



# Recent perspectives and awareness on transmission, clinical manifestation, quarantine measures, prevention and treatment of COVID-19 among people living in Malaysia in 2020

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## Abstract

**Background** There is a major public health challenge threatening the world with the rapid spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which emerged in December 2019 from Wuhan, China.

**Objective** The aim of this study was to assess the knowledge, attitude and practice regarding COVID-19 and its transmission, causes and prevention among people living in Malaysia.

**Methods** A cross-sectional study was conducted among people living in Malaysia by using an online survey in March and April 2020.

**Results** Out of 520 respondents, the mean age was  $36.9 \pm 14.9$ , between 19 and 67 years with the majority being female. Most respondents had good knowledge, attitude and practice towards COVID-19 with mean  $\pm$  sd  $18.2 \pm 1.7$ ,  $5.2 \pm 1.1$  and  $4.1 \pm 1.4$ , respectively. In addition, the majority had good knowledge regarding cause, mode of transmission, signs and symptoms, prevention and treatment and quarantine measures after answering 21 questions.

**Conclusion** To date, there is no specific treatment or vaccine for COVID-19, thus staying at home is the best preventive measure to curb the further growth of positive cases in the country. These findings could provide an insight in designing effective preparedness for future pandemic outbreaks.

**Keywords** Knowledge · Attitude · Practice · COVID-19 · Malaysia

## Introduction

The epidemic of unknown acute respiratory tract infection first broke out at the Huanan South China Seafood Market in Wuhan City of Hubei Province, China on 12 December 2019 (Guo et al. 2019). Chinese scientists found that the unknown sample had >95% homology with the bat coronavirus

and >70% similarity with the severe acute respiratory syndrome coronavirus (SARS-CoV) on 7 January 2020 (Singhal 2020). Therefore, the World Health Organization (WHO) confirmed that the novel coronavirus 2019 or SARS-CoV-2 was the cause of this outbreak and they named the disease COVID-19 (World Health Organization (WHO) 2020). SARS-CoV-2 is a  $\beta$ -coronavirus, which is an enveloped, non-segmented positive-sense, single-stranded RNA virus (Wang et al. 2020). As of 24 July 2020, a total of 15,651,911 coronavirus disease 2019 (COVID-19) cases; 636,470 cases of deaths and 9,535,342 recovered cases had been reported worldwide. The United States of America (USA) shows the highest number of total cases (4,169,991) and death cases (147,333) (Coronavirus Outbreak 2020).

The current pandemic of COVID-19 is propagated from human to human transmission by small droplets from the nose or mouth which are spread when a person with COVID-19 coughs or exhales (Adhikari et al. 2020). It is also transmitted through the air. The most commonly reported symptoms are fever, dry cough, tiredness, lung infection and difficulty in

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breathing. Some patients may have headache, runny nose, diarrhea, sore throat or nasal congestion (Huang et al. 2020). Elderly people, children, pregnant women, smokers, immune-compromised people and those with chronic diseases such as high blood pressure, diabetes or heart problems, are the people at high risk to become infected with COVID-19. Currently, there is no vaccine or specific antiviral medicine for the disease (Chen et al. 2020). Thus, WHO has developed a strict guideline to adhere to during the pandemic of COVID-19.

As of 24 July 2020, there were 8840 confirmed cases; 123 deaths and 8574 recovered cases reported at the Ministry of Health, Malaysia (Coronavirus Outbreak 2020). COVID-19 cases remained relatively low until a large spike in cases in March 2020, following a religious event held at Sri Petaling, Kuala Lumpur (Ng 2020). Malaysia had the highest number of confirmed COVID-19 cases in South East Asia a few weeks after the event (The Straits Times 2020). It is a four-day event. About 16,000 people attended the event (Barker 2020). COVID-19 spread to other states of Malaysia and other countries, including Brunei (Cabrera 2020). Thus, awareness of the importance of prevention messages such as avoid handshaking, frequent handwashing, avoid mass gatherings, maintain physical distancing or avoid travelling to affected areas is essential to prevent the disease. Many people have limited knowledge of standard precautions. Practices such as wearing masks and gloves; cleaning hands with sanitizer prevent the potential risks for contracting COVID-19. The Malaysian government announced the Movement Control Order (MCO) from 18 March – 9 June 2020 to curb the further growth of positive cases in the country through social distancing (Sukumaran 2020; Bunyan 2020; Wern Jun 2020).

Therefore, this study is aimed to determine the knowledge, attitude and practice regarding COVID-19 and its transmission, causes and prevention among people living in Malaysia. The findings of this research and suggestions will aid in public health decisions makers on pandemic preparedness and disease control.

## Methods

### Study design and sampling

A cross-sectional study was conducted among people living in Malaysia by using an online survey in March and April 2020 during the Movement Control Order. Malaysians and non-Malaysians 18 years old and above were chosen to participate in this study. People who were able to read the questionnaire and write their responses were approached for the study. Hundreds of people were invited to participate in this study voluntarily and randomly through emails, WhatsApp and Facebook and other social media. A total of 520 were collected within 2 months (March and April) in 2020. All

respondents were briefed about the study at the beginning of the questionnaire as a short introduction.

### Measurement tool and ethics

This study utilized a questionnaire which was derived from a previous study. The modified validated questionnaire was used to assess the awareness of knowledge, attitude and practice towards COVID-19 regarding causes, symptoms and prevention and included questions about vaccination. The questionnaire was slightly modified and re-validated by an epidemiologist, biostatistician and public health specialist to be used for people living in Malaysia. Pre-test was done for 10 respondents to make sure the questions were understandable and not confusing. The questionnaire was distributed in the English language.

The questionnaire had 30 questions: 21 regarding knowledge, 7 regarding attitude and 12 regarding practice. It had eight sections including demographic factors, knowledge on causes, mode of transmission, signs and symptoms, prevention and treatment, perceptions of treatment centres and quarantine measures, as well as attitude and practice.

Most of the questions were closed-ended and the participants were given a choice of answering by yes or no for knowledge, attitude and practice. Other questions such as who are at risk, causes, mode of transmission, signs and symptoms, suspect cases and action to avoid being infected were multiple choices. For all knowledge, attitude and practice questions with yes and no answer, the incorrect response was given a 0 score, while 1 point was given for the correct answer. The expected maximum total knowledge, attitude and practice scores were 21, 7 and 12, respectively.

Respondents with knowledge, attitude and practice scores above 60% were considered as having good knowledge, attitude and practice, while those who scored below 60% were considered having poor knowledge, attitude and practice (Yusof et al. 2018; Shafei et al. 2012; Arbiol et al. 2016). The questionnaire was designed to be anonymous, and informed consent was obtained from every respondent, as it was sent along with the survey. The data were kept confidential and the results did not identify the respondents personally. Participating in the research was voluntary and anonymous.

### Data analysis

Data was collected by google form and was exported to an Excel file. Then the Statistical Package for Social Sciences (SPSS) version 23 was used for extracting the data from the excel file and performing the analysis. Mean and standard deviation (SD) were presented for numerical data, while frequency and percentage were presented for the categorical data. Descriptive statistics were performed to determine the socio-demographic factors and KAP scores. Independent t-test (for

numerical data) and Chi-square test (for categorical data) were used to assess the association between socio-demographic factors and overall KAP scoring. The Pearson correlation coefficient was used to describe the strength and direction of the relationship between knowledge, attitudes and practices (KAP). The significance level was set at ( $P \leq 0.05$ ) for all statistical procedures.

## Result

To assess the awareness of COVID-19, 21 questions were used to measure the total knowledge score, 7 questions for total attitude score and 12 questions for total practice score. Table 1 shows the descriptive analysis of demographical factors by presenting the mean  $\pm$  standard deviation for age and frequency and percentage for other variables. A total of 520 individuals between 19 and 67 years responded to our questionnaire. The mean age of the respondents is  $36.9 \pm 14.9$ . The majority of them were female (61.5%), Malaysian (88.5%), held a bachelor's degree (56.2%), married (64.0%) and non-healthcare workers (43.3%).

Most of the respondents had heard about COVID-19 (99.4%), were aware that it is more fatal than the normal flu

(96.7%), aware that the infected person may show no signs or symptoms (92.7%), believe that anyone with COVID-19 has a higher chance of survival if he/she seeks immediate medical attention (92.7%), believe that spreading of COVID-19 infection can be reduced if the infected person with COVID-19 goes immediately to any medical center (92.1%) or is isolated (98.5%). On the other hand, most of them do not believe that traditional medicine can treat COVID-19 (77.1%) and asymptomatic people with COVID-19 cannot spread the virus to others (90.2%). The majority of respondents were aware that elderly people (81.9%), people with chronic diseases (80.8%) and smokers (62.7%) were the people most at risk from COVID-19 infection (Table 2).

As reported in Table 3, awareness about the causes, signs and symptoms for all respondents were gauged by the questions K10, K11 & K12. Most of the respondents were aware that the cause of COVID-19 was due to bats (75.1%) and virus (48.1%). It was believed that by other physical contact with an infected person (87.4%), shaking the hands of an infected person (87.2%), saliva of an infected person (81.5%) and through the air (57.1%) were the most common modes of transmission of COVID-19. Fever, cough, difficulty in breathing, sore throat and flu were shown to be the most common signs and symptoms (97.7%), (97.1%), (91.6%), (77.7%) and (75.6%), respectively.

It was revealed that the knowledge of the respondents was good regarding prevention and treatment. It was shown that respondents were aware about preventing infection if they avoid contact with blood or body fluids of an infected person, eating outside, in the close area and crowded places such as train stations/shopping malls (76.3%), (94.8%) and (98.8%), respectively. On the other hand, mostly they do not believe that traditional medicine can cure COVID-19 (70.2%) and there is a vaccine or treatment available for COVID-19 (78.3%) (Table 4).

As shown in Table 5, responders have good knowledge of quarantine measures. The majority agreed that those diagnosed with COVID-19 should be admitted into the hospital (88.1%), who had direct contact with a person who has been diagnosed with COVID-19 must be quarantined for two weeks (98.7%), and who had a recent travelling history should be immediately quarantined for 14 days (99.8%). To answer the question of suspecting someone in your family of having COVID-19, most of them believe to call the hospital/COVID-19 phone line and inform the incident (92.2%), isolate the suspected person in a separate room (82.1%) and avoid all physical contact and bodily fluids of that person (71.6%). The mean  $\pm$  standard deviation of the total knowledge score was  $18.2 \pm 1.7$ . It shows obviously that the respondents have good knowledge regarding COVID-19.

To calculate the overall knowledge score, the correct answer was coded as "1" and the wrong answer was coded as "0" for all 12 questions under knowledge. By adding all

**Table 1** Descriptive analysis for the demographical factors in Malaysia

Variable	Malaysia	
	N	(%)
Age	36.1 $\pm$ 15.1*	
Gender		
Male	200	38.5
Female	320	61.5
Nationality		
Malaysian	460	88.5
Non-Malaysian	60	11.5
Education		
High school	78	15.0
Bachelor	292	56.2
Postgraduate	150	28.8
Marital status		
Married	333	64.0
Single	173	33.3
Divorce	14	2.7
Occupation		
Healthcare workers	144	27.7
Non-healthcare workers	225	43.3
Students	151	29.0
<b>TOTAL</b>	520	100

\* Mean  $\pm$  SD

**Table 2** Awareness of general knowledge for the respondents

Questions	Answer	Knowledge	
		N	(%)
K1: Do you know what is COVID-19?	Yes	517	99.4
	No	3	.6
K2: Do you think COVID-19 is more fatal than normal flu?	Yes	503	96.7
	No	17	3.3
K3. Is it possible for an infected person with COVID-19 to show no signs or symptoms?	Yes	482	92.7
	No	38	7.3
K4. Do you think a person with COVID-19 has a higher chance of survival if he/she seeks immediate medical attention?	Yes	501	96.3
	No	19	3.7
K5. If an infected person with COVID-19 goes immediately to any medical centre, will he/she reduce the chance of spreading it to family members or people he/she lives with?	Yes	479	92.1
	No	41	7.9
K6. Do you believe that traditional medicine can treat COVID-19 successfully?	Yes	119	22.9
	No	401	77.1
K7. Do you think asymptomatic people with COVID-19 cannot spread the virus to others?	Yes	51	9.8
	No	469	90.2
K8. Isolation of COVID-19 patients could be an effective way to reduce the spread of the virus?	Yes	512	98.5
	No	8	1.5
K9. Who would be most at risk of COVID-19? (select all the applicable choices)	Elderly people	389	81.9
	Children	242	50.9
	Young adults	103	21.7
	Pregnant ladies	224	47.2
	Immunocompromised people		
	People with chronic diseases	384	80.8
	Smokers	298	62.7
	Those who live with pets	88	18.5
	Anyone	259	54.5

answers, only the correct answer will be calculated to get the total score for each question.

The respondents present a good attitude when they answered questions A1–A7; 67.5% of them were aware that they will go to the hospital to get a confirmed diagnosis if they have flu-like symptoms, 98.8% follow the distancing etiquette, 96.5% sanitize their hand, 58.7% take supplements, 35.8% put other students in their class at risk of infection after survived from COVID-19, 74.4% would buy groceries from them if the seller survived from COVID-19 and 90.0% welcome someone back to the community/neighbourhood after recovered from COVID-19 (Table 6). The mean  $\pm$  standard deviation of the total attitude score was  $5.2 \pm 1.1$  out of 7 points. It shows obviously that the respondents have a good attitude towards COVID-19.

To calculate the overall attitude score, the correct answer was coded as “1” and the wrong answer was coded as “0” for all 7 questions under attitude. By adding all answers, only the

correct answer will be calculated to get the total score for each question by summing all the questions.

Respondents show good practice towards COVID-19 in regard to washing hands with water and soap (78.9%), clean hands with other disinfectants (48.6%), try to avoid crowded places (68.4%), try to avoid physical contact with people suspected to have COVID-19 (55.2%), avoid physical contact with everyone (46.9%) and wear a mask (59.3%) (Table 7). The mean  $\pm$  standard deviation of the total practice score was  $4.1 \pm 1.4$  out of 11 points. It was shown that the respondents have good practice towards COVID-19.

To calculate the overall Practice score, the correct answer was coded as “1” and the wrong answer was coded as “0” for all 11 questions under attitude. By adding all answers, only the correct answer will be calculated to get the total score for each question by summing all the questions.

To determine the association between overall knowledge, attitude and practice score and all demographic factors,

**Table 3** Awareness regarding causes, modes of transmission, signs and symptoms of COVID-19

Questions	Answer	Knowledge	
		N	(%)
Awareness regarding causes, modes of transmission and signs and symptoms			
K10. What could be the source of COVID-19? (select all the applicable choices)	Bats	356	75.1
	Monkey	65	13.7
	Rats	77	16.2
	Pangolin	129	27.2
	Other exotic animals	192	40.5
	Virus	228	48.1
	Bacteria	18	3.8
K11. How does a person get COVID-19? (select all the applicable choices)	Through the air	271	57.1
	Preparing/eating bush meat as a meal (monkeys or others)	168	35.4
	Saliva of an infected person	387	81.5
	Blood of an infected person	180	37.9
	Sweat of an infected person	152	32
	Urine/faeces of an infected person	137	28.8
	Breast milk of an infected person	110	23.2
	Sperm or vaginal fluid of an infected person	114	24
	By shaking the hands of an infected person	414	87.2
	Other physical contact with an infected person	415	87.4
	K12. What are the probable signs and symptoms of someone who is infected with COVID-19? (select all the applicable choices)	Fever	464
Flu		359	75.6
Cough		461	97.1
Severe headache		274	57.7
Muscle pain		225	47.4
Weakness		275	57.9
Diarrhea (with or without blood)		207	43.6
Vomiting (with or without blood)		128	26.9
Abdominal (stomach) pain		92	19.4
Chest pain		194	40.8
Upper back pain		47	9.9
Sore throat		369	77.7
Rashes		21	4.4
Difficulty in breathing		435	91.6
Bleeding (internal or external)		18	3.8
Others	57	12	

Pearson correlation, Independent sample t-test and one-way ANOVA were performed. It was demonstrated that the total knowledge score was significantly associated with all demographic factors except education ( $P < 0.05$ ). For total attitude score, it was revealed that there was a significant association with only age and gender ( $P < 0.05$ ). Finally, total practice score was associated with age, education and occupation ( $P < 0.05$ ) (Tables 8 and 9).

## Discussion

To the best of our knowledge, we were the first to perform a survey not only on the knowledge, attitude and practices (KAP) of COVID-19 but also the preventive measurements and attitude of the participants towards the COVID-19 survivors among the Malaysian population. The findings of this study would be able to shed further light upon COVID-19,

**Table 4** Awareness regarding prevention and treatment of COVID-19

Questions	Answer	Knowledge	
		N	(%)
Awareness regarding prevention of COVID-19			
K13. A person can prevent getting the infection of COVID-19 by avoiding contact with blood or body fluids of an infected person.	Yes	397	76.3
	No	123	23.7
K14. A person can prevent getting the infection of COVID-19 by avoiding eating outside, in the close area such as restaurants/café.	Yes	493	94.8
	No	27	5.2
K15. A person can prevent getting the infection of COVID-19 by avoiding crowded places such as train stations/ shopping malls.	Yes	514	98.8
	No	6	1.2
K16. Do you think traditional medicine can cure COVID-19?	Yes	155	29.8
	No	365	70.2
K17. Is there a vaccine or treatment available for COVID-19 which has been given to the infected patients?	Yes	113	21.7
	No	407	78.3

and the information collected through this survey could be expended by healthcare providers and the media to enlighten the population. In general, we found that most of the participants in this study are knowledgeable about COVID-19 and they anticipated more in-depth information especially on how to prevent this contagious infection. Through the assessment of the general knowledge on COVID-19, we have discovered that the majority of the participants have heard and know about the infection (99.4%), which could be from all sorts of social media such as television, radio, press interviews,

newspapers, online news, Facebook, Instagram and so on (Malaysian Multimedia and Communications Commission 2018).

The current pandemic condition and the devastating news reports have led Malaysians to actively seek knowledge of this contagious disease from various channels of information either Malaysian or international news, and a majority of them (96.7%) are aware that the current outbreak of this virus is more fatal than normal flu and believe that the infected person might not show any sign and symptoms (92.7%). The

**Table 5** Awareness regarding quarantine measures of COVID-19

Questions	Answer	Knowledge	
		N	(%)
K18. Do you agree that if a person has been diagnosed with COVID-19, he/she must be admitted into the hospital?	Yes	458	88.1
	No	62	11.9
K19. Do you agree that people who had direct contact with a person who has been diagnosed with COVID-19 must be quarantined for two weeks?	Yes	513	98.7
	No	7	1.3
K20. People who have been in close contact with someone infected with COVID-19 or who had a recent travelling history should be immediately quarantined for 14 days.	Yes	519	99.8
	No	1	0.2
K21. What would you do if you suspect someone in your family has COVID-19? (select all the applicable choices)	Nothing	5	1.1
	Help care for the person at home (e.g. clean up their excretions/vomit; help bathe them)	46	9.7
	Check their temperature by touching their body	56	11.8
	Avoid all physical contact and bodily fluids of that person	340	71.6
	Isolate the suspected person in a separate room	390	82.1
	Call the hospital/ COVID-19 phone line and inform the incident	438	92.2
	Take the person to the hospital	225	47.4
<b>Total knowledge score</b>		<b>18.2 ± 1.7*</b>	

\* Mean ± SD

**Table 6** Awareness regarding attitudes towards COVID-19 survivors

Questions	Answer	Attitude	
		N	(%)
A1. If you have flu-like symptoms, would you go to the hospital to get the confirmation on the diagnosis?	Yes	351	67.5
	No	169	32.5
A2. Do you follow the physical distancing etiquette?	Yes	514	98.8
	No	6	1.2
A3. Do you sanitize your hands often?	Yes	502	96.5
	No	18	3.5
A4. Do you take any supplements (e.g. vitamin C) as prevention to COVID-19 infection?	Yes	305	58.7
	No	215	41.3
A5. Do you think that a student who has survived COVID-19 and has a certificate from hospitals stating he/she is COVID-19-free puts other students in their class at risk of infection?	Yes	186	35.8
	No	334	64.2
A6. If you knew workers who survived COVID-19 and has a certificate from hospitals stating he/she is COVID-19 free, would you buy groceries from him or her?	Yes	387	74.4
	No	133	25.6
A7. Would you welcome someone back into your community/neighbourhood after he/she has recovered from COVID-19?	Yes	468	90.0
	No	52	10.0
<b>Total attitude score</b>		<b>5.2 ± 1.1*</b>	

\* Mean ± SD

participants also realize that the clinical spectrum for infected people with COVID-19 ranges from non-specific fever, cough and fatigue signs and symptoms of acute respiratory to severe pneumonia with respiratory failure, and this case is comparable with other coronavirus diseases (Backer et al. 2020; Chakraborty and Maity 2020). Recently, the World Health Organization (WHO) announced other COVID-19 symptoms such as aches and pains, nasal congestion, headache,

conjunctivitis, sore throat, diarrhea, loss of taste or smell, a rash on skin or discoloration of fingers or toes. The general knowledge score of the participants in this survey on COVID-19 is approximately 18.2 out of 21 total points (approximately 87%) at a time approximately 6 weeks after the first case was diagnosed on 11 March 2020 in Malaysia. Our data suggested that, generally, Malaysian residents are more knowledgeable regarding COVID-19 compared to residents in other studies

**Table 7** Awareness regarding practice towards COVID-19

What ways of precautions have you taken to prevent from getting COVID-19? (select all the applicable choices)	Practice		
	N	(%)	
P1. Wash hands with water	68	14.3	
P2. Wash hands with water and soap	375	78.9	
P3. Clean hands with other disinfectants	231	48.6	
P4. Drink a lot of water/juice	224	47.2	
P5. Drink traditional herbs	55	11.6	
P6. Try to avoid crowded places	325	68.4	
P7. Try to avoid physical contact with people suspected to have COVID-19	262	55.2	
P8. Avoid physical contact with everyone	223	46.9	
P9. Wear mask	284	59.8	
P10. Wear gloves	154	32.4	
P11. Take antibiotics	28	5.9	
P12. If there is an approved vaccine to prevent COVID-19 tested on animal but yet to be tested on humans, would you accept it for yourself or your family members?	Yes	224	43.1
	No	296	56.9
<b>Total practice score</b>	<b>4.1 ± 1.4*</b>		

\* mean ± standard deviation

**Table 8** Association between total knowledge, attitude and practice score and age (numerical data) in Malaysia

	Age	
	Pearson correlation test	<i>P</i> value
Total Knowledge score	0.133	0.002
Total Attitude score	0.204	< 0.001
Total Practice score	0.113	0.010

such as in the USA which only scored 9.72 out of 12 points (approximately 80%) (Clements 2020). However, the current data showed a slight difference in the percentage compared to with China 10.8 out of 12 points (approximately 90%), and this could suggest that they had experience during the SARS outbreak in the 2000s (Zhong et al. 2020) and the variances in measurement and scoring systems are unlikely for accurate evaluations of knowledge levels through these studies.

This indicated that the participants are keeping up with the current updates of COVID-19 from the Ministry of Health (MOH), in which they realized that an infected person will have a higher chance of survival if the person seeks immediate medical attention (92.7%), the transmission of the infection can be contained if the suspected person is isolated from the others (92.1%) and elderly individuals (81.9%) with chronic

diseases such as high blood pressure or diabetes (80.8%) and chronic chain smokers (80.8%) are generally at higher risk from infection (Devaraj 2020; Sohrabi et al. 2020). Uncertainty about a potential future threat disturbs our capability to avoid it or to alleviate its adverse effect consequently causing anxiety and the resulting loss of control that follows (Grube and Nitschke 2013; Guan and Sue-Yin 2020; Sun et al. 2020; Taylor 2019). These reactions could be seen when the movement control order (MCO) on 18 March 2020 was announced to contain the infection from spreading further by the Malaysian government. The MCO extended until 9 June 2020 to break the infection chain (Prime Minister's Office 2020).

Promisingly, the survey finds the majority of the participants take it seriously by enhancing their protective behaviour such as wearing masks, frequent handwashing, sanitizing their hands with alcohol hand sanitizer, wearing gloves and avoiding crowded places even before the MCO had commenced (Mohd Hanafiah and Wan 2020). It was found that approximately 76% respondents from a recent study conducted in the USA showed a large population chose to ignore wearing masks (Clements 2020); on the other hand, this survey indicated that the majority of the Malaysian residents complied to those rules by wearing a mask whenever they are outside of their home. Results from this study also showed that the majority of the respondents practice social distancing (approximately 1 m) and pack their food instead of eating

**Table 9** Association between total knowledge, attitude and practice score and demographic factors (categorical data) in Malaysia

Characteristics	Mean ± Sd	Knowledge		Mean ± Sd	Attitude		Mean ± Sd	Practice	
		Test value	<i>P</i> value		Test value	<i>P</i> value		Test value	<i>P</i> value
Gender		3.882*	< 0.001		2.448*	0.015		0.433*	0.665
Male	17.9 ± 1.8			5.1 ± 1.3			4.1 ± 1.4		
Female	18.4 ± 1.5			5.3 ± 0.9			4.1 ± 1.4		
Nationality		3.123*	0.003		0.886*	0.376		1.887*	0.060
Malaysian	18.3 ± 1.6			5.2 ± 1.1			4.1 ± 1.4		
Non-Malaysian	17.5 ± 2.0			5.1 ± 1.3			3.8 ± 1.5		
Education		3.487**	0.031		0.241**	0.786		35.421**	< 0.001
High school	18.1 ± 1.6			5.3 ± 0.9			5.1 ± 1.3		
Bachelor	18.4 ± 1.5			5.2 ± 1.0			4.1 ± 1.2		
Postgraduate	17.9 ± 1.9			5.2 ± 1.2			3.6 ± 1.4		
Marital Status		6.705**	0.001		0.116**	0.891		1.077**	0.341
Married	18.4 ± 1.6			5.2 ± 1.1			4.2 ± 1.4		
Single	18.0 ± 1.5			5.2 ± 1.1			4.0 ± 1.4		
Divorce	17.1 ± 2.8			5.2 ± 1.9			3.8 ± 0.8		
Occupation		1.707*	0.182		0.109*	0.896		15.163*	< 0.001
Healthcare workers	18.3 ± 1.6			5.3 ± 1.1			4.6 ± 1.3		
Non-healthcare workers	18.3 ± 1.7			5.2 ± 1.1			3.8 ± 1.3		
Students	18.0 ± 1.6			5.2 ± 1.1			4.1 ± 1.4		

\*Independent sample T-test, \*\*One way ANOVA Test



outside and the messages have been extensively circulated since the commencement of the MCO period (Wong and Alias 2020), and this demonstrates that Malaysians have taken these issues seriously. Furthermore, it was discovered that the participants knew the list of preventive measurements that should be followed strictly during the outbreak. For example, approximately 98.8% of the participants agreed that the infection can be prevented by avoiding going to crowded places such as shopping malls, markets, cinema malls or train stations. Furthermore, the Director-General of Health Malaysia asked the people to avoid mass gatherings—weddings, conferences, religious gatherings, etc.; and avoid travelling to COVID-19 affected areas or countries. If a person returns from overseas, he or she must self-quarantine for 14 days by staying at home. This again, has proved that the majority of Malaysians are very well conversant regarding the consequences from the current outbreak unlike the younger generations of Malaysians which was revealed to have lower knowledge about COVID-19 and have higher probabilities of participating in activities that are not recommended by their authorities (Clements 2020).

To date, this study was the first to analyze the quarantine measures and treatment on COVID-19 among Malaysians as well as their attitudes towards COVID-19 survivors. The majority of the participants agreed that people who had contact with an infected person should be admitted to the hospital immediately and the incident should be reported to any nearest hospitals by calling the COVID-19 hotline (03–88,810,200, 03–88,810,600 and 03–88,810,700). This again has reiterated that the majority of Malaysians (approximately 66.4%) had opted for social networking towards social skilling and learning behaviours (Malaysian Multimedia and Communications Commission 2018). Moreover, the data also showed that participants are being unprejudiced by willing to accept and welcome the COVID-19 survivors back into their community. Though the participants' attitudes, practices and preventive measurements taken towards COVID-19 were positive, these firm precautionary routines shall be primarily attributed to the strict prevention and prompt control measures executed by the Malaysian government with the help of the Ministry of Health (MOH).

The outcomes of this study have several strengths and limitations. The strengths include the fact that this survey attained a sufficient sample size of participants during the second–third MCO phase. There was a predominate number of female participants with education as professional background with a minimum of bachelor's degree (56.2%); the fact that the age and education level distribution were practically illustrative of the Malaysian population and the responses could be revealing the public system dispersal in urban parts of Malaysia. Education has been previously reported to be a significant demographic determinant and the results of a high correct rate of COVID-19 knowledge among Malaysian residents

supports this. The significant positive association between levels of education and COVID-19 knowledge scores proves this conjecture. Upcoming research involving a larger sample size is required to further explore the possible socio-demographic variances in psychological influence related to COVID-19 among low socioeconomic status residents in the different areas of Malaysia. Emerging technologies are being deployed all across Asia to help fight the coronavirus outbreak. For example, Singapore government data has enabled detailed mapping of the COVID-19 outbreak. In South Korea, they are tracking the potential carriers using cell phone satellite technology. In Malaysia, three major mobile applications such as Gerak Malaysia, MySejahtera and MyTrace can be easily downloaded by the public for the purpose of monitoring and tracing contact during the COVID-19 pandemic. Therefore, more questions related with technology support for COVID-19 in Malaysia should be included to support the society.

## Conclusion

Data suggest that, in general, Malaysians and non-Malaysians who participated in this survey have good knowledge, positive attitudes and appropriate hygienic practices towards the contagious infection during the COVID-19 outbreak, signifying the help of mass media and health education programs intended at educating the residents on COVID-19 awareness are effective for reassuring optimistic attitudes and maintaining safe practices.

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## Compliance with ethical standards

**Competing interests** The authors have declared that no competing interest exists.

**Ethical approval** This study was approved by the Research committee in the Medical Faculty and Ethics Committee of Lincoln University College.

**Informed consent** Not applicable.

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