ORIGINAL ARTICLE

Factors impacting COVID-19 preventive behaviors in Thai adults during the initial phase of vaccination

Wiphawadee Potisopha[1], Donwiwat Saensom[1], Chanapa Noonark[2], Chompoonoot Kabkumba[3], Chatkhane Pearkao[1]

[1] Department of Adult Nursing, Faculty of Nursing, Khon Kaen University, Khon Kaen, Thailand
[2] The School of Communication Arts, Sukhothai Thammathirat Open University, Nonthaburi, Thailand
[3]Department of Psychiatric & Mental Health Nursing, Faculty of Nursing, Khon Kaen University, Khon Kaen, Thailand

Corresponding Author Donwiwat Saensom **Email:** donsae@kku.ac.th

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ABSTRACT

Public preventive behaviors can effectively help control the spread of COVID-19. Exploring the leading factors affecting these behaviors is thus vital to public health planning. This study aimed to explore factors influencing COVID-19 preventive behaviors among the Thai population. A cross-sectional online survey was distributed to Thai residents through social media applications (Facebook, Line, Instagram, and Twitter) in July 2021. The questionnaires included behaviors, knowledge, and perceived responsibility for COVID-19 control, confidence in pandemic management, having chronic diseases, COVID-19 vaccination, and demographic factors. The data was analyzed using descriptive statistics, Chi-square, T-Test, and multivariate linear regression analysis. A total of 500 participants (mean age = 40.49 ± 12.68 years; 79.2% females) completed the questionnaires. Of these, 58% were vaccinated. Participants who had college and higher education and were employed tended to be vaccinated compared to their counterparts. Most participants (70%) reported they "always" wear masks outside their homes, but only half (52.8%) admitted that they regularly use hand sanitizers. COVID-19 preventive behaviors were positively associated with preventive knowledge ($p < .001$), perception of responsibility to control COVID-19 ($p = .019$), and being a female ($p = .007$). Being employed or self-employed, on the other hand, was associated with a decrease in preventive behaviors ($p = .025$). There was no relationship between participants who took COVID-19 vaccination and preventive behaviors. To promote COVID-19 preventive behaviors, efforts should be focused on increasing public knowledge and encouraging perceived responsibility for COVID-19 control, particularly among men and those who are employed, regardless of the COVID-19 vaccination status.

Key words:
COVID-19; prevention and control; knowledge; sex; employment status

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INTRODUCTION

COVID-19 is continuing to spread around the world, with approximately 230 million confirmed cases and more than 4.7 million deaths worldwide.[1] The spread of COVID-19 impacted all aspects of wellness, including physical, emotional, and social problems. Physical health problems vary from mild to severe symptoms, especially respiratory failure, and some may even lead to death.[2] Besides, COVID-19 also affects the mental health of those who are infected.[3] Globally, governments announced the policy of lockdown in their countries and travel restrictions to avoid the spread of infection.[4,5] Travel restrictions were effective in preventing the spread of COVID-19 nationally in the early stages of the pandemic.[4,5] However, the local transmission was challenging to prevent.[5] Infection prevention strategies can also disturb personal relationships and cause economic problems.[6] Vaccines to prevent COVID-19 are perhaps the best hope for ending the pandemic.

In Thailand, around 1.5 million cases were confirmed.[7] A full-scale nationwide lockdown, curfew, and 14-day quarantine among international travelers were employed in the first wave of the COVID-19 outbreak, and targeted local lockdown and early treatment for infected cases in the provided healthcare units were implemented during the COVID-19 second wave.[8] The first dose of the COVID-19 vaccine was administered in February 2021, but it was only available for medical care providers, people with chronic diseases, and older people.[9] At that moment, the number of COVID-19 cases was low. Until April 2021, new cases had rapidly increased throughout the country while the distribution of COVID-19 vaccines for the general population was postponed from May to July.[7,9] Therefore, less than 10% of the Thai population was fully vaccinated at the end of June 2021.[10]

The spread of this virus could only be effectively controlled by public preventive behaviors, such as wearing a mask, washing hands, disinfecting frequently touched objects, practicing physical distancing, and staying at home.[11] People who are aware of COVID-19 prevention strategies may benefit from their actions.[12,13] Confidence in politicians and governments could positively or negatively influence individuals' behaviors.[14] Vaccinated people could be less likely to follow strict preventive behaviors and return to their pre-COVID-19 lifestyle, but some studies discovered that people's COVID-19 prevention actions did not change even after vaccination.[15,16] Exploring the leading factors affecting these behaviors is thus vital to public health planning in Thailand. This study aimed to explore the factors influencing COVID-19 preventive behaviors among the Thai population, particularly during the initial phase of vaccination.

METHODS

Study design and ethical considerations

An online cross-sectional survey was conducted between July 1 and July 31, 2021, following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. An ethics approval was granted for this study by the Center of Ethics in Human Research at Khon Kaen University (Study protocol number HE642174). Consent was based explicitly on the submission of the survey. There was no monetary incentive for participation, and data were kept anonymous to preserve confidentiality.

Study participants, sample size, and sampling

Eligible participants were (1) Thai residents, (2) aged 18 or older, and (3) able to read and understand the Thai language. The exclusion criteria were those who were not able to access the online survey and those who were unwilling to participate in this study. The sample size was calculated based on Cochran, with a 95% confidence interval, a power of 80%, a significant level of 0.5, and an acceptable margin error of 0.5, yielding a sample of 385 participants. We considered a nonresponse rate of 10–40% in online surveys.[17] Therefore, the sample size was increased to 540 participants. Participants were recruited using convenience sampling.

Survey tool

COVID-19 preventive behaviors were measured by asking the participants about their preventive activities recommended by the World Health Organization (WHO) and the Thailand Ministry of Public Health to reduce the COVID-19 spread in the seven days before the survey.[11,12,18] There were eight items, including wearing a mask when going out, using an alcohol-based hand sanitizer, avoiding social gatherings, social distancing, washing hands with soap, disinfecting frequently touched objects, avoiding touching eyes, nose, and mouth, and working (or studying) from home. All items were answered on a response scale from never (1), rarely (2), sometimes (3), most of the time (4), and always (5). The total scores ranged from 8-40; the higher score indicated better preventive behaviors.

The research questionnaires also consisted of COVID-19 preventive knowledge (5 items) and confidence in pandemic management by communities, hospitals, the Ministry of Public Health, and the government (4 items). Perceived responsibility for COVID-19 control was a question asking if the participants agreed that everyone was all responsible for reducing the spread of the coronavirus. These questionnaires were developed based on a literature review by the research teams from nursing and communication schools.[19,20] Respondents rated these items by using the 5-Likert Scale: 1 – Strongly disagree, 2 – Disagree, 3 – Neither agree nor disagree, 4 – Agree, and 5 – Strongly agree. The appropriate responses reflecting their knowledge, confidence, and perception of responsibility to control COVID-19 were greater or equal to four. Additionally, having a chronic disease was measured by using a self-reported question to determine whether the participants had been diagnosed with heart disease, stroke, diabetes, high blood pressure, or others (cancer, chronic obstructive pulmonary disease). COVID-19 vaccination status at least one dose (yes/no) was surveyed. Demographic factors include age (< 60 years, ≥ 60 years), sex (male, female), education level (primary school, secondary school, high school, college or higher), employment status (employed, self-employed, unemployed or housewife, student, retired or disabled), and region of residence (Capital, Northern, North-eastern, Eastern, Central, Southern or Western).

We created an anonymous, voluntary online survey using Google Forms using security and privacy configurations. The pre-testing of the questionnaires was completed by 26 Thai adults. Cronbach's alpha coefficients of COVID-19 preventive behaviors, knowledge, and confidence in pandemic management were 0.93, 0.81, and 0.76, respectively, which are acceptable. The pre-testing data were excluded from the data analysis in the large study.

Data collection

After obtaining the IRB approval, the link and QR code for the online survey were distributed to Thai residents aged 18 years and older through social media applications (Facebook, Line, Instagram,

and Twitter). To recruit participants with diverse backgrounds and locations, we distributed the questionnaire through public groups on Facebook, including local communities, districts, and provinces. Based on the pilot study, it took approximately 15–30 minutes to complete this survey. There were 514 survey responses collected from the Google Form system. Of these, 14 participants were excluded due to incomplete data submission. Therefore, a total of 500 participants were included in the final analysis.

Data analysis

The statistical analysis was conducted using the STATA program version 15.1. Before beginning the analysis, the data in the Excel spreadsheet were cleaned, sorted, and processed. Frequencies and percentages were used to analyze categorical data. A mean and standard deviation (S.D.) were used for continuous variables. We performed a Chi-square test and a T-test to compare characteristics and COVID-19 preventive behaviors by vaccination status, respectively. Demographic data collected and evaluated as covariates of multiple linear regression analysis were coded as follows: age (0 = "< 60 years", 1 = "≥ 60 years"), sex (0 = "male", 1 = "female"), education level (0 = "high school or lower", 1 = "college or higher"), and employment status (0 = "a combination of groups such as: "unemployed or housewife", "student", "retired or disabled"; 1 = "a combination of "employed" and "self-employed" groups). Multivariate linear regression analysis was applied to examine factors influencing COVID-19 preventive behaviors. Less than .05 *p*-values were considered statistically significant.

RESULTS

Demographics

The average age of the 500 participants was 40.28 (range: 18–76) years. Most of the participants were females (79.2%), had a college degree or higher education (88.6%), and were employed or self-employed (78%). Almost half (45.4%) lived in Bangkok, Thailand's capital, and about fifteen percent had chronic diseases. Fifty-eight percent of the participants received COVID-19 vaccines (Table 1). The participants who were elderly, men, and had chronic diseases had a higher proportion of vaccinated status compared to their counterparts. Participants with higher education and being employed were more likely to be vaccinated than those who had high school or lower education and were self-employed or did not work. Participants from Northern and Eastern regions were less likely to get vaccinated.

Table 1. Characteristics of study participants (n=500)

Socio-demographic characteristics	Total (n = 500)	COVID-19 vaccinated (n = 291)	COVID-19 unvaccinated (n = 203)	*p*-value
Age groups, n (%)				.001
< 60 years	447 (89.40)	251 (56.15)	191(42.73)	
≥ 60 years	45 (9.00)	36 (80.00)	8 (17.78)	
n/a	8 (1.60)			
Sex, n (%)				.030
Males	96 (19.20)	67 (69.79)	29 (30.21)	
Females	396 (79.20)	218 (55.05)	172 (43.43)	
n/a	8 (1.60)			
Education level, n (%)				<.001
Primary school	5 (1.00)	1 (20.00)	4 (80.00)	
Secondary school	32 (6.40)	10 (31.25)	22 (68.75)	
High school	20 (4.00)	7 (35.00)	13 (65.00)	
College and higher	442 (88.40)	273 (61.76)	163 (36.88)	
n/a	1 (0.20)			
Employment status, n (%)				<.001
Employed (Full-time/Part-time)	359 (71.80)	233 (64.90)	122 (33.98)	
Self-employed	31 (6.20)	12 (38.71)	19 (61.29)	
Unemployed/Housewife	31 (6.20)	13 (41.94)	16 (51.61)	
Student	42 (8.40)	11 (26.19)	31 (77.50)	
Retired/Disabled	32 (6.40)	20 (62.50)	12 (37.50)	
n/a	5 (1.00)			
Regions, n (%)				<.001
Capital (Bangkok)	227 (45.60)	160 (70.48)	64 (28.19)	
Northern	38 (7.60)	9 (23.68)	29 (76.32)	
North-eastern	86 (17.20)	49 (56.98)	36 (45.35)	
Eastern	43 (8.60)	15 (34.88)	28 (65.12)	
Central	47 (9.40)	26 (55.32)	19 (40.43)	
Southern/Western	59 (11.80)	32 (54.24)	27 (45.76)	
Chronic diseases, n (%)				.008
Yes	73 (14.60)	52 (71.23)	19 (26.23)	
No/ Don't know	427 (85.40)	238 (55.74)	184 (43.09)	

Knowledge towards COVID-19 prevention, perception of responsibility to control COVID-19, and confidence in pandemic management

Overall, the participants' COVID-19 preventive knowledge was high (see Table 2). For each item, the majority of participants (90.8–98.2%) reported appropriate responses (score ≥ 4). Almost 92% had a positive perception of responsibility to control COVID-19, meaning that they felt that everyone was responsible for reducing the spread of COVID-19. Participants expressed that they have lower confidence in pandemic management by the government and the Ministry of Public Health.

Table 2. Knowledge and attitude of COVID-19 prevention and confidence in pandemic management (n=500)

Items	Mean Rating (SD)	Responses with Rating ≥ 4 (%)
Knowledge of COVID-19 prevention		
Washing hands with soap or hand sanitizer could prevent the spread of COVID-19	4.56 (0.69)	453 (90.6)
Wearing a mask in public could prevent the spread of COVID-19	4.59 (0.64)	467 (93.4)
Staying at home and reducing the exposure to other people could protect myself from contracting COVID-19	4.71 (0.59)	474 (94.8)
Staying at home and reducing the exposure to other people could protect others from contracting COVID-19	4.56 (0.81)	454 (90.8)
A person infected COVID-19 without any signs or symptoms could spread to the others	4.88 (0.41)	491 (98.2)
Perceived responsibility for COVID-19 control	4.90 (0.37)	492 (98.4)
Confidence in pandemic management		
By communities	3.45 (1.19)	229 (45.8)
By hospitals	3.61 (1.05)	264 (52.8)
By the Ministry of Public Health	2.84 (1.31)	158 (31.6)
By the government	2.30 (1.37)	108 (21.6)

COVID-19 preventive behaviors

Figure 1 shows the participants' COVID-19 preventive behaviors in the past seven days. More than a half of them reported that they "always" wore face masks outside their homes, and half admitted that they regularly used hand sanitizers, avoided social gatherings, and practiced social distancing. One-third of the participants reported that they "always" avoided touching their faces with unwashed hands (31%), and studied or worked from home (30.8%). A sub-group analysis of COVID-19 preventive behaviors by the group with vaccination status revealed that vaccinated participants were more likely to use an alcohol-based hand sanitizer than those who had not received the COVID-19 vaccines (Table 3).

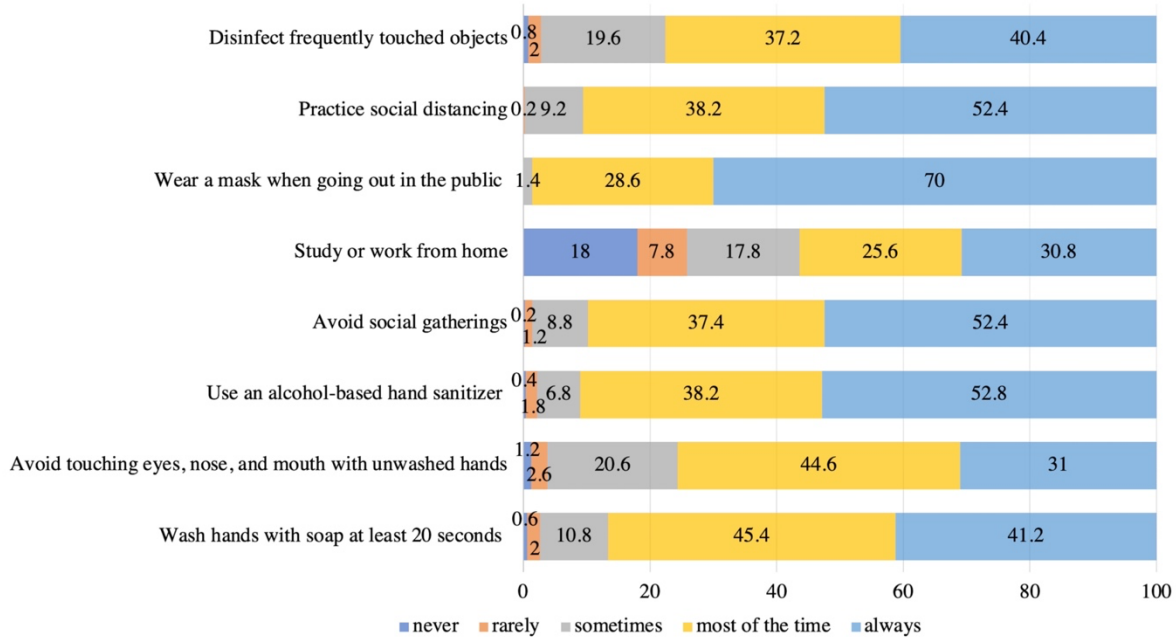

Figure 1. Distribution of COVID-19 preventive behaviors (n=500)

Table 3. COVID-19 preventive behaviors by vaccination status (n=500)

COVID-19 preventive behaviors	Vaccination (n=291) Mean (SD)	Non-vaccination (n=203) Mean (SD)	*P*-value
Wash hands with soap at least 20 seconds	4.27 (0.75)	4.20 (0.80)	0.270
Avoid touching eyes, nose, and mouth with unwashed hands	4.08 (0.80)	3.94 (0.90)	0.073
Use an alcohol-based hand sanitizer	4.48 (0.65)	4.32 (0.83)	**0.013**
Avoid social gatherings	4.39 (0.73)	4.42 (0.71)	0.685
Study or work from home	3.41 (1.45)	3.45 (1.46)	0.748
Wear a mask when going out in the public	4.70 (0.48)	4.67 (0.51)	0.426
Practice social distancing	4.43 (0.66)	4.41 (0.68)	0.753
Disinfect frequently touched objects	4.14 (0.85)	4.13 (0.86)	0.885

Abbreviations: SD = Standard deviation

Factors influencing COVID-19 preventive behaviors

Table 4 shows the Multivariate Linear Regression analysis. COVID-19 preventive behaviors were related to COVID-19 preventive knowledge (β = 0.20, $p < .001$), perceived responsibility for COVID-19 control ($\beta = 0.11, p = .019$), and sex ($\beta = 0.12, p = .007$). In contrast, being employed or self-employed was associated with a decrease in preventive behaviors (β = -0.11, $p = .025$). Whereas confidence in pandemic management, age, education, having chronic diseases, and participants' COVID-19 vaccination status were not significantly associated with individuals' preventive behaviors.

Table 4. Factors associated with COVID-19 preventive behaviors using multivariate linear regression

Factors	Unstandardized coef.		Standardized coef. (β)	*t*	*P*-value
	B (95% CI)	SE			
Constant	17.70 (11.87, 23.54)	2.97		5.97	**0.000**
COVID -19 preventive knowledge	0.41 (0.21, 0.61)	0.10	0.20	4.19	**0.000**
Perceived responsibility for COVID-19 control	1.28 (0.21, 2.34)	0.54	0.11	2.36	**0.019**
Confidence in pandemic management	0.09 (-0.01, 0.20)	0.05	0.08	1.75	0.080
Having chronic diseases	-0.67 (-1.78, 0.44)	0.56	-0.05	-1.19	0.234
COVID -19 vaccination	0.33 (-0.49, 1.16)	0.42	0.04	0.79	0.431
Age (≥ 60 years)	-0.39 (-1.89, 1.12)	0.77	-0.03	-0.51	0.613
Being a female	1.33 (0.37, 2.30)	0.49	0.12	2.71	**0.007**
College or higher education	-1.01 (-2.22, 0.19)	0.61	-0.07	-1.65	0.100
Being employed or self-employed	-1.31 (-2.45, -0.17)	0.58	-0.11	-2.25	**0.025**

DISCUSSION

This current study was conducted during the first period of the COVID-19 vaccination for the Thai public. The survey was distributed to target populations across the country via social media platforms that were popular in Thailand. Our results show that half of the participants were vaccinated with at least 1 dose of COVID-19 vaccine. The participants practiced some COVID-19 preventive behaviors regularly, and their influencing factors were knowledge, attitude, sex, and employment status.

The included participants in Thailand tended to habitually wear masks while going out. Only one-third tried to avoid touching their faces or to stay at home. These results were similar to those of a previous study's findings.[21] Firouzbakht et al.[21] discovered that 62%, 56%, and 58% of Iranian participants regularly practiced hand-washing, wearing masks, and gloves, respectively. Whereas, they rarely avoided touching their faces (31.2%) and didn't leave home unless it was necessary (44.6%). We, however, found a progressive trend of preventive behaviors among Thai populations across the year. Compared to a similar study conducted in Thailand in July 2020[22] and January to February 2021,[23] Thai people were more likely to practice COVID-19 prevention, especially by always washing their hands and always wearing a mask when going out.[22,23]

Preventive knowledge, perceived responsibility for COVID-19 control, and being female were positively associated with COVID-19 preventive behaviors, supported by numerous studies.[21,24-26] Higher knowledge was related to better individuals' preventive behaviors.[25,26] In our study, the participants had a high level of COVID-19 prevention knowledge. Their higher educational background could lead to a higher mean score of COVID-19 knowledge, resulting in the improvement of applying preventive behaviors.[13] A study conducted in the U.S. (Washington, D.C. and

Puerto Rico) has revealed that the interactions between knowledge of behavioral control and attitudes predicted each preventive behavior (wearing a face mask and staying home if getting sick).[12] A qualitative study in Indonesia explored that individual responsibility is the main concern of the COVID-19 spread during the new normal.[27] The respondents' perception of the ignorance of others increases the individual risk of COVID-19 and the mistrust of government management.[27] Another study in Egypt and Jordan revealed that the willingness of people to take action against COVID-19 was a sense of responsibility for their own health, followed by concern for the spread of infection to other people.[28]

Interestingly, there are discrepancies in knowledge and behaviors between sexes in several countries.[24,29] There was evidence from eight countries (Australia, Austria, France, Germany, Italy, New Zealand, the United Kingdom, and the United States) supporting sex differences in COVID-19 behaviors.[24] A cross-sectional study of Turkish healthcare workers has revealed that women had more knowledge about COVID-19 compared to men.[29] Also, being male is associated with lower COVID-19 preventive behaviors, as reported in Iran and Bangladesh.[21,26] Women are more likely to perceive the pandemic as a very serious health problem and tend to practice recommended COVID-19 prevention measures compared to men.[24] Our study also supports that being a woman was related to COVID-19 preventive behaviors.

Another interesting finding of this current study is that participants who work (employed or self-employed) were less likely to adhere to preventive behaviors. The reason behind this issue could be related to the types of work or a pandemic protocol in their workplace. Occupations such as unskilled workers had an impact on differences in COVID-19 preventive behaviors, particularly staying at home.[30] In a study conducted among the general public in Mexico City and the State of Mexico, workplace pandemic protocols may impact employee behaviors, especially among those who work in the informal economy.[31] The "Stay at home" policy could be the biggest challenge since they did not have any income or any monetary support.[31] In our study, around 80 percent of our participants were employed or self-employed, and some had part-time jobs while studying to cover their bills. Some occupations, such as healthcare providers and drivers, cannot work from home. Many private agencies did not have the policy to stay at home; therefore, employees might not be able to adhere to this prevention strategy. Another concern is that people who stayed at home may not strictly perform COVID-19 preventive behaviors because they were less likely to contact infected people.

Across our sample, confidence in pandemic management towards hospitals was high. On the other hand, we found low confidence in government pandemic management. This result is similar to a study conducted on the Latvian general population indicating their overall low level of trust in the government.[32] Also, a similar study in Israel showed that its participants reported low levels of government trust but had high levels of trust in science and primary care providers.[33] Even though many studies have discovered a strong relationship between confidence or trust in organizations such as the government or national health ministry and COVID-19 preventive behaviors,[14,34,35] there was a contrary finding in our study. We did not find any impact of either overall confidence or confidence in each organization on the samples' preventive behaviors. Our participants complained about the COVID-19 management by the Thai government. However, it is important to build confidence in the government and other organizations to encourage the population

to follow COVID-19 preventive guidelines. Additionally, a study exploring the trust in information sources is needed to communicate recommended COVID-19 preventive behaviors.

The Thai government policy of COVID-19 vaccination was first prioritized for the elderly and the people with chronic diseases, as well as healthcare providers.[7,9] Employed individuals may need to receive the vaccination to return to work onsite following the workplace policy or if their organization offers a vaccination program in the private sector. In this study, there were differences in the characteristics of individuals who were vaccinated and unvaccinated. Individual COVID-19 preventative behaviors did not differ between participants who were vaccinated and those who were not. This finding is similar to that of a previous study conducted in 15 countries.[15] Additionally, vaccinated participants were more likely to apply hand sanitizer than non-vaccinated people. This finding suggests self-concern motivates people to continue COVID-19 prevention behaviors even after vaccination, in the early phase of the COVID-19 vaccine distribution in Thailand.

Limitations and recommendations

There are some limitations of this study. Firstly, an online self-reported survey without external observation could lead to a chance of bias. We could not assess their actual behaviors. Secondly, only people who used social media and were following accounts that posted the announcement could access the link to this survey, which potentially causes sampling biases. COVID-19 has affected all classes of society, including vulnerable people who might not be able to access this survey. Next, this study may limit the participation of people who have internet issues or lack technological literacy. Despite these limitations, this online study has several advantages. Participants from a wide geographic range were reached. This study has also brought up that enhancing the preventive behaviors for the new variances of COVID-19 still needs to be promoted, regardless of vaccination status.

CONCLUSION

Preventive behaviors have a significant relationship with knowledge, perceived responsibility for COVID-19 control, sex, and employment status. There are no differences in behaviors preventing COVID-19 between people who got vaccinated and those who did not. To promote individuals' preventive behaviors, efforts should be focused on increasing COVID-19 preventive knowledge and encouraging a positive perception of responsibility, particularly among those who are men and those who are employed or self-employed.

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