

Preventive Practice towards Covid-19 and Its Associated Factors among Malaysian Adults during Massive Outbreak in 2021

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Abstract

Combating COVID-19 pandemic will not be successful without everyone's cooperation from all levels of society. Therefore, this study assessed the extent of the public's knowledge, attitude, and preventive practice towards COVID-19. The current study also determined the associated factors for preventive practice towards COVID-19 among Malaysian adults. An online cross-sectional study was conducted among 897 Malaysian adults. Data were collected using the snowball sampling method via the online platform: WhatsApp, Facebook, Twitter, Telegram, and email. Multiple linear regression analysis was performed to determine the association between all independent variables and the preventive practice of COVID-19. The mean (SD) scores for knowledge, attitude, and preventive practice towards COVID-19 were 122.70 (6.05), 249.91 (17.29), and 64.48 (5.58), respectively. Preventive practice towards COVID-19 were associated with gender ($p < 0.001$), race ($p = 0.002$), history of being fined due to noncompliance to COVID-19 SOP ($p = 0.002$), knowledge on COVID-19 ($p < 0.001$), and attitude towards COVID-19 ($p = 0.017$). The overall knowledge, attitude, and preventive practice towards COVID-19 among Malaysian adults were satisfactory. Health education should focus more on the identified factors, and legislation enforcement should be enhanced to ensure COVID-19 SOP compliance.

Keywords

Coronavirus, Health Behavior, Pandemic, Population Study

Introduction

World Health Organization (WHO) declared the COVID-19 pandemic in March 2020¹. Since then, it has spread rapidly worldwide, posing enormous health, economic, environmental, and social challenges to the

entire human population². The Malaysian government had carried out a nationwide control and preventive measures for COVID-19 to overcome the pandemic led by The National Security Council (Majlis Keselamatan Negara or MKN). The first Movement Control Order (MCO) was initiated from 18th March 2020 to 28th April 2020, followed by second MCO from 13th January 2021 to 5th March 2021, and third MCO from 6th May 2021 until 1st August 2021. The components of MCO included restriction in interstate and inter-district traveling, closure of non-essential economic sectors, work-from-home order, closure of the schools, prohibition of mass gatherings, stay-at-home advice, and prohibition of contact sports³.

At the personal or societal level, several preventive measures had been implemented since the beginning of the pandemic in 2020. Proper hand washing with soap and the usage of hand sanitizer were promoted continuously through all types of media². Secondly, everyone was advised to maintain physical distancing at least one meter from each other⁴. The WHO, along with other international as well as national health institutions, issued advice that aside from the vaccines to prevent COVID-19, the best way to decrease the spread of the virus is through lowering individual risk by proper hand washing and social distancing measures⁵. Thirdly and most importantly, wearing a face mask was promoted and made compulsory on 1st August 2020 (MKN, 2020). The use of face masks in the community primarily served as a means of disease control and was particularly relevant in pandemic situations when the number of asymptomatic but infectious person in the community was high⁴.

However, all these preventive measures could be meaningless if everyone did not practice them in the society. This pandemic could not be tackled without the cooperation of every individual to comply with the preventive measures implemented by the government. As of August 2021, Malaysia ranked 115 of 121 countries in Nikkei's Covid-19 Recovery Index⁶. Thus, the current study is crucial to assess the knowledge, attitude, and practice regarding COVID-19 prevention among Malaysian adults during the massive outbreak in 2021. This study also determined the associated factors for preventive practice towards COVID-19. Evaluating the preventive practice towards COVID-19 among the general public could be beneficial in providing better insight to understand the influence of knowledge and attitude on people's preventive actions. Thus, this study provided crucial information to policymakers for future effective preventive strategies among Malaysian adults if another wave of COVID-19 is to hit. This research also gave a general picture of Malaysians' preventive practice during the MCO, which can better prepare the people to address future health crises involving infectious diseases. The results of this research were essential to inform future efforts focusing on societal readiness to comply with pandemic control measures⁶.

Methodology

Study Design and Subjects

A nationwide cross-sectional study was conducted from the 25th of July to the 9th of September 2021. All adults aged 18 years and above living in Malaysia were invited to participate in the study. On the other hand, those who were non-Malaysian citizens, Malaysian citizens staying abroad during the survey, or those who were mentally disabled were excluded from the study.

The sample size was calculated for each factor associated with preventive practice towards COVID-19 using Power and Sample Size Calculation software version 3.1.2. Two means comparison sample size calculation approach was applied, and the largest estimated sample was 786 using 0.5 as the standard deviation score of the preventive practice score among males⁷, an estimated standard deviation of 0.10, 5% type 1 error,

and 80% power. After adjusting for 10% of expected missing data, the total number of respondents required was 873.

Sampling Method and Data Collection

Data was collected using the snowball sampling method through online platforms, namely WhatsApp, Facebook, Twitter, Telegram, and email. The data collection commenced from the 9th to the 12th of August 2021. There was a total of 31 researchers involved in spreading the questionnaires. Each distributed a Google Forms link containing the questionnaires to their close friends and family members. Implied consent was applied referring to participants ticking a consent button indicating their agreement to participate in the study.

Operational Definitions

Preventive practice was defined as the actions taken by the respondents to prevent the transmission of COVID-19 during the pandemic. These actions included personal practice of hand washing, wearing a face mask, and compliance with the Movement Control Order (MCO).

Educational level was defined as the highest level of education a respondent has successfully completed. It was categorized into low educational level which referred to secondary education, and high educational level for tertiary education. Monthly household income was categorized into low, which referred to the B40 or M40 groups, and high, for the T20 group. Front liner status referred to a frontline worker with public-facing jobs, including healthcare workers and other essential workers such as protective service workers (police and emergency medical services).

COVID-19 vaccination status was categorized into two: not vaccinated and vaccinated. The respondents were classified as vaccinated if they had at least one vaccination dose. Co-morbidities referred to the underlying illness classified as risk factors for severe COVID-19 infection, such as obesity, stroke, asthma, cancer, diabetes, hypertension, heart disease, and kidney failure.

Knowledge of COVID-19 included awareness of the *SARS-CoV-2* virus, disease transmission, high-risk group, risk factors for exposure, symptoms, and disease complications and their risk factors. Attitude towards COVID-19 was defined as the willingness and motivation to prevent COVID-19. Attitude included respondents' concern about going out during MCO, parties that were responsible during the pandemic, the efficacy and compliance of the current MCO guidelines, potential success in controlling the pandemic, the efficacy of quarantine guidelines, attitude towards COVID-19 patients, screening program, and government roles in providing COVID-19 information.

Research Tool

A validated questionnaire was adopted to assess the knowledge, attitude, and preventive practice towards COVID-19. The questionnaire comprised of five sections: Section 1: Sociodemographic, which included age, gender, marital status, educational status, occupation, frontline status, and household income; Section 2: Personal experience related to COVID-19, which included vaccination status, covid-19-related history, and comorbidities; Section 3: Knowledge regarding COVID-19; Section 4: Attitude towards COVID-19; and Section 5: Preventive practice towards COVID-19.

There were seven subdomains and a total of 45 items that explored the respondents' knowledge regarding COVID-19. The response options were either true, don't know, or false. Three marks was given for a correct answer, two marks if the respondent didn't know, and one mark for a wrong answer. The maximum score for knowledge was 135. On the other hand, 12 subdomains and 62 items were used to assess the respondents' attitude towards COVID-19. Five points Likert scale was used for scoring. The maximum score for attitude was 310. Meanwhile, six subdomains and a total of 34 items were used to study the respondents' preventive practice towards COVID-19. Three points Likert scale was used for scoring. The maximum score for preventive practices was 102.

Validity and reliability analysis were done by Amaran et al. (2020) in their previous study⁸. Analysis for the knowledge domain was done using item response theory (IRT) analysis. They reported that evaluation of model fitness indicated that the model was fit with good item fit. Item Characteristics Curve (ICC) and Item Information Curve (IIC) were satisfactory. The total information was 40.8%, with information ranged between ± 3 is 87.79%.

Meanwhile, exploratory and confirmatory factor analysis were performed to assess the validity and reliability of attitude and preventive practice domains. For all the subdomains in the attitude domain, the internal consistency reliability (Cronbach alpha) was reported to range from 70% to 93%, and the composite reliability was reported to range from 75.1% to 91.8%⁸. Meanwhile, the preventive practice domain revealed the internal consistency reliability (Cronbach alpha) ranged from 81% to 87%, and the composite reliability ranged from 74.5% to 82.9%⁸.

Statistical Analysis

The data were analyzed using SPSS version 22.0. Descriptive statistical analysis was used to describe the variables. Numerical variables were described as mean and standard deviation (SD), and categorical variables were described as frequency and percentage (%). Both univariable and multivariable analyses were performed to determine the associated factors for preventive practice towards COVID 19. The independent variables were socio-demographic characteristics, personal experience related to COVID-19, vaccination status, knowledge of COVID-19, and attitude towards COVID-19. The dependent variable was preventive practice towards COVID-19. For further steps in multivariable analysis, simple linear regression was used to screen and select the independent variables with a *P*-value of less than 0.25. Selected independent variables were analyzed using forward method to obtain the preliminary model. The multicollinearity and interactions were checked. The model was reasonably fit, and all assumptions were met. The final model was presented with crude and adjusted regression coefficients with 95% Confidence Intervals (CI), their corresponding *p*-values, and overall *R*² values.

Ethical Consideration

Description of the research and its confidentiality had been displayed on the initial page of the google form, including information that their data will be kept anonymous and confidential without requiring them to reveal their identities. Implied consent was taken. Ethical approval from UniSZA Human Research Ethical Committee (UHREC) was obtained prior to data collection (UniSZA/UHREC/2021/280).

Results

Sociodemographic characteristics, personal experience, and comorbidities among respondents.

A total of 897 Malaysian adults aged from 18 to 68 years voluntarily participated in the study. The majority of the respondents were female, Malay, single, reached the tertiary educational level, unemployed, and not front liners (Table 1).

The majority of the respondents were vaccinated and did not have comorbidity. More than a quarter of them had been quarantined before, and very few of them had ever been fined due to noncompliance to COVID-19 standard operating procedure (SOP) (Table 2).

Knowledge on COVID-19

The mean (SD) score of knowledge on COVID-19 among the respondents was 122.70 (6.05). Only a minority of them responded correctly that COVID-19 was not caused by SARS-CoV-1 or MERS-CoV. Moreover, only half of the respondents (52.5% and 51.1%, respectively) knew that SARS-CoV-2 caused COVID-19 and the virus came from a bat. On the other hand, many respondents knew that COVID-19 was a new virus (71.9%), and it was from the coronavirus group (86.8%).

Most of the respondents had the right idea that children (84.1%), adults (79.2%), and the elderly (99.6%) were all susceptible to get COVID-19. Regarding symptoms of COVID-19, most of the respondents knew that cough (96.9%), fever (99.4%), runny nose (91.5%), diarrhea (70.5%), fatigue (89.4%), sore throat (95.3%), shortness of breath (98.6%), lethargy (84.6%), loss of smell (94.4%) and loss of taste (97.0%) could be the symptoms of COVID-19. Most of them (77.6%) also knew that COVID-19 patients could be asymptomatic.

Table 1: Socio-demographic characteristics of respondents (n=897)

Variable	n (%)	Mean (SD)
Age (years)		30.89 (12.28)
Gender		
Male	286 (31.9)	
Female	611 (68.1)	
Ethnicity		
Malay	801(89.3)	
Non-Malay	96(10.7)	
Education level		
Low	57 (6.4)	
High	840 (93.6)	
Occupational Status		
Unemployed	502 (56.0)	
Employed	395 (44.)	
Marital Status		
Single/Divorced/Widow/Widower	567 (63.2)	
Married	330 (36.8)	
Monthly Household Income		
Low	759 (84.6)	
High	138 (15.4)	
Frontliner status		
No	806 (89.9)	
Yes	91(10.1)	

Table 2: Personal experience related to COVID 19 and comorbidity among respondents (n=897)

Variables	Frequency (%)
COVID-19 Vaccination Status	
Yes	164 (18.3)
No	733 (81.7)
Personal experience related to COVID-19	
Quarantined	274 (30.5)
Diagnosed with COVID-19	29 (3.2)
Family member/s diagnosed with COVID-19	244 (27.2)
Family member/s passed away due to COVID-19	49 (5.5)
Fined due to noncompliance to COVID-19 SOP	5 (0.6)
Comorbidities	
No	750 (83.6)
Yes	147 (16.4)

More than half of the respondents (51.2%) wrongly assumed that COVID-19 was transmitted when a patient's respiratory fluid splashed onto another person's skin. In contrast, they were aware that COVID-19 disease transmission could occur when sharing the same airspace with COVID-19 patients (84.8%), when a patient's breathing fluid splashed into another person's mouth, nostrils or eyes (93.3%), and when an individual with contaminated hands touched their own eyes, nostrils or mouth (96.3%).

More than 90% of respondents were aware of conditions with increased risk of COVID-19 infection. The conditions included visiting the home of COVID-19 infected person (99.4%), living in the same house as COVID-19 infected person (98.3%), sharing workspace with COVID-19 infected person (99.2%), sharing a vehicle with COVID-19 infected person (98.9%), sharing the dining room with COVID-19 infected person (97.0%), physical contact with COVID-19 infected person (97.1%), sitting close to COVID-19 infected person (98.1%), being indoors with COVID-19 infected person (98.8%), and giving treatment to COVID-19 infected person without wearing personal protective equipment (98.1%).

Most respondents answered correctly that death (98.7%), lung infection (92.6%), and severe respiratory attacks (98.7%) are complications of COVID-19. Less answered correctly are heart attack (46.7%) and kidney failure (40.6%) as complications of COVID-19. The respondents were also aware that the high-risk groups for COVID-19 complications were obese people (68.3%), smokers (77.8%), elderly (98.6%), cancer patients (80.4%), diabetics (84.4%), and those with chronic kidney failure (80.9%). In contrast, almost half of them (49.3%) believed that males have less risk of COVID-19 complications.

Attitude towards COVID-19

The mean (SD) score for attitude towards COVID-19 was 249.91 (17.29). Most of the respondents agreed that COVID-19 caused people to be worried about going out to places such as hospitals (86.5%), workplaces (93.0%), family members' houses (78.6%), groceries stores (80.3%), and vaccination centers (55.6%).

Most of the respondents had a positive attitude regarding agencies responsible for controlling the spread of COVID-19. They agreed that the police (87.6%), employers (91.8%), individuals (99.6%), society (99.4%), leaders of the country (96.0%), Malaysian National Security Council (96.1%) and Ministry of Health Malaysia (97.0%), were all responsible in controlling the spread of COVID-19.

Most of the respondents agreed that the MCO regulation was important and effective in controlling the spread of COVID-19. They decided that the closure of factories (94.2%), the closure of schools (90.8%), cross-state restrictions (93.4%), cross-district restrictions (84.9%), work from home (93.5%), large-scale gatherings restriction (97.9%), group sports activities restriction (94.9%), enhanced movement control order (EMCO) (95.4%), and closure of non-essential stores (74.3%), were all effective in reducing the spread of COVID-19. Most of the them also agreed that quarantine centers (82.8%), hotels (56.0%), and homes (60.7%) were effective places for quarantine.

On the other hand, majority of the respondents thought that MCO had significant adverse effects on society. For example, MCO affected work performance (80.1%), made people depressed (92.4%), affected the country's economy (92.1%), reduced an individual's income (94.9%), and affected family relationship (59%). The majority agreed that public non-compliance with the rules of MCO was due to the economic pressure (96.3%), easily bored at home (65.1%), missing their family (79.1%), and the ineffective enforcement of MCO (77.9%).

Regarding COVID-19 screening, most of the respondents agreed that screening should be done to close contacts (98.3%), patients should not hide their symptoms (98.3%), patients should not hide their COVID-19 contact history (98.2%), and patients should not hide their travel history (98.6%). They also agreed that screening should be done for individuals with symptoms even with no close contact (90.9%).

The respondents knew that COVID-19 patients were at risk of depression (96.0%) and had to face social stigma (76.1%). They also agreed that asymptomatic patients (77.3%) and mildly symptomatic patients (68.6%) could be isolated at home. Most respondents (97.2%) agreed that individuals under home quarantine should not get out of their houses. Besides that, the majority of them believed that the individual could not do the followings; go out if they have no COVID-19 symptoms (70.2%), mingle with people in their house (64.7%), share the same toilet with others at home (61.8%), eat together with others at home (71.5%), and go out to buy necessities (77.6%).

More than half of the respondents agreed that information regarding COVID-19 from the government was accurate (71.8%), fast (70.3%), thorough (63.7%), satisfying (63.7%), and easily understood (74.9%). They also agreed that effective channels for COVID-19 information sharing were television (92.1%), MySejahtera mobile application (91.0%), Facebook (84.1%), SMS (77.7%), Telegram (69.1%), newspaper (69.1%), and advertising board (68.1%).

Preventive practice towards COVID-19

The mean (SD) score for preventive practice towards COVID-19 among the respondents was 64.48 (5.58). Table 3 shows item analysis of preventive practice towards COVID-19 among respondents. More than half of the respondents frequently practiced positive techniques of handwashing. In addition, most respondents also had positive handwashing habits and never went out of the house during both MCO from March 2020 until May 2020 and from May 2021 until June 2021 except to buy groceries.

Factors associated with the preventive practice towards COVID-19

Multiple linear regression analysis showed five significant variables in the final model, as shown in Table 4. There were significantly positive linear relationships between gender, race, knowledge of COVID-19, and attitude towards COVID-19 with the preventive practice towards COVID-19. On the other hand, there was

a negative significant linear relationship between the history of being fined due to COVID-19 SOP breaches with the preventive practice towards COVID-19. The model can be interpreted as follows:

- An increase of 1.74 score of preventive practice was seen in female respondents compared to that of males.
- An increase of 1.78 scores in preventive practice was demonstrated in non-Malay compared to Malay.
- An increase of 10-unit score of knowledge about COVID-19 resulted in a rise of 1.1 units in the total score of the preventive practice of COVID-19.
- An increase in 10 units score of attitude towards COVID-19 will increase by 0.30 units in the total score of the preventive practice of COVID-19.
- Those fined due to noncompliance to COVID-19 SOP had 7.62 lesser score of preventive practice towards COVID-19 than those who complied.

Table 3: Item analysis of preventive practice towards COVID-19 among respondents (n = 897)

Variables	Frequency (%)		
	Often	Sometimes	Never
Handwashing techniques:			
Use water only	501 (55.9)	298 (33.2)	98 (10.9)
Use soap and water	742 (82.7)	152 (16.9)	3 (0.3)
Use hand sanitizer	642 (71.6)	245 (27.3)	10 (1.1)
Use the 7 steps recommended by MOH	480 (53.5)	344 (38.4)	73 (8.1)
Handwashing habits:			
Before eating	879 (98.0)	17 (1.9)	1 (0.1)
After returning from the store	794 (88.5)	94 (10.5)	9 (1.0)
After returning from the market	809 (90.2)	81 (9.0)	7 (0.8)
After using the toilet	811 (90.4)	77 (8.6)	9 (1.0)
Before touching the face	548 (61.1)	331 (36.9)	18 (2.0)
When handling food	859 (95.8)	34 (3.8)	4 (0.4)
During the Movement Control Order (MCO) from March until May 2020, I went out of the house to...			
meet the neighbours	28 (3.1)	203 (22.6)	666 (74.2)
meet a friend	35 (3.9)	237 (26.4)	625 (69.7)
go out to the park	40 (4.5)	164 (18.3)	693 (77.3)
go out and buy groceries	240 (26.8)	516 (57.5)	141 (15.7)
meet family members who live near the house	58 (6.5)	316 (35.2)	523 (58.3)
During the Movement Control Order (MCO) from May 2021 until now, I went out of the house to...			
meet the neighbours	26 (2.9)	261 (29.1)	610 (68.0)
meet a friend	40 (4.5)	282 (31.4)	575 (64.1)
go out to the park	36 (4.0)	192 (21.4)	669 (74.6)
go out and buy groceries	231 (25.8)	564 (62.9)	102 (11.4)
meet family members who live near the house	55 (6.1)	361 (40.2)	481 (53.6)
Face mask wearing technique			
I pulled the face mask down my nose	82 (9.1)	239 (26.6)	576 (64.2)
I covered my nose and mouth completely	864 (96.3)	25 (2.8)	8 (0.9)
My chin was exposed while wearing a face mask	74 (8.2)	127 (14.2)	696 (77.6)
I was comfortable letting my face mask loose	51 (5.7)	178 (19.8)	668 (74.5)
I pull the face mask down my chin while eating	230 (25.6)	357 (39.8)	310 (34.6)

Table 4: Factors associated with total practice scores (n =897)

Variables	Simple Linear Regression		Multiple Linear Regression ^b	
	Crude <i>b</i> (95% CI)	<i>p</i> value	Adjusted <i>b</i> ^a (95% CI)	<i>p</i> value
Gender				
Male	0.00		0.00	
Female	2.07 (1.30, 2.84)	<0.001	1.74 (0.96, 2.51)	<0.001
Race				
Malay	0.00		0.00	
Non-Malay	1.72 (0.54, 2.90)	0.004	1.78 (0.64, 2.92)	0.002
History of being fined due to non-compliance to COVID-19 SOP				
No	0.00		0.00	
Yes	-9.14 (-14.01, -4.26)	<0.001	-7.62 (-12.36, -2.88)	0.002
Knowledge on COVID-19	0.17 (0.11, 0.23)	<0.001	0.11 (0.05, 0.17)	<0.001
Attitude towards COVID-19	0.05 (0.03, 0.07)	<0.001	0.03 (0.01, 0.05)	0.017

^aMultiple linear regression (Forward method was applied); ^bregression coefficient, R²=8.2%

Discussion

COVID-19 is an infectious disease caused by the newly discovered strain of coronavirus. Up to the time study was conducted, no specific treatment for COVID-19 has been found. Therefore, preventive measures are crucial to prevent and control the rapid spread infection of COVID-19. Standard and quality precautions are essential to restrain the spread of the SARS-CoV-2 virus worldwide. Preventive measures such as hand hygiene with soap or sanitizer, wearing mask and gloves, physical distancing of 1 to 2 meters, avoidance of mass gatherings, avoidance of unnecessary travel to affected areas, self-isolating if symptomatic, and following strict local guidance if asymptomatic will help in suppressing the spread of viral infection⁹.

Knowledge on COVID-19

Individual preventive practice plays a fundamental role in determining society's preparation to accept and adhere to preventive measures prescribed by the government. The current study showed that Malaysian adults had good knowledge of COVID-19. A good level of knowledge was expected because the pandemic was the main focus and concern worldwide. People received much information on COVID-19 from multiple sources, such as social media and mass media, as it was covered widely daily. Most respondents answered correctly on the mode of transmission, susceptible group, and situations that increased the risk of COVID-19. Aside from that, less than half of respondents recognized the scientific name of the virus causing COVID-19 because it was less frequently used in the media. Therefore, COVID-19 was more familiar and applicable to laymen.

Most respondents agreed that COVID-19 could easily infect children (84.1%) and the elderly (99.6%). A similar finding was noticed in a previous study where 89% of the respondents indicated that the most vulnerable people to get COVID-19 were the elderly and people with an underlying health conditions¹⁰, and 40% of the respondents believed that children under five years of age were at high risk of developing COVID-19⁹. However, only 79.2% of respondents in the current study agreed that adults were also susceptible to COVID-19 infection. This showed that the respondents might not be aware of or underestimated the risk of COVID-19 disease among adults.

Regarding knowledge of COVID-19 symptoms, 29.5% of the respondent did not aware of diarrhea as one of the COVID-19 symptoms. In Jordan, a study conducted among university students also showed that a large proportion of respondents (59.2%) were unaware of diarrhea as a COVID-19 symptom⁹. The general public needs to be aware of the symptoms to be more alert regarding the COVID-19 infection.

Overall knowledge of the complication of COVID-19 was satisfactory. However, less than 50% of the respondents knew that kidney failure and heart attack are also possible COVID-19 complications. This is probably because many people understand coronavirus as a respiratory infection, and complications highlighted in the media mainly were related to the respiratory system, such as infection in the lungs and severe respiratory distress. A similar result was found in a previous study among university students in Jordan, where 55.2% recognized that COVID-19 could cause damage to other organs such as the kidney, heart, and liver⁹.

Attitude towards COVID-19 prevention and control

The majority of the respondents had a positive attitude towards COVID-19. Most were concerned about COVID-19 prevention and control, such as avoiding crowded places and proper hand hygiene practice. This coincides with research done in India, where there is marked fear of attending public gatherings, using public transportation, and touching any surface among the residents¹¹. Moreover, the result is consistent with prior cross-sectional research among nurses in the Philippines, which suggested that Filipino frontline nurses experienced mild-to-moderate levels of fear of COVID-19¹². In addition, it was also similar to a previously conducted online survey among 400 residents in Karachi, Pakistan. The study revealed that the spread of COVID-19 had resulted in the subsequent development of fears in the target population, with the majority of the respondents starting to practice preventive measures to control the infection¹³.

Almost all respondents agreed that individuals and society play a significant role in controlling the spread of COVID-19. A similar result was seen in a previous online cross-sectional study among Vietnamese, which showed a high level of agreement among the population towards the importance and necessity of community response measures to combat the COVID-19 pandemic¹⁴. These are all excellent indicators that the community showed to end the pandemic. Preventive measures such as physical distancing, mask-wearing in public, hand washing with soap and water or an alcohol-based hand rub, choosing well-ventilated spaces, and getting vaccinated rely on individual behaviour as a key. These measures aimed to flatten the curve of the infection. Thus, it is clear that preventive measures like practicing physical distancing behaviours and wearing masks are considered signs of social responsibility.

Nonetheless, it is undeniable that government actions are also necessary. The present study showed that a vast majority of the respondents (96%) agreed that the country's leaders were responsible for controlling the spread of influence COVID-19. Strong leadership and commitment from the highest political level are essential in mobilizing different sectors and groups to prevent and control COVID-19¹⁵.

Malaysian government had enforced a few series of MCO following the surge of COVID-19 pandemic in Malaysia. The MCO implementation in Malaysia included large-scale gathering restrictions, closure of schools and factories, group sports activities restrictions, and cross-district and cross-state restrictions. This study demonstrated that the majority of the respondents agreed with MCO implementation. This finding was similar to a survey among 812 adult respondents in Sudan that showed about two-thirds of respondents (66.9%) decided that religious gatherings and events should be cancelled during this pandemic¹⁶. The current study also showed that most respondents agreed that public non-compliance with the rules of MCO is due to economic pressure (96.3%). Nevertheless, this result contrasts with a previous online news report review which revealed most MCO violations in Malaysia were due to social-related reasons, and only a tiny number were related to economic factors¹⁷.

More than half of the respondents were aware of the importance of MCO. Still, at the same time, they acknowledged that MCO also negatively affected mental health and economic income. Previous studies showed that people experienced mental health problems due to the strict control measures during the

pandemic¹⁸⁻²⁰. During the pandemic, many Malaysians had lost their jobs because business activities had to be temporarily halted, and some had undergone business closure. Consequently, the country's unemployment rate reached 4.5% in 2020, the highest in almost three decades²¹. Based on an online study by the Academy of Professors Malaysia (APM), 91% of respondents were able to sustain themselves for the first two weeks of MCO (ending 31st March 2020). However, only 58% of them were able to support themselves if the MCO was extended by another two weeks to 14th April 2020²².

Based on the current situation of COVID-19 in Malaysia at the time of data collection, less than 20% of the respondents believed that Malaysia would be able to control COVID-19 in the near future successfully. This might be due to the significant and widespread wave of COVID-19 occurring throughout Malaysia. The present study's result contrasts with another cross-sectional survey conducted in Malaysia during the second week of MCO in 2020. The findings from that study showed that the majority of the participants agreed that the Malaysian government was handling the COVID-19 health crisis well (89.9%) and was confident that Malaysia would be able to win the 'war' against COVID-19 (95.9%)⁶. In addition, it was also contradicted by an online cross-sectional study among Chinese residents during the rapid rise period of the COVID-19 outbreak, where nearly all of the respondents (97.1%) had confidence that China could win the battle against COVID-19 based on the way the government reacted to the outbreak²³.

Vaccination programs brought hope to decrease the number of COVID-19 morbidity and mortality. However, a vaccination program's success depends on the population's willingness to be vaccinated²⁴. Most (80%) of the respondents believed that the pandemic could be overcome by achieving herd immunity. Indirectly, this might be a good indicator of people's acceptance of vaccination. This is also supported by the finding in a previous study which demonstrated that the acceptance rate of the COVID-19 vaccination program among Malaysian adults was high (83.3%)²⁵.

The majority of the respondents agreed that information regarding COVID-19 from the government was easily understood (74.9%), accurate (71.8%), and fast (70.3%). It is crucial to sustain reliable resources of valid medical information to avoid fake news or misconceptions. The highest percentage for the source of information regarding COVID-19 was from television (92.1%), followed by MySejahtera mobile application (91.0%) and Facebook (84.1). This is in line with a study among Cameroonian residents, which stated that more than half of their respondents got information regarding COVID-19 through television²⁶. Therefore, relevant authorities should continue giving the information through these media.

Preventive practice on COVID-19

The current study showed that the respondents had a high total practice score. This corresponds to the previous cross-sectional studies conducted among Chinese residents²³ and pregnant women in Nigeria²⁷, where both studies found that the respondents had high preventive practice scores towards COVID-19²². On the other hand, cross-sectional studies conducted among residents in Ethiopia²⁸ and students in Pakistan²⁹ found that the participants had a low preventive practice score. In addition, most respondents had good hand-washing techniques and habits. Hand washing habit has a vital contribution to infectious disease transmission. A community intervention study conducted among villagers in China showed that those who received intensive education on hand hygiene had significantly lower Hand, Foot, and Mouth Disease (HFMD) incidence than the control group³⁰.

In Malaysia, MCO was implemented to restrict people's movement to reduce the transmission of COVID-19³¹. The current study showed increased frequencies of respondents that went out of the house during the current MCO (2021) compared to the first MCO (2020). Correspondingly, a study on video observational analysis conducted from February until May 2020 among the public in Amsterdam, Netherlands, found that compliance with physical distancing started to decline gradually over time³². On the contrary, an online survey conducted in April 2020 among Dutch people in the

Netherlands showed good compliance with physical distancing³³. However, this is debatable, as the study was conducted during the early implementation of the lockdown in the Netherlands. In contrast, the current study was completed two years after the implementation of the lockdown in Malaysia. Initially, mask-wearing was only reserved for healthcare workers and those with respiratory symptoms³⁴. However, new evidence indicates that the general population's use of face masks may help prevent the overall transmission of SARS-CoV-2 (35). In Malaysia, wearing a face mask in the public area was made mandatory on the 1st of August 2020, and those who failed to oblige will be compounded³⁵. Almost all respondents practiced wearing a face mask properly by covering the nose and mouth completely. Even so, some respondents still practice improper mask-wearing methods such as pulling down their face mask under the chin while eating, pulling down the mask under their nose, and letting the mask loose. Hence, a proper intervention focusing on educating the population on the correct technique of wearing a face mask is crucial to ensure the effectiveness of using a face mask³⁶.

Factors associated with preventive practice

The current study showed females had better preventive practice towards COVID-19 than males. A similar finding was found in a cross-sectional study conducted among 417 university students in Pakistan. The study showed mean preventive practice towards COVID-19 score was significantly higher among females than males ($p = 0.012$) (30). These results are also supported by a web-based study conducted in India regarding the assessment of preventive practice followed by the general public during the COVID-19 pandemic. The study was conducted on a group of 964 participants, and the results showed females significantly had better preventive practice score as compared to males³⁷.

The present study also demonstrated significantly higher preventive practice scores in non-Malays than Malays. A similar finding was seen in another study conducted among Malaysians, where the Chinese ethnicity was more knowledgeable regarding COVID-19 and had good preventive practice against the infection. The preventive practice score was increased by 2.36 units (95% CI: 1.82, 3.05) among Chinese compared to Malays ($p < 0.001$)³⁸.

The preventive practice score in the current study was significantly decreased in those fined due to non-compliance to the SOP. This is very worrying because if left unchecked, it will cause the spread of COVID-19 to be even more severe than what had happened in Pakistan. Pakistan's public was reported as careless and did not comply with the SOPs. They blatantly disobeyed government orders, underestimated the threat, and took it lightly. As a result of this dangerous and cavalier attitude, a rapid surge in cases was recorded after the relaxation in lockdown³⁹.

A study conducted in Sudan among 812 adult respondents, showed an association between education, positive attitudes, and appropriate practice towards COVID-19, suggesting that education helps encourage positive attitudes and maintain safe practices¹⁶. This finding supported the significant association between knowledge and attitude with the preventive practice towards COVID-19 in present study.

There were some limitations in the current study. The sampling method used was a non-probability method. So, there will be limitations in generalizing the results from this study to the general population. In addition, the method of data collection using online platforms might cause non-response bias. A certain group of potential subjects, such as senior citizens and those living in rural areas, would not be able to participate in this study due to limited access to the internet.

Conclusions

The level of knowledge, attitude, and preventive practice towards COVID-19 were found to be satisfactory. A poorer preventive practice of respondents towards COVID-19 were significantly associated with males, non-Malay, history of being fined due to noncompliance to COVID-19 SOP, lesser knowledge of COVID-19,

and unsatisfactory attitude towards COVID-19. Therefore, to strengthen the preventive practice among Malaysian adults, health education could be tailored and focused on the identified associated factors for poor preventive practice. Enforcement regarding the SOP must be tightened and continued until the chain of COVID-19 transmission is successfully abolish. Lastly, a future qualitative study is recommended to further explore other significant factors that may influence Malaysians' compliance with the preventive measures of COVID-19.

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