

# Health literacy and post-vaccination covid-19 prevention behavior in the community: a cross-sectional study in Indonesia

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Responsible Editor: Retnayu Pradanie

Received: 22 July 2022 ◦ Revised: 3 March 2023 ◦ Accepted: 18 March 2023

## ABSTRACT

**Introduction:** The government has made vaccination as the primary strategy to control the COVID-19 pandemic. However, the public still needs to implement COVID-19 prevention behavior even though they have been vaccinated. This study aimed to determine the correlation between health literacy and post-vaccination COVID-19 prevention behavior of the community in the work area of the Patrang Public Health Center, Jember Regency, Indonesia.

**Methods:** A cross-sectional design was performed in the public health center in Jember Regency Indonesia, in May 2022. The sample in this study was 435 people selected by purposive sampling with the inclusion criteria of those aged >17 years old and receiving a total primary vaccination dose. The data were collected using the Health Literacy Survey Coronavirus Disease Questionnaire 22 (HLS-COVID-Q22) and the COVID-19 prevention behavior questionnaire. The data were analyzed by using Spearman test with a significance level of  $\alpha < 0.05$ .

**Results:** The results showed that the most of health literacies were inadequate ( $n=188$ , 43.2%), and the post-vaccination COVID-19 prevention behavior was in the moderate category ( $n=186$ , 42.7%). There was a moderate correlation between health literacy and post-vaccination COVID-19 prevention behavior ( $p < 0.001$ ;  $r = 0.513$ ).

**Conclusions:** The higher the health literacy, the better the post-vaccination COVID-19 prevention behavior. The nurse was important in providing health education about COVID-19 by paying attention to community health literacy ability. Improving health literacy is an important strategy to enhance COVID-19 prevention behavior and reduce coronavirus transmission.

**Keywords:** COVID-19 prevention behavior; health literacy; post-vaccination

## Introduction

Vaccines are the primary strategy for controlling the pandemic that is effective in overcoming infections of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS CoV-2) and cases of Coronavirus Disease 2019 (COVID-19) (Haas et al., 2021; World Health Organization, 2021). However, COVID-19 prevention behavior, despite vaccination, still needs to be done because COVID-19 infection with symptoms or without symptoms can still occur (Bahl et al., 2021; Jain, Iyengar and Ish, 2021). People who have been fully vaccinated but are infected with SARS CoV-2 are called

"breakthrough infections" (Centers for Disease Control and Prevention, 2021). Individuals loosen COVID-19 preventive behavior after vaccination, it can be seen that fewer people are wearing masks in public area after vaccination. This behavior can increase the potential risk of infection in a new wave of virus variants and would possibly provide loopholes for causing virus transmission (Zhang et al., 2021; Satuan Tugas Penanganan COVID-19, 2022).

Health promotion and preventive measures still need to be implemented to stop the pandemic (Yuan et al., 2021). However, there are still global gaps in the

availability and accessibility of various preventive and public health protection measures that can prevent the virus's spread and future global pandemics (Taggart et al., 2022). Sometimes information is subjected to contradictory opinions and experts' views. Too much information made it hard to distinguish between correct and incorrect information, allowing for the introduction of misconceptions and wrong beliefs, often under cover of almost scientific language (Silva and Santos, 2021). Even if fully vaccinated, precautions such as keeping a distance of at least 1 meter from other people, wearing a mask, avoiding poorly ventilated places, washing hands frequently, staying home if unwell and testing for COVID-19, staying informed about COVID-19 must be still implemented (World Health Organization, 2020). But a loosening of the behavior of COVID-19 prevention has happened globally. Based on research in Israel, preventive behavior was reported to show a decrease in the rate of wearing masks (21.1%) and implementing social distancing (47.3%) in people who had been vaccinated (Rahamim-Cohen et al., 2021). Facts related to the application of preventive behavior in data as of January 30, 2022, in Indonesia show that 88.89% of people adhere to wearing masks and 85.61% adhere to keeping their distance. However, individuals actually weaken the behavior prevention of COVID-19 after vaccination (Zhang et al., 2021).

One of the factors that can influence COVID-19 prevention behavior is the level of health literacy (Sánchez-Arenas et al., 2021). Health literacy is defined as an ability that requires knowledge, motivation, and individual competence to seek or access information, understand its meaning, and assess health information to make decisions so that they can adequately apply information into actions in daily life. This health information relates to healthcare, disease prevention, and health promotion to maintain and improve a better quality of life (Okan et al., 2019). Good health literacy levels are associated with better attitudes as a key to prevention strategies against COVID-19 and its spread leading to better health outcomes (Silva and Santos, 2021).

Health literacy during the pandemic is essential to find or access information about COVID-19, transmission, preventive behavior that needs to be done, understand what it means, and assess the information so that decisions can be made to apply knowledge to behavioral compliance (Sørensen et al., 2012; Do et al., 2020; Hong et al., 2021). Good health literacy allows individuals to gain knowledge about COVID-19, seek relevant facts about infection transmission and prevention behavior, and find the

necessary information and apply it in daily life (Do et al., 2020). Increasing health literacy becomes very important at the individual and community level to deal with pandemic situations that require immediate and rapid action (Abdel-Latif, 2020). Accordingly, this study aimed to determine the relationship between health literacy and post-vaccination COVID-19 prevention behavior.

## Materials and Methods

### Research design

This study used a descriptive correlation with a cross-sectional approach to determine the correlation between health literacy and post-vaccination COVID-19 prevention behavior.

### Respondents

The sample was 435 people in the work area of the Patrang Public Health Center which covers a geographical area consisting of the sub-districts of Patrang, Gebang and Jember Lor in May 2022. The sample was collected by purposive sampling in order to get the complete address of the respondent, as there were no clear data about the address of the respondents from Public Health Center. Minimum total sample based on the Lemeshow formula  $n = [Z_{21-\alpha} \times (p) \times (1 - p)]/d^2$ , assuming the proportion of the COVID-19 vaccination coverage rate as 50% with a precision level of 0.05 (Nursalam, 2020). The inclusion criteria were aged >17 years old and receiving 2 or 3 doses of COVID-19 vaccine. The exclusion criteria were healthcare workers, because the health workers are likely to have good health literacy, and people with mental and cognitive disorders validated by the Mini-Mental State Examination (MMSE) for the respondents >65 years old. The MMSE is used in respondents >65 to determine the presence of dementia, and are suspected of experiencing cognitive problems related to aging beyond normal memory problems. Respondents with mental and cognitive disorders such as mental disorders, mental retardation were immediately excluded from the study. During the research the MMSE test was conducted on 37 respondents with the interpretation that all respondents had normal cognitive status.

### Instruments

This research used the self-report data collection techniques by filling out a questionnaire. The questionnaires used were the respondent's characteristics (age, gender, marital status, education level, occupation, income level, history of comorbidities, and sources of information about COVID-19), Health

Literacy Survey Coronavirus Disease Questionnaire 22 (HLS-COVID-Q22) and COVID-19 preventive behavior questionnaire. This questionnaire is specifically used to analyze health literacy during the COVID-19 Infodemic.

Health literacy is measured by the HLS-COVID-22Q designed by Okan et al. (2020). This questionnaire has been translated into the Indonesian language by Utami et al. (2021) with the results of the validity test having a correlation coefficient of 0.412–0.690 ( $r > 0.300$ ) and Cronbach's alpha reliability test showing  $\alpha = 0.921$ . This questionnaire consists of 22 questions that are used to assess the difficulty or ease felt by respondents when accessing (6 questions), understanding (6 questions), considering (5 questions), and applying (5 questions) the health information about COVID-19. The assessment in this questionnaire uses a Likert scale of 1-4 with a score of 1 (very difficult) to 4 (very easy). This questionnaire used an interval scale with a minimum score of 22 and a maximum score of 88 which obtained by adding up the answer scores for each question item (Okan et al., 2020; Utami et al., 2021). According to Okan et al. (2020), the final assessment of this questionnaire can also be presented as an index or category of health literacy. The presentation of the data is by using the average cut-off values which the average value was 2.5 (inadequate health literacy),  $>2.5$ – $<3$  (problematic health literacy), and 3 (sufficient health literacy).

Post-vaccination COVID-19 prevention behavior was measured by a questionnaire consisting of seven favorable and unfavorable questions based on the guidelines of the Ministry of Health of the Republic of Indonesia. The questionnaire includes wash hands with soap or use hand sanitizer after handling objects in public places, take a shower and change clothes after coming home from traveling, wear a mask in public places, keep a distance of at least 1 meter, keep distance from elderly, don't attend large gatherings and don't use public facilities or go to public places. This questionnaire has been tested for validity and reliability by Yanti et al. (2020); with the results of the validity test having a correlation coefficient 0.187-1 ( $r > 0.1409$ ) and the Cronbach alpha reliability test  $\alpha = 0.770$ . Assessment in this questionnaire used a Likert scale with 0-3 for favorable questions with the score of 0 (never), 1 (rarely), 2 (almost always), and 3 (always) and vice versa for unfavorable questions. The calculation for the prevention behavior had a total score 0-7 (low protocol adherence), 8-14 (moderate protocol adherence), and 15-21 (high protocol adherence).

The data were collected using a door-to-door technique where more than one respondent can be taken from each house according to the inclusion and

Table 1 Demographic characteristics of respondents (N=104)

Variable	n	%
Age (years)		
18-25	57	13.1
26-35	85	19.6
36-45	110	25.3
46-55	92	21.1
56-65	54	12.4
>65	37	8.5
Gender		
Male	100	23
Female	335	77
Marital status		
Married	365	83.9
Unmarried	45	10.3
Widowed	25	5.8
Educational level		
Elementary and lower	171	39.3
Junior high school	56	12.9
Senior high school	176	40.5
Collage	32	7.3
Occupation		
Unemployed	23	5.3
Student	10	2.3
Entrepreneur/trader	103	23.7
Farmer	10	2.3
Civil servant	7	1.6
Retired	12	2.7
Private employees	53	12.2
Laborer/driver/housekeeper	24	5.5
Housewife	193	44.4
Income level		
<Rp2.400.000,-	371	85.3
≥Rp2.400.000,-	64	14.7
History of comorbidities		
Have comorbidities	60	13.8
Hypertension	36	8.3
Diabetes	6	1.4
Asthma	13	3.0
Tuberculosis	2	0.5
Liver disease	1	0.2
Heart disease	1	0.2
Cancer	1	0.2
Have no comorbidities	375	86.2
Most used sources of information about COVID-19		
Television	163	37.5
Internet (Website/Online Magazine/etc.)	53	12.2
Newspaper/magazine	1	0.2
Radio	1	0.2
Social media (Instagram/Twitter/Facebook/etc.)	82	18.9
Message apps (WhatsApp/Line/Telegram/etc.)	11	2.5
Health workers	32	7.4
Family or friends	92	21.1

exclusion criteria. The data collection was assisted by two enumerators. Enumerators were selected from undergraduate students of Faculty of Nursing, Universitas Jember who were first given the training to equate perceptions and understanding about study, questionnaire and the data collection process used in this study. Search for the respondents' addresses was assisted by the head of the community association in the research area. Respondents were recruited from accessible communities and according to established inclusion and exclusion criteria.

Table 2 Health literacy in respondents (n=435)

Health Literacy	f	%
Inadequate health literacy	188	43.2
Problematic health literacy	92	21.2
Sufficient health literacy	155	35.6

Data analysis

Data analysis in this study used univariate and bivariate analysis using SPSS version 27. The results of the univariate analysis of health literacy and post-vaccination COVID-19 prevention behavior will be presented in frequency and percentage, while the bivariate analysis was carried out using the Spearman non-parametric correlation to determine the correlation between health literacy and post-vaccination COVID-19 prevention behavior.

Ethical consideration

This research was approved by the Health Research Ethics Committee of the Faculty of Nursing, Universitas Jember with a certificate No. 063/UN25.1.14/KEPK/2022. During the research the respondents and researchers continued to use masks and wash their hands with the handrub/hand sanitizer provided by the researchers before data collection was carried out and have agreed to informed consent as evidence of involvement in this study.

Results

Characteristic of the respondents

The results of the study which consisted of 435 respondents showed that the most age of respondents was 36-45 years (n=110, 25.3%), the most gender was female (n=335, 77%), and the majority of respondents were married (n= 365, 83.9%). Based on education level, most of the respondents were senior high school students (n=176, 40.5%) and most of the respondents in this study were housewives (n=193, 44.4%). Based on the income level it was at most less than IDR 2,400,000 (n = 371, 85.3%). Most of the respondents in this study did not have comorbidities (n = 375, 86.2%). The most frequently used source of information about COVID-19 by respondents was television (n=163, 37.5%). The details are shown in [Table 1](#).

Table 4 Post-vaccination COVID-19 prevention behavior in respondents (n=435)

Post-Vaccination COVID-19 Preventive Behavior	f	%
Low protocol adherence	69	15.9
Moderate protocol adherence	186	42.7
High protocol adherence	180	41.4

Table 3 Indicator of health literacy in respondents (n=435)

Indicator	Mean (SD)	Median (Min-Max)
Access	2.61 (±1.085)	3 (1-4)
Understand	2.67 (±1.020)	3 (1-4)
Appraise	2.37 (±0.999)	2 (1-4)
Apply	2.40 (±1.010)	2 (1-4)

Health literacy

[Table 2](#) shows that the health literacy in respondents' results were 155 (35.6%) in the sufficient health literacy, 92 (21.2%) in the problematic health literacy, and 188 (43.2 %) in the inadequate health literacy. Based on this research, the highest result is shown in the inadequate health literacy. Based on the indicators of health literacy, the highest and the lowest are present in [Table 3](#). The highest score of the average value per item of the indicators of health literacy ability is the ability to understand the health information (mean=2.67) and the lowest score is the ability to appraise the health information (mean=2.37).

Post-vaccination COVID-19 prevention behavior

[Table 4](#) shows that the highest level of community adherence was moderate protocol adherence 186 (42.7%) followed by high protocol adherence (41.4%) with a slight difference (1.3%). As seen in [Table 5](#), the best post-vaccination COVID-19 prevention behavior is wearing masks when in public places (mean=2.37). In contrast, the worst post-vaccination COVID-19 prevention behavior is shown in the behavior of keeping a distance from the elderly (mean=0.83).

The correlation between health literacy and post-vaccination COVID-19 prevention behavior

This research shows a moderate positive correlation between health literacy and post-vaccination COVID-19

Table 4 Post-vaccination COVID-19 prevention behavior in respondents (n=435)

Question	Mean (SD)	Median (Min-Max)
I wash my hands with soap or use hand sanitizer after handling objects in public places	2.2 (0.976)	3 (0-3)
I take a shower and change clothes after coming home from traveling	1.69 (0.935)	2 (0-3)
I wear a mask in public places (markets, terminals, prayer places, etc.)	2.37 (0.831)	3 (0-3)
I keep a distance of at least 1 meter from other people when outside the house	1.22 (0.952)	1 (0-3)
I keep my distance from elderly	0.83 (0.872)	1 (0-3)
I attended an event that gathered many people	2.16 (0.831)	2 (0-3)
I use public facilities or go to public places (public transportation, malls, markets, tourist attractions)	2.31 (0.896)	3 (0-3)

prevention behavior with a significance value  $<0.001$  and a coefficient correlation  $r=0.513$ .

## Discussions

The pandemic has been going on since January 2020. Even though the majority of people have received the COVID-19 vaccine, confirmed cases of COVID-19 are still significant showing an increase in the third wave of the new variant of the coronavirus. This study revealed that there is a positive correlation with moderate of relationship between health literacy and post-vaccination COVID-19 prevention behavior. This means that the higher the level of health literacy, the higher the community's adherence to prevention of COVID-19 behavior. Study about health literacy and COVID-19 prevention behavior found that health literacy was significantly related to COVID-19 awareness and COVID-19 prevention behavior (Gautam et al., [2021](#)).

Health literacy during the pandemic is very necessary to find or access information about COVID-19, transmission, preventive behavior that needs to be done, understand what it means, appraise, or interpret the information correctly so that they can make decisions and apply information in the form of behavior adherence in everyday life (Sørensen et al., [2012](#); Okan et al., [2019](#); Do et al., [2020](#); Bin Naeem and Kamel Boulos, [2021](#); Hong et al., [2021](#)). The better health literacy indicates the possibility for individuals to gain knowledge about COVID-19, seek relevant facts about infection transmission and prevention behavior using, and find the necessary information (Do et al., [2020](#)). Therefore, better attitudes are expected as a key to prevention strategies against COVID-19 and its spread leading to better health outcomes (Silva and Santos, [2021](#)).

Based on this study, most respondents had inadequate health literacy, but had already performed moderate to high protocol adherence of COVID-19 prevention. The best prevention behavior shown in this study is wearing a mask when in a public place although the easing of the use of masks has been announced (mean=2.37). Wearing masks has been practiced for health and cultural reasons so that the use of masks on COVID-19 prevention behavior does not cause conflicts that arise if people are forced to change cultural norms. In addition, the majority of the community also has a habit of wearing masks to overcome air pollution (Nguyen et al., [2020](#)).

Health literacy so far remains a concept that is underestimated as a public health problem in the context of the COVID-19 pandemic, although health

information about COVID-19 has dominated most of the sources of information and communication (Paakkari and Okan, [2020](#); Sentell, Vamos and Okan, [2020](#)). The respondents in this study had received two or three doses of COVID-19 vaccine, but still had inadequate health literacy. The respondents' ability to appraise the health information had the lowest average score (mean per item=2.37). Assessing and interpreting health information demands more excellent cognitive skills and resources. In addition, too much and complicated information in various media such as the internet or smartphone applications also increases the difficulty in processing those large amounts of information (Svendsen et al., [2020](#)).

Health literacy is an important competency that must be developed during the current pandemic (Luengo-Oroz et al., [2020](#)). Too many sources of information and inaccurate information (hoax) related to COVID-19 caused the spread of fear and panic among the public much faster than the virus (Abdel-Latif, [2020](#)). Health literacy is needed because it has the potential to make individuals understand the reasons for the recommendations and the impact or results of implementing COVID-19 preventive behavior. Improved health literacy will reduce health expenditure costs and ease the tremendous burden on the healthcare system (Shaukat, Asghar and Naveed, [2021](#)). Health literacy limited to individuals, populations, and systems can cause adverse effects for some and even entire communities. When people are not competent to assess health information critically, health information providers cannot ensure the means to protect valid and useful information against the many sources that spread invalid information (hoax information). This can cause panic, and interfere with the effectiveness of information distribution and health interventions in the community (Okan et al., [2020](#)).

The results of this research have implications for the importance of providing health education or counseling, especially regarding COVID-19, by paying attention to the health literacy ability of the community. Nurses as educators can play a role in increasing health literacy, one of which is by providing health education or counseling, especially related to COVID-19 as a form of new normal for society to continue to carry out healthy living behaviors not only to prevent COVID-19 but other infectious diseases. In addition, a strategy that can be done is to improve the quality of health information and training to improve information search skills about COVID-19.

## Limitation of the study

The limitation in this study is that the sampling technique used purposive sampling which can limit the generalization of the findings. Furthermore, self-reported technique could be biased for filling the questionnaire

## Conclusions

The majority of respondents to this study had inadequate health literacy. They already understand the information but have low ability to assess valid information. Post-vaccination COVID-19 prevention behavior in respondents showed moderate adherence to health protocols as indicated by adherence to wearing masks in public places. Thus, this study reveals that there is a moderate positive correlation between health literacy and post-vaccination COVID-19 prevention behavior. This means that the higher the health literacy, the better the post-vaccination COVID-19 prevention behavior. Based on the results of this study, it is necessary to improve community health literacy. Further research is expected to be able to develop a model of increasing community health literacy that can be applied effectively.

## Acknowledgment

The authors would like to thank the respondents who have participated in this study. In addition, the author would also like to thank the community leaders who have helped researchers in finding research respondents. The same gratitude goes to the Faculty of Nursing, Universitas Jember for all the technical and bureaucratic assistance.

## Funding source

No sponsors were involved in this study. Research funding used private funds.

## Conflict of interest

There is no conflict of interest

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**How to cite this article:** Desfiani, Y. R., Sutawardana, J. H., and Widayati, N. (2023) 'Health literacy and post-vaccination covid-19 prevention behavior in the community: a cross-sectional study in Indonesia', *Jurnal Ners*, 18(1), pp. 54-60. doi: <http://dx.doi.org/10.20473/jn.v18i1.37721>