false rumor belief. *Pers Individ Differ*. 2020;**152**:109520. doi: [10.1016/j.paid.2019.109520](https://doi.org/10.1016/j.paid.2019.109520).
- Gallotti R, Valle F, Castaldo N, Sacco P, De Domenico M. Assessing the risks of 'infodemics' in response to COVID-19 epidemics. *Nat Hum Behav*. 2020;**4**(12):1285-93. doi: [10.1038/s41562-020-00994-6](https://doi.org/10.1038/s41562-020-00994-6). [PubMed: [33122812](https://pubmed.ncbi.nlm.nih.gov/33122812/)].
- Schillinger D, Grumbach K, Piette J, Wang F, Osmond D, Daher C, et al. Association of health literacy with diabetes outcomes. *JAMA*. 2002;**288**(4):475-82. doi: [10.1001/jama.288.4.475](https://doi.org/10.1001/jama.288.4.475). [PubMed: [12132978](https://pubmed.ncbi.nlm.nih.gov/12132978/)].
- Abel T, McQueen D. Critical health literacy and the COVID-19 crisis. *Health Promot Int*. 2020;**35**(6):1612-3. doi: [10.1093/heapro/daaa040](https://doi.org/10.1093/heapro/daaa040). [PubMed: [32239213](https://pubmed.ncbi.nlm.nih.gov/32239213/)].
- Montazeri A, Tavousi M, Rakhshani F, Azin A, Jahangiri K, Ebadi M, et al. Health literacy for Iranian Adults (HELIA): development and psychometric properties. *Payesh*. 2014;**13**(5):589-99.
- Okan O, Bollweg TM, Berens E-M, Hurrelmann K, Bauer U, Schaeffer D. Coronavirus-related health literacy: A cross-sectional study in adults during the COVID-19 infodemic in Germany. *Int J Environ Res Public Health*. 2020;**17**(15):1-20. doi: [10.3390/ijerph17155503](https://doi.org/10.3390/ijerph17155503). [PubMed: [32751484](https://pubmed.ncbi.nlm.nih.gov/32751484/)].
- Paasche-Orlow MK, Parker RM, Gazmararian JA, Nielsen-Bohman LT, Rudd RR. The prevalence of limited health literacy. *J Gen Intern Med*. 2005;**20**(2):175-84. doi: [10.1111/j.1525-1497.2005.40245.x](https://doi.org/10.1111/j.1525-1497.2005.40245.x). [PubMed: [15836552](https://pubmed.ncbi.nlm.nih.gov/15836552/)].
- Nutbeam D, Kickbusch I. Advancing health literacy: a global challenge for the 21st century. *Health Promot Int*. 2000;**15**(3):183-4. doi: [10.1093/heapro/15.3.183](https://doi.org/10.1093/heapro/15.3.183).
- Lee HY, Lee J, Kim NK. Gender differences in health literacy among Korean adults: do women have a higher level of health literacy than men? *Am J Mens Health*. 2015;**9**(5):370-9. doi: [10.1177/1557988314545485](https://doi.org/10.1177/1557988314545485). [PubMed: [25122719](https://pubmed.ncbi.nlm.nih.gov/25122719/)].
- Ahmadi FZ, Mehrmohammadi M, Talaei E, Fardanesh H, Paknahad M, Taghizadeh S, et al. Health literacy among students of Farhangian University. *Payesh*. 2018;**17**(3): 257-66.
- He L, Chen Y, Xiong X, Zou X, Lai K. Does science literacy guarantee resistance to health rumors? The moderating effect of self-efficacy of science literacy in the relationship between science literacy and rumor belief. *Int J Environ Res Public Health*. 2021;**18**(5):1-10. doi: [10.3390/ijerph18052243](https://doi.org/10.3390/ijerph18052243). [PubMed: [33668310](https://pubmed.ncbi.nlm.nih.gov/33668310/)].
- Afassinou K. Analysis of the impact of education rate on the rumor spreading mechanism. *Physica A*. 2014;**414**:43-52. doi: [10.1016/j.physa.2014.07.041](https://doi.org/10.1016/j.physa.2014.07.041).
- Greenhill KM, Oppenheim B. Rumor has it: The adoption of unverified information in conflict zones. *Int Stud Q*. 2017;**61**(3):660-76. doi: [10.1093/isq/sqx015](https://doi.org/10.1093/isq/sqx015).
- Oh HJ, Lee H. When do people verify and share health rumors on social media? The effects of message importance, health anxiety, and health literacy. *J Health Commun*. 2019;**24**(11):837-47. doi: [10.1080/10810730.2019.1677824](https://doi.org/10.1080/10810730.2019.1677824). [PubMed: [31609678](https://pubmed.ncbi.nlm.nih.gov/31609678/)].
- Johri M, Subramanian SV, Sylvestre MP, Dudeja S, Chandra D, Koné GK, et al. Association between maternal health literacy and child vaccination in India: a cross-sectional study. *J Epidemiol Community Health*. 2015;**69**(9):849-57. doi: [10.1136/jech-2014-205436](https://doi.org/10.1136/jech-2014-205436). [PubMed: [25827469](https://pubmed.ncbi.nlm.nih.gov/25827469/)].
- Meppelink CS, Smit EG, Fransen ML, Diviani N. "I was right about vaccination": Confirmation bias and health literacy in online health information seeking. *J Health Commun*. 2019;**24**(2):129-40. doi: [10.1080/10810730.2019.1583701](https://doi.org/10.1080/10810730.2019.1583701). [PubMed: [30895889](https://pubmed.ncbi.nlm.nih.gov/30895889/)].
- Lorini C, Santomauro F, Donzellini M, Capecchi L, Bechini A, Boccacini S, et al. Health literacy and vaccination: A systematic review. *Hum Vaccin Immunother*. 2018;**14**(2):478-88. doi: [10.1080/21645515.2017.1392423](https://doi.org/10.1080/21645515.2017.1392423). [PubMed: [29048987](https://pubmed.ncbi.nlm.nih.gov/29048987/)].