

## Influence of social media exposure on knowledge and behaviour of COVID-19 preventive measure: a cross sectional study

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### Article Info

#### Article history:

Received Mar 28, 2022

Revised Aug 15, 2022

Accepted Sep 5, 2022

#### Keywords:

COVID-19

Health literacy

Information

Knowledge

Social media

### ABSTRACT

A lot of misinformation about COVID-19 on social media possibly hinder the practice of healthy behaviors that are essential to protect individuals. This situation is exacerbated by the lack of health literacy in Indonesia. This study aimed to determine the influence of social media information exposure on the knowledge and behavior of Indonesians in compliance with COVID-19 protocols. An online survey of 909 people was conducted from July 2 to August 10, 2020. The data collected were knowledge and behavior of preventing COVID-19, while independent variables were socio-demographic characteristics and exposure to social media information. Inclusion criteria were defined as follows: minimum age of 18 years and domiciled in the country during the data collection period. The analysis used for the data collected were univariate and multivariate. The result showed that gender, age, marital status, and social media presence significantly affect a person's knowledge about COVID-19 with a p-value less than 0.05. Enforcement behavior of health and healthy living protocols is significantly influenced by the respondent's gender, marital status, education level, the island of residence, and exposure to online information. The frequency of exposure to information affects people's knowledge and behavior to implement health protocols and healthy living in the COVID-19 era, and it is further influenced by socio-demographic characteristics.

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## 1. INTRODUCTION

COVID-19 was initially identified in Wuhan, China, in 2019 and has remained of international concern as it has spread rapidly around the world, including Indonesia [1]. The information on this virus is easily accessible [2], [3] but has two main implications, namely increased awareness distrust, and anxiety as well as other mental problems [4]. Subsequently, the World Health Organization has confirmed that this pandemic is accompanied by misinformation [5].

COVID-19 in Indonesia is diverse and exhaustive, including information on transmission, infection symptoms, prevention methods, case data, regional distribution, and treatment activities [6]. The data is mainly

sourced from social media because 85% of the users in the country are connected to Facebook groups namely Facebook, Instagram, and WhatsApp messenger [7]. Social media was initially developed to help people to be connected. However, its incredible popularity has harmed the users despite the benefits [8], [9]. The significant difference between COVID-19 and other previous pandemics is that fears are now immediately viralized to cause confusion and uncertainty. In this regard, social media platforms mainly spread misinformation [10]. The increased access to digital media platforms facilitated information during the current pandemic such that much false information is shared without quality control or background check [11].

Social media platforms are comparatively more powerful in spreading such news for many people. Numerous studies found that social media platforms is an effective tools to improve public awareness of public health issues [12]–[17]. On the other hand, detrimental outcomes may arise due to misinformation including intolerance, racism, inequality, and unhealthy behaviors [18]. Furthermore, myths and rumors spread across traditional and new media platforms are causing xenophobia, lesbian, gay, bisexual and transgender (LGBT) rights violations, and psychological unrest among the masses which may hamper COVID-19 mitigation efforts [19].

Each individual's knowledge, attitudes, and practices regarding this virus are closely related to the information received from the mass media and will undoubtedly determine their behavior. Therefore, useful information must come from an adequate source in order to promote and calm the people [20]. Furthermore, the information will increase the recipient's knowledge and can be used as a basis in making decisions. To the author's knowledge, a limited study has been published on how social media affects the public information space about COVID-19 and its impact on knowledge and prevention behaviour in Indonesia. Therefore, this study aims to determine the influence of social media information exposure on the knowledge and behavior of Indonesians in compliance with COVID-19 protocols. The findings of the study would provide an overview of social media influence to knowledge and behaviour of Indonesian towards COVID-19, thus can be used to produce an effective prevention program by public health agencies in Indonesian context.

## **2. RESEARCH METHOD**

### **2.1. Study design and setting**

A cross-sectional approach and a consecutive sampling method were used in the survey, while Google forms were used to collect data. Respondents were invited to participate through the google link form shared via social media, namely Facebook and WhatApps group team researcher. Data collection was conducted for approximately three weeks, from July 2 to August 10, 2020. The eligible categories include respondents who are 18 years of age, living in Indonesia during the data collection period, and are willing to become research respondents according to informed consent.

The survey sample formula with a known population size used in the calculation is Central Bureau of Statistics. Data related to the population of Indonesia (N) in 2010 was 237,641,326 people. The calculations with 95% CI showed that the minimum number of samples required is 1,083 respondents. However, at the time of data collection, the total number of respondents who met the eligibility criteria and completeness of filling were 909 respondents.

### **2.2. Research instrument and study variables**

Structured questionnaire is used in the study, prior to the survey the questionnaire has been validated by an expert in the health communication and behaviour field. The dependent variables are knowledge and behavior toward COVID-19 protocols adherence. This knowledge is defined as a total score of 16 questions with correct answers recorded as 1, and wrong/do not know as 0 for positive questions, while for negatives, the wrong answer gets a score of 1, and correct/do not know is recorded as 0. Table. 1 depicts the statements used in the study to measure knowledge of study participants.

Meanwhile, the behavior of implementing health protocols and healthy living is defined as the total score of 10 indicators with each of them measured on a Likert scale of 1-4 ranging from "never" to "always" as shown in the Table 2. There are two main groups of the independent variables: i) demographic characteristics which include gender, age, marital status and number of children, education level, area of residence, and type of occupation. The ages are categorized into four, namely < 20 years, 21-30, 31-40, and over 40. The education level is categorized into uneducated to high school and university. Marital status is classified into unmarried and married. Types of work are classified into five categories, namely civil servants, private, not working, students, and others such as freelancer, driver, laborer, and trader. The region/island is divided into two categories: the western Indonesia region including Sumatra, Kalimantan, and Java as well as the central and eastern regions including Sulawesi, Bali, Papua, Maluku, and Nusa Tenggara; ii) the frequency of exposure to information about COVID-19 until this government policy is categorized into three (never/rarely, often, and always).

From a total sample of 909, the results of validity and reliability tests with the Pearson correlation statistical test shows that  $r$  count  $> r$  table or  $ir$ -cor is more than 0.3. Hence, Cronbach alpha is greater than 0.6 which implies that the instrument used is valid and reliable.

Table 1. Statement list to assess the knowledge

Statement	True (%)	False (%)	Do not know (%)
COVID-19 is a disease that attacks the respiratory tract.	893 (98.2)	7 (0.8)	9 (1.0)
The virus causes COVID-19.	901 (99.1)	1 (0.1)	7 (0.8)
Common symptoms of COVID-19 are cough, sore throat, loss of smell, and fever.	887 (97.6)	16 (1.7)	6 (0.7)
Transmission of COVID-19 through droplets issued by sufferers.	869 (95.6)	13 (1.4)	27 (3.0)
COVID-19 can be transmitted by air.	612 (67.3)	196 (21.6)	101 (11.1)
COVID-19 can cause death.	754 (82.9)	124 (13.6)	31 (3.4)
There is currently no effective cure for COVID-19.	809 (89.0)	40 (4.4)	60 (6.6)
To date, no vaccine has been found for COVID-19.	734 (80.7)	105 (11.6)	70 (7.7)
The correct use of a mask is to cover the nose and mouth.	897 (98.7)	11 (1.2)	1 (0.1)
The use of cloth mask should be replaced after four hours of use.	823 (90.5)	19 (2.1)	67 (7.4)
Hand washing should use soap and running water to prevent the transmission of COVID-19.	905 (99.6)	1 (0.1)	3 (0.3)
Hand washing with sanitizer is done when there is no soap and running water.	897 (98.7)	9 (1.0)	3 (0.3)
Keeping a distance of 1-2 meters reduces the risk of contracting COVID-19.	903 (99.3)	2 (0.2)	4 (0.5)
Efforts to limit activities outside the home are efforts to prevent the transmission of COVID-19.	903 (99.3)	4 (0.5)	2 (0.2)
Eating nutritious foods, including fruits and vegetables, is a way to increase immunity to prevent the transmission of COVID-19.	906 (99.7)	1 (0.1)	2 (0.2)
Keeping exercising by using a mask and keeping a distance is a way to increase body immunity to prevent the transmission of COVID-19.	851 (93.6)	41 (4.5)	17 (1.9)

Table 2. Statement list to assess the behaviour

Statement	Never	Rarely	Often	Always
In the past week, I washed my hands with soap and running water or using hand sanitizer after touching shared items such as gates, and TV remotes	4 (0.4)	56 (6.2)	381 (41.9)	468 (51.5)
In the past week, I have been wearing a mask when I am out of the house.	3 (0.3)	8 (0.9)	113 (12.4)	785 (86.4)
I wear a mask when receiving a guest at home.	44 (4.8)	149 (16.4)	260 (28.6)	456 (50.2)
I cover my nose and mouth when sneezing/coughing with tissue/handkerchief/other.	3 (0.3)	15 (1.7)	176 (19.3)	715 (78.7)
In the past week, I have avoided crowds/gatherings with lots of people (>20 people).	11 (1.2)	53 (5.8)	274 (30.1)	571 (62.8)
In the past week, I have followed the government's policy of just staying indoors.	22 (2.4)	110 (12.1)	289 (31.8)	488 (53.7)
When receiving guests at home, I keep a distance of 1-2 meters.	22 (2.4)	110 (12.1)	300 (33.0)	477 (52.5)
In the past week, I have been eating vegetables and fruits to maintain my body's immunity.	1 (0.1)	54 (5.9)	296 (32.6)	558 (61.4)
In the past week, I have been doing sports to maintain my body's immunity.	35 (3.9)	295 (32.5)	279 (30.6)	300 (33.0)
In the past week, I have barely touched my eyes, nose, and mouth when I am out of the house.	224 (24.6)	456 (50.2)	146 (6.1)	2 (9.1)

### 2.3. Statistical analysis

The univariate, bivariate, and multivariate analyses were used to analyze the data collected through this online survey. Univariate was conducted to obtain the distribution of the variables in the descriptive statistics including frequency, percentage, mean, and standard deviation. Bivariate was carried out using simple linear regression to see the distribution of each demographic characteristics variable and social media exposure on people's knowledge and behavior. Meanwhile, the multivariate analysis was performed using multiple linear regression and the results were significant when the p-value was  $< 0.05$ . All data analyses were conducted with Stata 14.0 statistical program.

### 2.4. Ethical approval

This study has been granted Ethics Approval Number: 1528/UN14.2.2.VII.14/LT/2020 dated July 20, 2020, by the Ethics Commission, Faculty of Medicine, Udayana University. Hence, the data is anonymized to protect confidentiality. The survey respondents received a GoPay credit/e-money reward of IDR 25,000 which is approximately USD \$1.78 for the first 100 people.

### 3. RESULTS AND DISCUSSION

#### 3.1. Socio-demographic

The number of respondents who completed the questionnaire was 1,002, while the survey found 909 eligible participants. Table 3 shows the socio-demographic characteristics of respondents where most of them were women between the ages of 21 and 30. Furthermore, 51.4% of those surveyed are married and have a university degree. Most of the respondents live in the urban areas in Central and East Indonesia and work in the private sector. Table 3 also shows the distribution of the independent and dependent variables. Overall, the frequency of exposure to COVID-19 information through social media is 73.4%, and only 7.8% never/rarely received information. The average respondent's knowledge of the virus and health protocol is 14.89, while the maximum and minimum number are 16 and 4 respectively. This shows that the average respondent's knowledge is quite good. Also, the respondents' behavior in implementing health protocols and healthy living during the pandemic has an average of 23.14 out of 30, with a minimum score of 9. This implies that the respondents' behavior in implementing health protocols and healthy living is also good.

Table 3. Characteristic of respondents

Variable (n=909)	f (%)
Sex	
Male	215(23.7)
Female	694 (76.3)
Age	
<20 years	78 (8.6)
21-30 years	469 (51.6)
31-40 years	204 (22.4)
>40 years	158 (17.4)
Marital status	
Unmarried	442 (48.6)
Married	467 (51.4)
Education	
Primary	205 (22.6)
University	704 (77.4)
Occupation	
Students	195 (21.5)
Unemployed	91 (10.0)
Others	126 (13.9)
Private employees	286 (31.5)
Government employees	211 (23.2)
Region	
Western Indonesia Region	320 (35.2)
Central and Eastern Indonesia Region	589 (64.8)
Frequency of Information Exposure through social media	
Never - Rarely	71 (7.8)
Often	667 (73.4)
Always	171 (18.8)
Knowledge (Mean ± SD)	14.89 (1.47)
Behaviour (Mean ± SD)	23.14 (3.82)

Figure 1 shows that health protocols, such as hand washing, mask-wearing, and keeping a distance are the most information often received by respondents through social media. Table 4 shows the distribution of mean and standard deviation of knowledge and behavior according to characteristics.

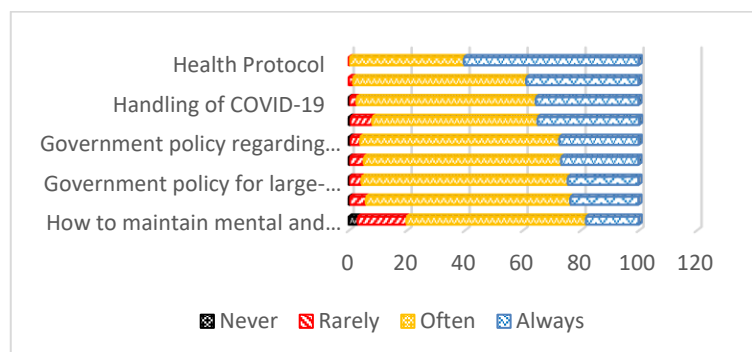


Figure 1. Frequency of exposure of information received by respondents

Table 4. Distribution mean and standard deviation knowledge and behavior by characteristics

Variable	Knowledge (Mean ± SD)	Behavior (Mean ± SD)
Sex		
Male	14.67 (1.83) *	22.60 (4.56) *
Female	14.97 (1.30)	23.31 (3.54)
Age		
< 20 years	14.15 (2.40)	22.17 (3.74)
21-30 years	14.84 (1.39)	23.00 (3.88)
31-40 years	15.15 (1.04)	23.05 (3.58)
40 and above	15.13 (1.23)	24.17 (3.76)
Marital status		
Unmarried	14.67 (1.61)	22.55 (3.83)
Married	15.12 (1.20)	23.71 (3.72)
Education		
Primary	14.53 (1.91)	22.32 (4.10)
University	15.01 (1.24)	23.38 (3.69)
Occupation		
Student	14.68 (1.60)	22.15 (4.56)
Unemployed	14.90 (1.60)	23.55 (3.51)
Other	14.81 (1.56)	23.71 (4.08)
Private employee	14.81 (1.43)	23.18 (3.86)
Government employee	15.28 (0.97)	23.49 (3.55)
Region		
Western Indonesia Region	15.02 (1.31)	22.84 (4.03)
Central and East Indonesia Region	14.84 (1.50)	23.31 (3.69)
Frequency of Information Exposure through social media		
Never – Rarely	14.45 (1.76)	22.31 (4.41)
Often	14.89 (1.44)	22.91 (3.71)
Always	15.12 (1.18)	24.38 (3.72)

\*p&lt;0.05

According to Table 5, the multivariate analysis results show that gender, age, marital status, and exposure to social media information had a significant effect on a person's knowledge of COVID-19 with a p-value  $\leq 0.05$ . The behavior in implementing health protocols and healthy lifestyles is strongly influenced by gender, age, marital status, education level, the island of residence, and exposure to social media information. The frequency of exposure to this information affects people's knowledge and behavior to apply health protocols and live healthy in the pandemic era, and also influenced by socio-demographic characteristics.

Table 5. Factors affecting the knowledge and behavior

Variable	Knowledge				Behavior			
	B	95% CI		p-value	B	95% CI		p-value
		lower	upper			lower	upper	
Sex								
Male	.	.	.	reff	.	.	.	reff
Female	0.24	0.02	0.45	0.031*	0.69	0.12	1.27	0.017*
Age								
<20 years	.	.	.	reff	.	.	.	reff
21-30 years	0.62	0.23	1.02	0.002*	-0.13	-1.17	0.91	0.804
31-40 years	0.67	0.18	1.16	0.007*	-0.80	-2.07	0.51	0.237
40 and above	0.67	0.18	1.16	0.008*	0.41	-0.89	1.72	0.534
Marital status								
Unmarried	.	.	.	reff	.	.	.	reff
Married	0.34	0.09	0.59	0.008*	1.02	0.36	1.68	0.003*
Education								
Primary	.	.	.	reff	.	.	.	reff
University	0.21	-0.08	0.49	0.161	0.79	0.02	1.55	0.043*
Occupation								
Student	0.08	-1.32	0.48	0.697	-0.32	-1.12	1.00	0.919
Unemployed	-0.16	-0.53	0.21	0.395	-0.24	-0.51	1.45	0.349
Other	-0.24	-0.58	0.09	0.151	0.23	-0.14	1.62	0.098
Private employee	-0.26	-0.54	0.03	0.074	0.19	-0.56	0.94	0.618
Government employee	.	.	.	reff	.	.	.	reff
Region								
Western Indonesia Region	.	.	.	reff	.	.	.	reff
Central and East Indonesia Region	-0.13	-0.32	0.60	0.178	0.54	0.03	1.05	0.040*
Frequency of Information Exposure through social media								
Never – Rarely	.	.	.	reff	.	.	.	reff
Often	0.39	0.05	0.74	0.024*	0.52	-0.38	1.44	0.183
Always	0.63	0.24	1.01	0.002*	2.07	1.04	3.09	0.000*

\*p&lt;0.05

### 3.2. Discussion

Data from The World Bank suggest that in 2020, 53.7% or almost 212 million of Indonesia population are active internet users and consider as third largest user in Asia [21]. Based on this study, it was found that the frequency of exposure to COVID-19 information through social media is relatively huge in Indonesia. This infers that social media enhances public awareness, promote healthy behavior, improve health outcomes, and provide health information to the community during the pandemic [22]–[24]. Furthermore, the relationship between social media and public health has been found, and the result showed that social media is able to significantly predict preventive behaviors [24]–[26]. However, misinformation about the virus on social media might affect individuals' behavioral outcomes [27], [28].

This study revealed that the frequency of exposure to information through social media directly affects people's knowledge and behavior. Previously, it was found that people who browse and select from the available messages benefit more from the information. However, those who do not actively search for information have lower knowledge, regardless of the information frequency provided [29]. This information must be kept accurate to positively benefit others rather than instigating fear [30]. Other results showed that social media exposure promotes subjective norms, and also significantly improves preventive behavior by personal means. The frequency of media and resources viewing often impact risk and media role perceptions. Therefore, it is necessary to carefully examine how the media's role shapes perception in order to promote individual compliance in the implementation of COVID-19 preventive behaviour [31]. For example, social media and online-based dissemination of information significantly impact raising personal awareness about the importance of wearing masks in the public places [32].

Furthermore, a significant influence was found between demographic characteristics such as gender, age, marital status, and exposure to social media information on the knowledge of the virus. Similar to the previous results, there is a significant relationship between demographic characteristics and knowledge of COVID-19 with the value of  $p < 0.001$ . Women have the opportunity to better understand the virus and health protocols than men. Previous study also showed that knowledge scores differed significantly between genders (female vs. male, OR: 1.50,  $p < 0.001$ ) [33].

Furthermore, the results showed that females with higher education levels take better COVID-19 prevention measures. This is similar to studies which stated that the application of COVID-19 prevention behavior increased among women with a value of 59.2% compared to that of men with 52.6%, resulting in  $p = 0.003$ . The women also have higher education with a value of 63.6% compared to 35.0% in men, thereby the  $p < 0.001$  [34], [35]. This shows that they followed the information provided more than men. The characteristics of healthier women affect the results obtained because higher education makes it easier for people to understand the risks of COVID-19, which helps to mitigate the transmission.

Aside gender and educational level, it was found that marital status also affects Indonesians' knowledge and behavior to implement health protocols and healthy living amidst the COVID-19 pandemic. Married people have a better chance of being aware of the virus than unmarried ( $\beta = -0.215$ ,  $p < 0.001$ ) [34]. Marital status and place of residence were also obtained as factors affecting a person's behavior regarding COVID-19 prevention [34]. Married individuals were statistically and significantly higher than the unmarried in the aspect of COVID-19 prevention with a mean score and p-value of 253.3 and 0.009 respectively. Specifically, married people have a better COVID-19 prevention behavior based on the family maintaining their health [35], [36].

The study also found that social media exposure to COVID-19 information influences preventive attitudes and behaviors. Higher exposure to COVID-19 details on social media was also associated with 2.5 times more chances of having higher risk perception (aOR 2.5; CI 95% 1.3–5.3) [17], [28], [37]. Predictors of preventive action are not only based on social media awareness, but also incorporate the body of health knowledge, skills, and capabilities known as health literacy. McCaffery *et al.* [38] showed differences in expertise, attitudes, and behaviors based on health literacy and public language in relation to the pandemic. Individuals with low health literacy lack understanding regarding COVID-19 because they are not able to seek and understand government's message than the literates. The internet is ubiquitous today and has drastically changed the way health information is disseminated. For example, e-health literacy is becoming increasingly important in the pandemic era as individuals seek medical advice from various web-based sources, specifically social media [38], [39]. In this regard, it is imperative to pay attention to the community's health literacy, language, and culture when conveying a health message about COVID-19 in order to form a perception that promotes awareness and compliance in implementing the prevention behavior. This study shows that having the right information affects the accuracy of people's knowledge. Later, the government, through the Ministry of Communications and Information Technology, took precautions to filter publicly available COVID-19 related information before it becomes an infodemic phenomenon [40].

Although this study yielded valuable results, it also has some limitations. Considering the research conducted through online surveys, the increase in respondent bias is enormous. A cross-sectional study

establishes the factors that influence the results which are likely to be different when implemented in other countries. Furthermore, the limited scope of the audience is dependent on the initial networks that the researchers deployed, which is not stated as representative. Nevertheless, this result is useful to inform the government about the effect of exposure to social media information on the knowledge and behavior of Indonesian people during the pandemic. Therefore, future studies need to consider more representative sampling methods, in order to increase generalizability.

#### 4. CONCLUSION

Exposure to information through online media affects people's knowledge and behavior to implement health protocols and healthy living during the COVID-19 pandemic. This is also influenced by socio-demographic characteristics, specifically women and married people. The women need to be trained to provide family members with more information and understand how to maintain their health during the pandemic. When disseminating information through online media, care needs to be taken in the form of presentation and language to minimize misinformation. The priority to prevent the spread of the virus at this time is to socialize health protocols, including handwashing, wearing of masks, and social distancing until the vaccination against COVID-19 is widespread in Indonesia.

#### ACKNOWLEDGEMENTS

The authors are grateful to the Center for Public Health, the Innovation, Medical Faculty, and Udayana University for supporting this study. Appreciation also goes to all respondents for their valuable time and effort in filling out the questionnaire.




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