

# Citizens' health practices during the COVID-19 pandemic in Indonesia: Applying the health belief model

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## Abstract

**Background:** Understanding the health practice of Indonesian residents and its related factors during the COVID-19 pandemic is crucial, but such association necessitates clarity.

**Objective:** To examine the health practices of the Indonesian citizens and their correlations with knowledge and health belief model (perceived susceptibility, barriers, benefits, severity, and self-efficacy) during the COVID-19 pandemic.

**Methods:** A community-based online cross-sectional design was employed. The study was conducted from 10 July to 30 August 2020 among 552 citizens selected using convenience sampling. Sociodemographic characteristics, knowledge, health belief model, and health practices, including wearing a mask, social distancing, and washing hands, were measured using validated questionnaires. Adjusted odds ratios (AORs) and logistic regression were employed for data analysis.

**Results:** The adjusted AORs (95% CIs) of a good level of health practices—wearing the mask, social distancing, and washing hands—were 3.24 (1.52–6.89), 2.54 (1.47–4.39), and 2.11 (1.19–3.75), respectively, in citizens with the high level of knowledge. Interestingly, respondents with positively perceived susceptibility exhibited significantly good practice in wearing the mask (4.91; 2.34–10.31), social distancing (1.95; 1.08–3.52), and washing hands (3.99; 2.26–7.05) compared to those with negatively perceived susceptibility. In addition, perceived barriers, benefits, severity, and self-efficacy also exhibited a significantly good all variables of health practice regarding COVID-19 pandemic after adjusting for confounding variables.

**Conclusion:** Citizens with high levels of knowledge and positive levels of the health belief model had good practice of wearing masks, social distancing, and washing hands. The outcomes of this survey could encourage health professionals, including nurses, through management practices of nursing intervention based on the health belief model during the pandemic.

## Keywords

COVID-19; health belief model; health knowledge; Indonesia; nursing; practice

Coronavirus disease 2019 (COVID-19) has emerged as one of the deadly pandemics in recent history (Grech, 2020; Huang et al., 2020). According to the World Health

Organization, a total of 163,312,429 infected with 3,386,825 fatalities by COVID-19 were confirmed globally as of 18 May 2021. In particular, this vulnerability has also

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emerged in Indonesia reached 1,744,045 with a case fatality of 2.77%, World Health Organization, 2020). Particularly, 215,059 people were infected in East Java with 11,707 fatalities and obtained the 4<sup>th</sup> rank in Indonesia (Gugus Tugas Percepatan Penanganan COVID-19, 2021). This situation is in line with the previous literature established that inadequate health practices among Indonesian citizens (Rias et al., 2020) or low public behaviors of citizens regarding the COVID-19 pandemic (Jose et al., 2021), complicating efforts to prevent the spread of this pandemic. Consequently, the containment of the COVID-19 pandemic must continue to rely on personal health behaviors control to decline the exposure (Bechard et al., 2021; Jose et al., 2021).

Preventing and or reducing the spread of infection is accomplished by practical personal care measures, which involved washing hands, wearing a mask, and required standard social distancing that could mitigate the COVID-19 transmission (Rias et al., 2020; Bechard et al., 2021; Muslih et al., 2021). Notably, these activities should be encouraged and viewed as primary preventative measures targeting COVID-19 immediately to protect its transmission (Muslih et al., 2021). Analysis of an environmental protection study in several countries such as South Korea, China, Italy, Iran, and the U.S. reported that over 50 million incidents were prevented by implementing good health practices (Hsiang et al., 2020). A previous study conducted in Indonesia only explored the health practices regarding the COVID-19 pandemic with sociodemographic, knowledge, and attitude variables without involving other important health-related factors (Muslih et al., 2021). Furthermore, no empirical survey has explored the health practices involved wearing masks, social distancing, and washing hands with specific determinant health factors during the COVID-19 pandemic among Indonesian citizens. Thus, empirical research of the citizens' health practices regarding the COVID -19 pandemic in Indonesia should immediately be explored.

Knowledge is critical for modifying health practices to assess public awareness in recognizing gaps and recognizing prevention efforts, particularly during a pandemic (Abdulkareem et al., 2020). A previous study in China revealed that a higher score of COVID-19 knowledge score was positively significant with good practice-not going to a crowded place and wearing the mask (Zhong et al., 2020). Additionally, even though the majority of the Indian citizen demonstrated adequate knowledge and appropriate health practices regarding the COVID-19 pandemic; however, they still have an issue with base myths and evidence. Remarkably, this issue suggested that citizens still need to assess and improve their knowledge (Narayana et al., 2020). Indonesia remains currently suffering from the COVID-19 transmission and the continuing battle against this pandemic (Rias et al., 2020; World Health Organization, 2020; Muslih et al., 2021), an association between knowledge concerning COVID-19 transmission and also the level of COVID-19-linked health practices need to be conducted.

The health belief model (HBM) is one of the theoretical guidelines for healthy lifestyle practices in epidemiology and behavioral study. Moreover, the HBM is common and widely accepted due to its high prediction accuracy (Rosenstock et al., 1988; Barakat & Kasemy, 2020). The HBM has a strong correlation with how citizens assess the challenges and difficulties they could encounter when adopting new practices related to health (Barakat & Kasemy, 2020). In a previous study conducted in India, behavioral change was examined in 638 (93.8%) of the respondents, and variables in the HBM demonstrated a positive correlation with behavioral change (Jose et al., 2021). As the health practices of the Indonesian citizens, particularly in East Java, are still uncomprehensive explored. At the same time, the HBM constructs may explain behavior in response to the COVID-19 pandemic and the involvement of HBM constructs.

A previous study analyzed health practices, which focused on assuming that having adequate knowledge and positive HBM alters one's behavior (Barakat & Kasemy, 2020; Jose et al., 2021). These conditions will assist in determining what individuals currently do and what they should do to regulate their behaviors successfully (Barakat & Kasemy, 2020; Jose et al., 2021). Notably, it may represent an effective nursing method for enhancing behavior management by using HBM procedures for optimal practices regarding the COVID-19 pandemic. Therefore, our research aimed to determine the relationship between health practices (wearing a mask, social distancing, and handwashing) and their factors during the COVID-19 pandemic among Indonesian citizens.

## Methods

### Study Design

Primary information was obtained from members of the citizens in East Java, Indonesia, using online a community-based with cross-sectional study design.

### Setting and Sample

Participants were selected from East Java, Indonesia, including rural and urban areas. The requirement for inclusion in the Google form were as follows: aged 17 until 65, able to communicate in Bahasa Indonesia, and willing to complete the informed consent form. We received 527 responses via the Google form. Therefore, a total of 522 citizens in East Java were included in the final survey. To estimated sample size, we used ClinCal application-online with incidents of not useful perceived benefit 42.9% and useful perceived benefit 57.1 (Shewasinad Yehualashet et al., 2021), and an Alpha level of .05, and a power value of .85, which calculated a sample size of 422 participants. Considering an estimated dropout rate of 25%, we increased our total sample size to 527 participants, but our sample was excluded five participants which total participant in our study was 522 citizens. The five participants were omitted because they did not agree to click the box consent form.

## Instruments

The survey of self-administered evaluations was developed based on prior investigations, which explored determining factors for health practices toward COVID-19 transmission (Rias et al., 2020; Muslih et al., 2021). There were components of a sociodemographic questionnaire that involved personal profile and characteristics of gender, age, marital status, occupation, educational level, income, and urbanicity.

Three items attributable to behaviors were used to determine health practices along with the Zhong et al.'s items (Zhong et al., 2020) and already back-translation into Bahasa (Rias et al., 2020). The content validity was determined by three experts in nursing who asked participants whether they had visited crowded places or use a face mask while outside their home in the week preceding the survey. We also assessed whether participants reported washing their hands after returning home or coming into contact with another person (yes = 1; and no = 0).

The respondents' knowledge related to COVID-19 tested levels of knowledge involved data information regarding clinical presentations, transmission paths, and COVID-19 prevention and control consisted of 12-item. Response choices were "true; wrong; and do not know"; a correct response was worth one point, while an incorrect or "do not know" response was worth zero points (Zhong et al., 2020). The total possible knowledge score was 0–12; high level (score  $\geq 10$ ) and low level (score  $< 9$ ), which indicated that a higher score suggests greater familiarity with knowledge of COVID-19. The Indonesian version of the knowledge questionnaire had good internal consistency, with Cronbach's alpha value for the KAP-COVID-19 analysis was 0.71 (Rias et al., 2020). Furthermore, Cronbach's alpha coefficient was 0.79 for our study.

The constructs for the HBM were a five-Likert scale item (one being extremely dissatisfied and five being extremely dissatisfied), and during the study, strongly dissatisfied and dissatisfied were merged to form negative, and strongly agree and agree were combined to form positive, with a total of 27 items. The content validity was 0.91, and reliability of perceived susceptibility was 0.91, severity was 0.85, benefit was 0.92, barrier was 0.75, and self-efficacy was 0.95. The questionnaire's content validity was determined by three experts in nursing. The survey tool was modified in response to their endorsements.

## Data Collection

Convenience sampling was used to distribute an online survey via a Google Form connection via WhatsApp, Facebook, and Instagram as Indonesia's most famous and accessible social media networks. All through the 10 July–30 August 2020 data collection period, we used various techniques to recruit as many respondents as possible from across the country. This entails leveraging researchers' strategic online and personal networks, as well as engaging

and circulating the survey with social media influencers and group leaders.

## Data Analysis

Descriptive analyses were used to assess sociodemographic data, knowledge, and HBM between groups. The outcomes are showed as percentages (%) and frequency ( $n$ ). The differences significance of categorical variables was calculated using a Chi-square. The relation between the three outcomes and the predictor variables was determined using a logistic regression model (sociodemographic, knowledge, and the HBM constructs). At a  $p$ -value of 0.05, statistical SPSS vers. 25 IBM (Armonk, NY, USA) significance was established. OR and 95% confidence intervals were used to express the direction and intensity of the association.

## Ethical Considerations

Ethical consideration was approved by the Survey and Behaviors Research Ethics Committee of Chakra Brahmada Lentera (reference no.: 010/09/VI/EC/Lemb.Candle/2020). Written informed consent was obtained from each participant before participation in this study. The confidentiality of the data was protected during the report, and the data were collected anonymously.

## Results

### Characteristics of the Respondents

Of 522 citizens, almost half were in the age range of 25–39 years (236, 45.2%). The majority of respondents were female (346, 66.3%), and more than half were married (304, 58.2%). Most participants were degree holders with either a monthly income of 2.5–5.9 million rupiah, of which 325 (62.3 %) and 402 (64.0 %) participants, respectively. The majority of them lived in urban areas (372, 71.3%) and were health care workers (233, 44.6%). It is also shown that 54.6% of the participants had good knowledge, 70.5% wore the mask, 61.3% did social distancing, and 69.2% washed hands. Moreover, most perceived susceptibility, severity, benefit, barrier, and self-efficacy, were 67.0%, 69.7%, 68.6%, 67.6%, and 76.4%, respectively (Table 1).

### Relationships Demographic and Determinates Factors with Practices COVID-19

The overall characteristics of the respondents are summarized in Table 2. No significant differences ( $p < 0.05$ ) were noted in gender, age, marital status, occupation, income, and urbanicity between all group outcomes. However, a significant difference in educational levels was revealed between all groups (Table 2). Notably, Table 3 shows that there were significant differences ( $p < 0.001$ ) levels in knowledge, perceived susceptibility, severity, benefit, barrier, and self-efficacy between all groups of practice variables.

**Table 1** Characteristics data of the respondents (*n* = 522)

Variables	Category	Frequency ( <i>n</i> )	Percent (%)
Gender	Male	176	33.7
	Female	346	66.3
Age	17-24	156	29.9
	25-39	236	45.2
	≥ 40	130	24.9
Marital status	Married	304	58.2
	Unmarried	218	41.8
Occupation	Unemployed workers	156	29.9
	Non-health professional	133	25.5
	Health professional	233	44.6
Income (IDR)	<2.5 million	211	40.4
	2.5~5 million	222	42.5
	6~10 million	66	12.6
	>10 million	23	4.4
Urbanicity	Rural	150	28.7
	Urban	372	71.3
Education	ISCED <3	197	37.7
	ISCED ≥3	325	62.3
Knowledge	Low (score <9)	237	45.4
	High (score ≥10)	285	54.6
Perceived susceptibility	Negative	172	33.0
	Positive	350	67.0
Perceived barriers	Negative	169	31.4
	Positive	353	68.6
Perceived benefits	Negative	164	31.4
	Positive	358	68.6
Perceived severity	Negative	158	30.3
	Positive	364	69.7
Perceived self-efficacy	Negative	123	23.6
	Positive	399	76.4
Wearing a mask	No	154	29.5
	Yes	368	70.5
Social distancing	No	202	38.7
	Yes	320	61.3
Washing hands	No	161	30.8
	Yes	361	69.2

Note: IDR = Indonesian Rupiah; ISCED ≥3 = International Standard Classification of Education with ≥ secondary education

### Specific Health Factors associated with COVID-19 of Health Practices

Importantly, the values of the AORs and 95% CIs of knowledge, perceived susceptibility, severity, benefit, barrier, and self-efficacy for practices, including using a mask, social distancing, and washing hands, are summarized in Table 4. The citizens with high knowledge (score ≥10) had a 3.24-fold higher risk (95% CIs = 1.52~6.89) of wearing a mask, and social distancing (AORs 2.54; 95% CIs = 1.47~4.39), as well as washing hands (AORs 2.1; 95% CIs = 1.19~3.75), compared with low levels of knowledge after adjusting the confounder variables. Citizens with positively perceived susceptibility had a 4.91-fold higher risk (95% CIs = 2.34~10.31) of wearing a mask, and social distancing (AORs 1.95; 95% CIs = 1.08~3.52), as well as washing hands (AORs 3.99;

95% CIs = 2.26~7.05), compared with negatively perceived susceptibility. Individuals with a positive level of perceived barriers had a 0.21-fold higher risk (95% CIs = 0.08~0.56) of wearing a mask, and social distancing (AORs 0.13; 95% CIs = 0.06~0.26), as well as washing hands (AORs 0.29; 95% CIs = 0.14~0.60), compared with negative levels of perceived barriers after adjustment for confounders. Also, participants with positive perceived benefits had a 5.37-fold higher risk (95% CIs = 2.55~11.29) of wearing a mask, and social distancing (AORs 1.80; 95% CIs = 0.99~3.30), as well as washing hands (AORs 2.73; 95% CIs = 1.52~4.90), compared with negatively perceived benefits. Moreover, a significant association was observed between being positively severity and self-efficacy of all domains of health practices related to COVID-19 after confounding variables control (Table 4).

**Table 2** Relationships of distributions of demographic with practice toward COVID-19 pandemic ( $n = 522$ )

Variables	Practice, $n$ (%)								
	Wearing a Mask when Leaving Home			Social Distancing			Washing Hands		
	No	Yes	$p$	No	Yes	$p$	No	Yes	$p$
<b>Gender</b>									
Male	57 (32.4)	119 (67.6)	0.303	78 (44.3)	98 (55.7)	0.060	58 (33.0)	118 (67.0)	0.456
Female	97 (28.0)	249 (72.0)		124 (35.8)	222 (64.2)		103 (29.8)	243 (70.2)	
<b>Age</b>									
17-24	47 (30.1)	109 (69.9)	0.241	67 (42.9)	89 (57.1)	0.339	51 (32.7)	105 (67.3)	0.543
25-39	62 (26.3)	174 (73.7)		84 (35.6)	152 (64.4)		67 (28.4)	169 (71.6)	
$\geq 40$	45 (34.6)	85 (65.4)		51 (39.2)	79 (60.8)		43 (33.1)	87 (66.9)	
<b>Marital status</b>									
Married	88 (28.9)	216 (71.1)	0.743	113 (37.2)	191 (62.8)	0.398	89 (29.3)	215 (70.7)	0.360
Unmarried	66 (30.3)	152 (69.7)		89 (40.8)	129 (59.2)		72 (33.0)	146 (67.0)	
<b>Occupation</b>									
Unemployed	48 (30.8)	108 (69.2)	0.275	68 (43.6)	88 (56.4)	0.075	50 (32.1)	106 (67.9)	0.551
Non-health professional	32 (24.1)	101 (75.9)		41 (30.8)	92 (69.2)		36 (27.1)	97 (72.9)	
Health professional	74 (31.8)	159 (68.2)		93 (39.9)	140 (60.1)		75 (32.2)	158 (67.8)	
<b>Income (IDR)</b>									
<2.5 million	64 (30.3)	147 (69.7)	0.152	92 (43.6)	119 (56.4)	0.249	69 (32.7)	142 (67.3)	0.630
2.5~5 million	64 (28.8)	158 (71.2)		80 (36.0)	142 (64.0)		65 (29.3)	157 (70.7)	
6~10 million	15 (22.7)	51 (77.3)		21 (31.8)	45 (68.2)		18 (27.3)	48 (72.7)	
>10 million	11 (47.8)	12 (52.2)		9 (39.1)	14 (60.9)		9 (39.1)	14 (60.9)	
<b>Urbanicity</b>									
Rural	48 (32.0)	102 (68.0)	0.427	63 (42.0)	87 (58.0)	0.325	51 (34.0)	99 (66.0)	0.321
Urban	106 (28.5)	266 (71.5)		139 (37.4)	233 (62.6)		110 (29.6)	262 (70.4)	
<b>Education</b>									
ISCED <3	122 (61.9)	75 (38.1)	<0.001	129 (65.5)	68 (34.5)	<0.001	116 (58.9)	81 (41.1)	<0.001
ISCED $\geq 3$	32 (9.8)	293 (90.2)		73 (22.5)	252 (77.5)		45 (13.8)	280 (86.2)	

Note:  $p$ -values were calculated using the Chi-square test, or Fisher's exact test, where appropriate. A  $p$ -value of <0.05 indicates statistical significance. IDR = Indonesian Rupiah; ISCED = International Standard Classification of Education

**Table 3** Comparisons of knowledge and HBM with practices toward COVID-19 pandemic ( $n = 522$ )

Variables	Practice, $n$ (%)								
	Wearing a Mask when Leaving Home			Social Distancing			Washing Hands		
	No	Yes	$p$	No	Yes	$p$	No	Yes	$p$
<b>Knowledge</b>									
Low (score <9)	119 (50.2)	118 (49.8)	<0.001	138 (58.2)	99 (41.8)	<0.001	117 (49.4)	120 (50.6)	<0.001
High (score $\geq 10$ )	35 (12.3)	250 (87.7)		64 (22.5)	221 (77.5)		44 (15.4)	241 (84.6)	
<b>Perceived susceptibility</b>									
Negative	109 (63.4)	63 (36.6)	<0.001	116 (67.4)	56 (32.6)	<0.001	110 (64.0)	62 (36.0)	<0.001
Positive	45 (12.9)	305 (87.1)		86 (24.6)	264 (75.4)		51 (14.6)	299 (85.4)	
<b>Perceived barriers</b>									
Negative	11 (6.5)	158 (93.5)	<0.001	15 (8.9)	154 (91.1)	<0.001	15 (8.9)	154 (91.1)	<0.001
Positive	143 (40.5)	210 (59.5)		187 (53.0)	166 (47.0)		146 (41.4)	207 (58.6)	
<b>Perceived benefits</b>									
Negative	105 (64.0)	59 (36.0)	<0.001	108 (65.9)	56 (34.1)	<0.001	99 (60.4)	65 (39.6)	<0.001
Positive	49 (13.7)	309 (86.3)		94 (26.3)	264 (73.7)		62 (17.3)	296 (82.7)	
<b>Perceived severity</b>									
Negative	115 (72.8)	43 (27.2)	<0.001	130 (82.3)	28 (17.7)	<0.001	107 (67.7)	51 (32.3)	<0.001
Positive	39 (10.7)	325 (89.3)		72 (19.8)	292 (80.2)		54 (14.8)	310 (85.2)	
<b>Perceived self-efficacy</b>									
Negative	91 (74.0)	32 (26.0)	<0.001	92 (74.8)	31 (25.2)	<0.001	84 (68.3)	39 (31.7)	<0.001
Positive	63 (15.8)	336 (84.2)		110 (27.6)	289 (72.4)		77 (19.3)	322 (80.7)	

Note:  $p$ -values were calculated using the Chi-square test, or Fisher's exact test, where appropriate. A  $p$ -value of <0.05 indicates statistical significance

**Table 4** Adjusted beta-coefficients and 95% confidence intervals (CIs) of knowledge and HBM with participants' practices toward COVID-19 pandemic ( $n = 522$ )

Variables	Practice, $n$ (%)					
	Wearing a Mask when Leaving Home		Social Distancing		Washing Hands	
	Unadjusted OR (95% CI)	AOR (95% CI)	Unadjusted OR (95% CI)	AOR (95% CI)	Unadjusted OR (95% CI)	AOR (95% CI)
<b>Knowledge</b>						
Low (score <9)	1.00	1.00	1.00	1.00	1.00	1.00
High (score $\geq 10$ )	7.20 (4.66~11.14)***	3.24 (1.52~6.89)**	4.81 (3.29~7.04)***	2.54 (1.47~4.39)**	5.34 (3.54~8.05)***	2.11 (1.19~3.75)**
<b>Perceived susceptibility</b>						
Negative	1.00	1.00	1.00	1.00	1.00	1.00
Positive	11.73 (7.55~18.22)***	4.91 (2.34~10.31)***	6.36 (4.26~9.50)***	1.95 (1.08~3.52)*	10.40 (6.77~15.99)***	3.99 (2.26~7.05)***
<b>Perceived barriers</b>						
Negative	1.00	1.00	1.00	1.00	1.00	1.00
Positive	0.10 (0.05~0.20)***	0.21 (0.08~0.56)**	0.09 (0.05~0.15)***	0.13 (0.06~0.26)***	0.14 (0.08~0.24)***	0.29 (0.14~0.60)***
<b>Perceived benefits</b>						
Negative	1.00	1.00	1.00	1.00	1.00	1.00
Positive	11.22 (7.24~17.40)***	5.37 (2.55~11.29)***	5.42 (3.63~8.08)***	1.80 (0.99~3.30)*	7.27 (4.80~11.02)***	2.73 (1.52~4.90)***
<b>Perceived severity</b>						
Negative	1.00	1.00	1.00	1.00	1.00	1.00
Positive	22.30 (13.75~36.12)***	10.94 (4.97~24.06)***	18.83 (11.62~30.52)***	10.21 (5.44~19.19)***	12.04 (7.74~18.73)***	3.67 (2.03~6.66)***
<b>Perceived self-efficacy</b>						
Negative	1.00	1.00	1.00	1.00	1.00	1.00
Positive	15.17 (9.34~24.62)***	8.02 (3.50~18.38)***	7.80 (4.91~12.38)***	2.79 (1.43~5.45)**	9.01 (5.72~14.18)***	2.62 (1.41~4.87)**

Note: Data were presented using OR and AOR,  $p$ -values were calculated using logistic regression. AOR adjusted for gender, age, marital status, occupation, income, education levels, and urbanicity. A  $p$ -value of < 0.05, \*\*  $p$ -value of < 0.01, \*\*\*  $p$ -value of < 0.001 indicates statistical significance

## Discussion

To our knowledge, no research has examined the determinants of health practices and their related factors in the East Java population during the COVID-19 pandemic, especially with an almost equal sample population from the healthcare and non-healthcare field. Although a previous study explored practices, it did not evaluate the perception of health belief toward the COVID-19 pandemic (Muslih et al., 2021). Our findings indicated that citizens who had high levels of knowledge and positive levels of all items of the health belief model of COVID-19 had good practice of wearing the mask, social distancing, and washing hands.

Prior cross-sectional reports revealed that good knowledge was significantly and positively correlated with practice against the COVID-19 transmission (Bechard et al., 2021; Muslih et al., 2021). It is in line with another study; approximately 52.9% of the individuals had positive knowledge regarding COVID-19 among Ethiopian citizens (Shewasinad Yehualashet et al., 2021). Moreover, the current study showed that citizens with good levels of knowledge have a 3.24-fold, 2.54-fold, and 2.11-fold higher risk of wearing a mask, social distancing, and washing hands compared with low levels of knowledge after adjusting the confounder variables, respectively. Another

study reported that a high level of knowledge was significantly related to social distancing, wearing a mask (Zhong et al., 2020) in China, and washing hands (Bates et al., 2020) in Ecuador. Moreover, reports study in Malaysia showed that higher levels of knowledge were consistently positively using a mask and not going to a crowded place, but not significantly with washing hands or using the hand sanitizer. Inconsistent findings have several reasons, including this variance in knowledge levels may indicate the country's current COVID-19 continuous updating.

Furthermore, though health authorities have regularly disseminated information since the disease was first discovered, there has also been an increase in false and inaccurate information. Remarkably, the information overload may have resulted in uncertainty and difficulty ascertaining accurate information (Azlan et al., 2020). Consequently, healthcare providers, including nurses, should be responsible for providing comprehensive health information through counseling programs for social distancing, wearing masks, and handwashing, to successfully boost the against COVID-19 transmission.

Interestingly, the citizens' belief of COVID-19 transmission was formulated from HBM domains. A report indicated that the health practices of the Indonesian citizens, particularly in East Java, are still the gap on the

belief related to this pandemic. Since Indonesian citizens have low adherence to health practices with a prevalence of 12%-24%, which are now critical factors for COVID-19 transmission (Muslih et al., 2021), the communities need to ensure and apply HBM constructs on preventive measures of COVID-19 infections (Shewasinad Yehualashet et al., 2021). The HBM predicts that a greater perceived susceptibility increases the probability of engaging in health-promoting behaviors such as social distancing, proper face mask use, and hand hygiene. The perceived susceptibility refers to an individual's subjective evaluation of the risk associated with COVID-19. Individuals who believe they are at low risk of contracting a disease are more likely to participate in unhealthy conduct. In comparison, anyone who thinks they are at risk of experiencing an infection is more likely to take steps to mitigate the risk (Onoruoiza et al., 2015). Remarkably, perceived benefits contribute to an individual's evaluation of the importance or effectiveness of participating in a health-promoting behavior to decline disease risk.

If a judge believes that a specific action can minimize vulnerability to or severity of a health condition, the citizen is likely to repeat the behavior regardless of empirical evidence about the action's effectiveness. Linear with the previous research in India, most participants found it incredibly easy to prevent infection if they followed the health authorities' advice (93.8%) and followed the same (Jose et al., 2021). Indeed, the HBM approach assumes that health-related practice is often affected by an individual's perceived barrier and self-efficacy from healthy activities, specifically COVID-19 preventive behavior (Tadesse et al., 2020). Similar to our results, media barriers were primarily the perceived barriers, not disease prevention barriers. The rapid introduction of various media introduced public uncertainty about behavioral changes (Jose et al., 2021). Overall effective awareness about the disease information was imperative. There were the programs that the authorities trusted, activities and information that were offered, and media resources aimed at improving health care (Rosenstock et al., 1988; Carpenter, 2010; Jose et al., 2021). Consequently, these findings and periodic evaluations of public HBM domains can be used to make policy preparation and used in the nursing intervention in the event of subsequent epidemic waves, thus avoiding the spread of a new pandemic.

The study's limitation is that data were collected via social media, which might have introduced bias due to the lack of certain target populations. Another constraint is that responses via Google's online forms could not monitor internet protocols (IP) addresses (Sharma & Tikka, 2020). However, comparable surveys have been performed (Azlan et al., 2020; Rias et al., 2020; Jose et al., 2021; Muslih et al., 2021) due to the impossibility of conducting a population survey directly due to social distancing. Another limitation was the lack of volunteers from East Java, especially rural residents, whom future studies could attempt to recruit specifically, as this may impair the findings' generalizability. However, we used multiple logistics regression analysis to

predict a large population behavior with possible confounding variables, thus eliminating the consequence of unequal distribution.

## Conclusion

Perceived self-efficacy, susceptibility, barrier, severity, and benefit were strongly related to health practices, including social distancing, washing hands, and wearing masks after adjusting the socio-demographic variables as confounding factors. The findings can be used for nurses and program managers to create successful baseline reference thresholds and establish goals in Indonesia. Also, this finding indicated that nurse educators and health professionals play critical roles in identifying and promoting treatment-targeted approaches, such as increasing knowledge and implementing the HBM constructs to improve individual practices regarding the COVID-19 pandemic among citizens in Indonesia.

## Declaration of Conflicting Interest

All the authors declare that they have no competing interests.

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## Authors' Contributions

Conception: EW, CUW, YAR, YM, SS, DLW. Investigators: EW, CUW, DLW. Design: EW, CUW, YAR, YM. Acquisition: EW. Analysis: EW, CUW, YAR, YM. Interpretation: EW, CUW, YAR, YM, DLW. Drafted manuscript: EW, CUW, YAR, YM, SS, DLW. Critically revised manuscript: EW, CUW, YAR, YM, SS, DLW. Giving final approval: EW, CUW, YAR, YM, SS, DLW. All authors agreed to be fully responsible for ensuring the integrity and accuracy of the work and approved the final version of the article.

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#### Data Availability Statement

All data generated or analyzed during this study are included in this published article. The data sets are not publicly available due to the information that could compromise research participants' privacy.

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