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Covid-19 Vaccination Acceptance and Its Associated Factors among Community in Kelantan

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ABSTRACT

Background: The global health crisis caused by the COVID-19 outbreak has significantly affected how people view the world and their daily routines. In response, the scientific community, with government support, has been actively working on developing a safe and effective vaccine as a preventive measure. To ensure adequate vaccination coverage, it is crucial to identify, comprehend, and tackle issues related to vaccine acceptance and hesitancy. Properly addressing these factors is a vital step in planning effective actions for successful vaccination efforts. **Methods:** In Kelantan, a descriptive cross-sectional study was conducted to investigate COVID-19 vaccination acceptance and its related factors among the general adult population. The study included 610 participants who completed an online, self-administered questionnaire adapted from previous research. The collected data were then analyzed using IBM Statistical Packages for Social Science (SPSS) version 26. **Results:** Almost all the respondents (99.0%) had been vaccinated, while only 1.0% were hesitant or refused. The majority of the respondents believed in the importance of the COVID-19 vaccine (86.1%); however, they still had concerns about the vaccine, such as doubts about its safety (51.6%), effectiveness (50.7%), and fear of adverse effects (61.1%). Most of the respondents (89.0%) had confidence in the vaccines that were being developed and found that the data on vaccine safety was adequate (88.9%). Meanwhile, 64.7% of them perceived a moderate to high risk of being infected with COVID-19, and 57.2% also perceived a moderate to high risk of developing severe disease following COVID-19 infection. **Conclusion:** The study found a high level of COVID-19 vaccine acceptance among the community in Kelantan. Overall, most of the community exhibited positive attitudes towards the COVID-19 vaccine, health authorities, and the government. However, a small minority still held doubts, concerns, and distrust regarding the vaccine.

Keywords: Community; COVID-19; Factors Associated; Vaccine Hesitancy

INTRODUCTION

This study aims to identify the vaccine intention and factors associated with the COVID-19 vaccination. COVID-19 is an illness caused by a novel coronavirus, which is now called severe acute respiratory syndrome coronavirus 2 (sars-cov-2) (Cennimo & Bergman, 2020). The coronavirus disease outbreak of 2019 (COVID-19) has sparked a global health catastrophe that has had a significant impact on how people view the world and their daily lives. Safety measures that have been aimed at stopping the virus's transmission demand social distancing from others by giving up what is naturally human: seeking comfort in their company.

The global efforts to lessen the effects of the pandemic and to reduce its health and socio-economic impact rely to a large extent on preventive efforts. Thus, huge efforts by the scientific community and pharmaceutical industry, backed by governments' support, were directed towards developing efficacious and safe vaccines. An effective and safe vaccine is vital to controlling the COVID-19 outbreak. It must be taken up, especially among the high-risk people; in a large proportion of the population, approximately 67% and 80% of the population have coverage (Randolph & Barreiro 2020).

Advances in COVID-19 vaccines are encouraging because this is the first time that vaccine development has

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accelerated at this speed (Ndwandwe & Wiysonge, 2021). As the vaccine development process progresses, it is crucial to boost the acceptance of new vaccines. A thorough understanding of the elements that could influence a person's decision to get the COVID-19 vaccine is necessary to develop effective COVID-19 vaccination strategies since these factors may differ between those who accept the vaccine and those who do not. Murphy *et al.* (2021) stated that identifying, understanding, and addressing vaccine acceptance, vaccine hesitancy, and resistance to a vaccine for COVID-19 is, therefore, a potentially important step to ensure the rapid and requisite uptake of an eventual vaccine.

METHODOLOGY

This cross-sectional study was conducted from May 22 to June 14, 2022, via an online self-administered questionnaire to assess the factors associated with COVID-19 vaccine intention among the community in Kelantan. The study sample was taken from all ten districts in Kelantan, which involved 610 respondents that met the inclusion criteria: adults over 18 years old, residing in Kelantan, and able to read and comprehend Bahasa Malaysia or the English language. The sample size was calculated by Raosoft Software, an online sample size calculator. The convenience sampling method was used in this study, where the online questionnaire was distributed on various online platforms such as WhatsApp, Facebook, and Telegram. Respondents were invited to participate at their own will. Volunteers had also contributed to helping to disseminate the link to the online questionnaire among the people in their community.

The research instrument used was an anonymous, self-administered online questionnaire adapted with permission from previous studies and related literature. The questionnaire consists of a total of 34 questions covering five sections: demographic characteristics, individual and group influences, COVID-19 disease influences, COVID-19 vaccine-related influences, and self-perception and history of COVID-19. A pilot study was conducted, and the Cronbach alpha value was 0.81, which indicates that the *reliability or consistency was good*. Meanwhile, the validity of the study instrument was verified by study field experts in family health medicine and primary health care and nursing educators.

Statistical Analysis of Data

The data were extracted from the form into an Excel sheet and statistically analyzed using IBM SPSS software version 26. Qualitative data were presented as frequencies and percentages; the Chi-square test and Fisher's exact test were used for analysis. Multivariate logistic regression was applied to identify associations between factors affecting vaccine acceptance among respondents. The adopted significance level is $p<0.05$.

Ethical Consideration

Ethical approval was provided by Research Ethics Committee of Universiti Teknologi MARA (UiTM), Malaysia Shah Alam (Ref: 500-FSK (PT.23/4) on 31st January 2022 with reference number FERC/FSK/MR/2021/0022.

RESULTS

Demographic Characteristics

A total of 610 respondents participated in this study. The overall demographic results are summarized in Table 1. The mean age of the respondents was 36.7 years old, and most of them were adults between 31 and 50 years old (64.2.9%). There were only 8.6% of older adults (51 years and older), while younger adults (below 30 years old) make up 27.2% of the sample size. Most of the respondents were female (79.5%), Malay (95.9%), married (89.3%), had secondary school education (43.6%), lived in rural areas (40.3%), and had a household income of B40 (64.3%). Most of them also had no loss of income due to the COVID-19 pandemic (68.7%) and were working in the government sector (51.1%).

Table 1: Demographic Characteristics of The Respondents

No.	Variables	Frequency (*n*)	Percentage (%)
1.	**Age (Mean: 36.71; ±9.81)**		
	Minimal Age: 17 years old		
	Maximum Age: 79 years old		
	<30 years old	166	27.2

	31-40 years old	207	33.9
	41-50 years old	185	30.3
	51-60 years old	40	6.6
	> 60 years old	12	2.0
2.	**Gender**		
	Male	125	20.5
	Female	485	79.5
3.	**Ethnic**		
	Malay	585	95.9
	Chinese	13	2.1
	Indian	0	0
	Bumiputera Sabah & Sarawak	2	0.3
	Bukan warganegara (non-Malaysian)	2	0.3
	Others	8	1.3
4.	**Marital Status**		
	Married	545	89.3
	Not married	65	10.7
5.	**Educational Level**		
	Primary school	11	1.8
	Secondary school	266	43.6
	Diploma	196	32.1
	Bachelor's degree	101	16.6
	Master/Doctorate	10	1.6
	Others	26	4.3
6.	**Occupation**		
	Unemployed	60	9.8
	Government	312	51.1
	Private	52	8.5
	Self-employed	70	11.5
	Housewife	69	11.3
	Student	39	6.4
	Retired	8	1.3
	Others	0	0
7.	**Monthly household income classification**		
	B40 (Below RM4,851)	392	64.3
	M40 (RM4,851 – RM10,595)	199	32.6
	T20 (Above 10,960)	19	3.1
8.	**Lost income due to the pandemic**		
	No loss	419	68.7
	Partial loss	171	28.0
	Total loss	20	3.3
9.	**Area of residence**		
	Urban	178	29.2
	Sub-urban	186	20.5
	Rural	246	40.3

COVID-19 Vaccination Among the Community in Kelantan

Acceptance was high, as shown in Table 2, where almost all the respondents (99.0%) have been vaccinated since the vaccines for COVID-19 were made available in Malaysia. Only 1.0% of them either refuse or are hesitant to be vaccinated. This study revealed that 61.5% of the respondents had no worries about getting the COVID-19 vaccine, while 38.3% had worries such as insufficient confidence in the source of the vaccine (14.1%), insufficient information about the side effects (12.6%), and insufficient information about the vaccine itself (11.6%).

Table 2: COVID-19 Vaccination Among the Community in Kelantan

No.	Variables	Frequency (*n*)	Percentage (%)
1.	**COVID-19 Vaccination Acceptance**		
	I have already been vaccinated	604	99.0
	I have registered for the vaccine and waiting for appointment	0	0
	I plan to get the vaccination, but have not registered	0	0
	I am still unsure	3	0.5
	I am not planning to get the vaccination	3	0.5
2.	**The Reasons for Concerns or Worries about the COVID-19 Vaccines**		
	You are not worried about getting vaccinated	375	61.5
	Lack of sufficient confidence in the source of the vaccine.	86	14.1
	Lack of sufficient information about the vaccine	71	11.6
	Lack of sufficient information about the side effects.	77	12.6
	I fully refuse to be vaccinated	0	0
	Others	1	0.2

Factors Influencing COVID-19 Vaccination

Individual and Group Influences

Table 3 displays the factors that influence the COVID-19 vaccination. It shows that half of the respondents rated their own health status as good (52.3%), 46% rated it as neutral, and only 1% rated it as bad. Most of them (93.3%) also claimed to have none of the health problems that were listed; only a small minority (6.7%) had either respiratory and lung disease or autoimmune disease. Hence, only a few (21.0%) had one or more comorbidities, while the rest had none. Since many of the respondents were married, most of them (69.2%) also have school-age children.

COVID-19 Disease Influences

Regarding the COVID-19 disease influences, confidence in the government's health services to respond to the pandemic was high, at 94.5%. Most of them also said that the information provided by health authorities was clear and understandable (94.3%), and the measures implemented by the government to combat the pandemic were adequate (92.3%). Meanwhile, 64.7% perceived a moderate to high risk of being infected with COVID-19, and 57.2% also perceived a moderate to high risk of developing severe disease following COVID-19 infection. More than half (62.3%) have never experienced agitation, sadness, or anxiety due to the physical distancing measures.

COVID-19 Vaccine-Related Influences

In relation to the COVID-19 vaccine-related influences, 89.0% of the respondents have confidence in the

vaccines that are being developed. They also find the data on vaccine safety adequate (88.9%).

Self-perception and History of COVID-19

Table 3 displays the self-perception and history of COVID-19. Half of the respondents (50.5%) self-rated having good knowledge about COVID-19 disease. Meanwhile, 48.0% had a history of being infected with COVID-19 with confirmed medical examinations, and 5.7% claimed they were infected but were not confirmed with medical examinations. The other half said they have not had a COVID-19 infection (42.8%). In their close social network, such as friends and families, 79.2% had a confirmed infection, while the rest claimed to have had an unconfirmed infection (3.3%), denied a history of COVID-19 infection (16.2%), and had no idea (1.5%).

Table 3: Factors Influencing COVID-19 Vaccination

No.	Variables	Frequency (*n*)	Percentage (%)
Individual and Group Influences			
1.	**Self-Perceived Health Condition**		
	Very bad	2	0.3
	Bad	4	0.7
	Neutral	285	46.7
	Good	243	39.8
	Very good	76	12.5
2.	**Health Problems (Considered to be at Risk for COVID-19)**		
	Respiratory / lung disease (including asthma, chronic bronchitis, and chronic obstructive pulmonary disease.	35	5.7
	Autoimmune disease	6	1.0
	I do not have any of the health problems listed	569	93.3
3.	**Number of Comorbidities**		
	No comorbid	482	79.0
	1 comorbidity	95	15.6
	2 or more comorbidities	33	5.4
4.	**Having School-Aged Children**		
	Yes	422	69.2
	No	188	30.8
COVID-19 Disease Influences			
1.	**Level of confidence in the Capacity of Health Services to Respond to the Pandemic**		
	Very confident	201	33.0
	Confident	375	61.5
	Not very confident	27	4.4
	Not confident	7	1.1
2.	**View on the Information Provided by Health Authorities**		
	Clear and understandable	575	94.3
	Unclear and confused	35	5.7
	Incoherent and contradictory	0	0
3.	**Perception of the Adequacy of Measures Implemented by the Government**		
	Very adequate	199	32.6
	Adequate	364	59.7
	Not very adequate	41	6.7
	Not adequate	6	1.0

4.	**Self-perceived Risk to get COVID-19 Infection**		
	High	149	24.4
	Moderate	246	40.3
	Low	152	24.9
	No risk	27	4.4
	Unknown	36	5.9
5.	**Frequency of Agitation, Sadness, or Anxiety Due to the Physical Distancing Measures**		
	Every day	55	9.0
	Almost every day	144	23.6
	Some days	31	5.1
	Never	380	62.3
COVID-19 Vaccine-related Influences			
1.	**Confidence in the COVID-19 Vaccines that are being Developed**		
	Very confident	129	21.1
	Confident	414	67.9
	Not very confident	62	10.2
	Not confident	5	0.8
2.	**Adequacy of the Available Safety Data for the New Vaccine**		
	Yes	542	88.9
	No	68	11.1
Self-perception & History of COVID19			
1.	**Self-perceived Knowledge about COVID-19 Disease**		
	Very bad	11	1.8
	Bad	10	1.6
	Neutral	281	46.1
	Good	262	43.0
	Very good	46	7.5
2.	**Previous Infection with COVID-19**		
	Yes, a confirmed case of medical examinations	293	48.0
	Yes, but infection is not confirmed	35	5.7
	No, I have not had COVID-19	261	42.8
	I have no idea	21	3.4
3.	**COVID-19 Infection in Close Social Network**		
	Yes, a confirmed case of medical examinations	483	79.2
	Yes, but infection is not confirmed	20	3.3
	No, they have not had COVID-19	98	16.2
	I have no idea	9	1.5

The Association Between the Demographic Characteristic with COVID-19 Vaccination

This study reveals that there was an association between vaccination acceptance and demographic characteristics with a *p* value less than 0.05 (ethnicity, occupation, and loss of income). Table 4 summarizes the findings. Malay ethnicity had higher odds of vaccine acceptance compared to other ethnicities (p=0.05). Those

who work in the government sector (p=0.01) and had no loss of income due to the pandemic (p=0.05) were also associated with a higher likelihood of accepting the COVID-19 vaccine.

Table 4: The Association between Vaccination Acceptance with Demographic Characteristics

	Vaccine Intention			x^2	p value
	Yes (n=604)	Wait (n=3)	No (n=3)		
Age					
< 30 years old	164 (26.9%)	1 (0.2%)	1 (0.2%)	6.48	0.73
31 to 40 years old	203 (33.3%)	2 (0.3%)	2 (0.3%)		
41 to 50 years old	185 (30.3%)	0 (0.0%)	0 (0.0%)		
51 to 60 years old	40 (6.6%)	0 (0.0%)	0 (0.0%)		
>60 years old	12 (2.0%)	0 (0.0%)	0 (0.0%)		
Gender					
Female	480 (78.7%)	3 (0.5%)	2 (0.3%)	1.02	0.75
Male	124 (20.3%)	0 (0.0%)	1 (0.2%)		
Ethnic					
Malay	580 (95.0%)	2 (0.3%)	3 (0.5%)	25.52	0.05
Chinese	13 (2.1%)	0 (0.0%)	0 (0.0%)		
Indian	0 (0.0%)	0 (0.0%)	0 (0.0%)		
Bumiputera Sabah & Sarawak	2 (0.3%)	0 (0.0%)	0 (0.0%)		
Others					
Bukan warganegara (non-Malaysian)	8 (1.3%)	0 (0.0%)	0 (0.0%)		
	1 (0.2%)	1 (0.2%)	0 (0.0%)		
Marital Status					
Married	540 (88.5%)	3 (0.5%)	2 (0.3%)	2.24	0.49
Not married	64 (10.5%)	0 (0.0%)	1 (0.2%)		
Education Level					
Primary school	11 (1.8%)	0 (0.0%)	0 (0.0%)	10.10	0.63
Secondary school	264 (43.3%)	2 (0.3%)	0 (0.0%)		
Diploma	193 (31.6%)	1 (0.2%)	2 (0.3%)		
Bachelor's Degree	100 (16.4%)	0 (0.0%)	1 (0.2%)		
Master's/ Doctorate	10 (1.6%)	0 (0.0%)	0 (0.0%)		
Others	26 (4.3%)	0 (0.0%)	0 (0.0%)		
Occupation					
Unemployed	58 (9.5%)	2 (0.3%)	0 (0.0%)	23.08	0.01
Government	312 (51.1%)	0 (0.0%)	0 (0.0%)		
Private	52 (8.5%)	0 (0.0%)	0 (0.0%)		
Self-employed	67 (11.0%)	0 (0.0%)	3 (0.5%)		
Housewife	68 (11.1%)	2 (0.3%)	3 (0.5%)		
Student	39 (6.4%)	0 (0.0%)	0 (0.0%)		
Retired	8 (1.3%)	0 (0.0%)	0 (0.0%)		
Monthly Household Classification					
B40 (Below RM4,851)	386 (63.3%)	3 (0.5%)	3 (0.5%)	3.67	0.46
M40 (RM 4,851-RM10,595)	199 (32.6%)	0 (0.0%)	0 (0.0%)		
T20 (Above RM10,960)	19 (3.1%)	0 (0.0%)	0 (0.0%)		

Income Loss During Pandemic					
No loss	417 (68.4%)	1 (0.2%)	1 (0.2%)		
Partial loss	168 (27.5%)	1 (0.2%)	2 (0.3%)	8.58	0.05
Total loss	19 (3.1%)	1 (0.2%)	0 (0.0%)		
Area of Residence					
Urban	176 (28.9%)	0 (0.0%)	2 (0.3%)		
Sub-urban	183 (30.0%)	2 (0.3%)	1 (0.2%)	4.39	0.23
Rural	245 (40.2%)	1 (0.2%)	0 (0.0%)		
Region of Residence					
Bachok	76 (12.5%)	2 (0.3%)	1 (0.2%)		
Gua Musang	55 (9.0%)	0 (0.0%)	0 (0.0%)		
Jeli	52 (8.5%)	0 (0.0%)	0 (0.0%)		
Kota Bharu	157 (25.7%)	0 (0.0%)	0 (0.0%)		
Kuala Krai	32 (5.2%)	0 (0.0%)	0 (0.0%)	16.35	0.36
Machang	63 (10.3%)	1 (0.2%)	1 (0.2%)		
Pasir Mas	45 (7.4%)	0 (0.0%)	1 (0.2%)		
Pasir Puteh	39 (6.4%)	0 (0.0%)	0 (0.0%)		
Tanah Merah	29 (4.8%)	0 (0.0%)	0 (0.0%)		
Tumpat	56 (9.2%)	0 (0.0%)	0 (0.0%)		

The Association Between COVID-19 Vaccination with The Factors That Influence COVID-19 Vaccination

Table 5 displays the association between COVID-19 vaccination and the factors that influence COVID-19 vaccination. For individual and group influences, respondents with a higher self-perceived risk of being infected had higher odds of vaccine acceptance (p = 0.03). In COVID-19 disease influences, all the factors have an association with vaccine acceptance: confidence in the ability of health services to respond to the pandemic, an adequate view of the information provided by health authorities, an adequate view of measures implemented by the government, a high self-perceived risk of getting COVID-19 infection, and a high self-perceived risk of developing severe disease following COVID-19 infection. All of them had a p value less than 0.05. An association was found between COVID-19 vaccine-related influences and vaccination intention. Respondents who were confident in the COVID-19 vaccines that were being developed (p = 0.01) and perceived sufficient information regarding vaccine safety (p = 0.01) were associated with COVID-19 vaccine acceptance.

Table 5: The Association Between COVID-19 Vaccination with The Factors That Influence COVID-19 Vaccination

	Vaccine Intention			x^2	p **value**
	Yes (n=604)	**Wait (n=3)**	**No (n=3)**		
Individual and Group Influences					
Perception of health status					
Very good/ Good	315 (51.6%)	1 (0.2%)	3 (0.5%)		
Neutral	283 (46.4%)	2 (0.3%)	0 (0.0%)	20.79	0.03
Very bad/ Bad	6 (1.0%)	0 (0.0%)	0 (0.0%)		
Having Health Problems Considered to be at Risk for COVID-19					
Respiratory/ lung disease	35 (5.7%)	0 (0.0%)	0 (0.0%)	11.10	0.07
Autoimmune disease	5 (0.8%)	1 (0.2%)	0 (0.0%)		
I do not have any of the health problems listed	564 (92.5%)	2 (0.3%)	3 (0.5%)		

Number of Comorbidities					
No comorbid	478 (78.4%)	1 (0.2%)	3 (0.5%)	5.42	0.22
1 comorbidity	93 (15.2%)	2 (0.3%)	0 (0.0%)		
2 or more comorbidities	33 (5.4%)	0 (0.0%)	0 (0.0%)		
School-Aged Children					
Yes	417 (68.4%)	3 (0.5%)	2 (0.3%)	1.07	0.80
No	187 (30.7%)	0 (0.0%)	1 (0.2%)		
COVID-19 Disease Influences					
Confidence in the ability of Health Services to Respond to the Pandemic					
Very confident	201 (33.0%)	0 (0.0%)	0 (0.0%)		
Confident	371 (60.8%)	3 (0.5%)	1 (0.2%)	20.39	0.01
Not very confident	27 (4.4%)	0 (0.0%)	0 (0.0%)		
Not confident	5 (0.8%)	0 (0.0%)	2 (0.3%)		
View on the Information Provided by Health Authorities					
Clear and understandable	471 (77.2%)	1 (0.2%)	3 (0.5%)	9.71	0.02
Unclear and confused	33 (5.4%)	2 (0.3%)	0 (0.0%)		
Incoherent and contradictory	0 (0.0%)	0 (0.0%)	0 (0.0%)		
Perception of the Adequacy of Measures Implemented by the Government					
Very adequate	199 (32.6%)	0 (0.0%)	0 (0.0%)	15.50	0.02
Adequate	360 (59.0%)	3 (0.5%)	1 (0.2%)		
Not very adequate	40 (6.6%)	0 (0.0%)	1 (0.2%)		
Not adequate	5 (0.8%)	0 (0.0%)	1 (0.2%)		
Self-perceived Risk to Get COVID-19 Infection					
High	148 (24.3%)	0 (0.0%)	1 (0.2%)	13.67	0.02
Moderate	245 (40.2%)	0 (0.0%)	1 (0.2%)		
Low	151 (24.8%)	1 (0.2%)	0 (0.0%)		
No risk	26 (4.3%)	1 (0.2%)	0 (0.0%)		
Unknown	34 (5.6%)	1 (0.2%)	1 (0.2%)		
Self-perceived Risk to Develop Severe Disease Following COVID-19 Infection					
High	106 (17.4%)	0 (0.0%)	0 (0.0%)		
Moderate	241 (39.5%)	0 (0.0%)	2 (0.3%)	11.59	0.05
Low	179 (29.3%)	1 (0.2%)	0 (0.0%)		
No risk	32 (5.2%)	1 (0.2%)	0 (0.0%)		
Unknown	46 (7.5%)	1 (0.2%)	1 (0.2%)		
Frequency of Agitation, Sadness, or Anxiety Due to Physical Distancing Measure					
Every day	55 (9.0%)	0 (0.0%)	0 (0.0%)	5.79	0.37
Almost every day	30 (4.9%)	1 (0.2%)	0 (0.0%)		
Some days	142 (23.3%)	1 (0.2%)	1 (0.2%)		
Never	377 (61.8%)	1 (0.2%)	2 (0.3%)		
COVID-19 Vaccine-Related Influences					
Confidence in the COVID-19 Vaccines that are being Developed					
Very confident	129 (21.1%)	0 (0.0%)	0 (0.0%)	30.28	0.01
Confident	413 (67.7%)	1 (0.2%)	0 (0.0%)		
Not very confident	59 (9.7%)	2 (0.3%)	1 (0.2%)		
Not confident	3 (0.5%)	0 (0.0%)	2 (0.3%)		
Sufficiency of Information Regarding Vaccine Safety					
Yes	542 (88.9%)	0 (0.0%)	0 (0.0%)	25.49	0.01
No	62 (10.2%)	3 (0.5%)	3 (0.5%)		

The Association between Vaccination Acceptance with the Self-Perception & History of COVID-19

This study reveals that there was association between vaccine acceptance with previous infection with COVID-19 (p=0.01) and infection in close social network (p= 0.01). However, no association was found for the self-perceived knowledge on COVID-19 disease (Table 6).

Table 6: The Association Between COVID-19 Vaccination with The Factors that Influence COVID-19 Vaccination

	Vaccine Intention			x^2	p value
	Yes (n=604)	Wait (n=3)	No (n=3)		
Self-Perceived Knowledge about COVID-19 Disease					
Very bad	10 (1.6%)	0 (0.0%)	1 (0.2%)	14.94	0.09
Bad	10 (1.6%)	0 (0.0%)	0 (0.0%)		
Neutral	278 (45.6%)	2 (0.3%)	1 (0.2%)		
Good	261 (42.8%)	1 (0.2%)	0 (0.0%)		
Very Good	45 (7.4%)	0 (0.0%)	1 (0.2%)		
Previous Infection with COVID-19					
Yes, a confirmed case of medical examinations	293 (48.0%)	1 (0.2%)	0 (0.0%)	21.05	0.01
Yes, but infection is not confirmed.	32 (5.2%)	0 (0.0%)	2 (0.3%)		
No, I have not had COVID-19	259 (42.5%)	2 (0.3%)	1 (0.2%)		
I have no idea	20 (3.3%)	0 (0.0%)	0 (0.0%)		
COVID-19 Infection in Close Social Network					
Yes, a confirmed case of medical examinations	482 (79.0%)	0 (0.0%)	1 (0.2%)	25.98	0.01
Yes, but infection is not confirmed.	18 (3.0%)	1 (0.2%)	1 (0.2%)		
No, I have not had COVID-19	96 (15.7%)	2 (0.3%)	0 (0.0%)		
I have no idea	8 (1.3%)	0 (0.0%)	1 (0.2%)		

DISCUSSION

The mean age of the respondents was 36.7 years old (±9.81); with the highest number of respondents aged between 31 and 40 years old. Most of them were female, married, and of Malay ethnicity. In this present study, most of the respondents were female, which was an expected outcome as women had a higher tendency to participate in studies (Peloso *et al.,* 2020; Cotrin *et al.,* 2020; Peloso *et al.,* 2020). Females were the majority in the present study. This was already expected since women participate more in answering surveys.

Almost half of the respondents lived in rural areas and had a secondary level of education. Although Malaysia was affected by the COVID-19 pandemic when this study was conducted, more than half of them had not lost their income. This could be since most of them were among government workers. Despite that, most of them still had low household income, which is under the B40 category. Educational efforts and ongoing campaigns emphasizing the significance of vaccination programs are essential for the success rate in resolving the healthcare crisis (Acob

et al., 2021).

The majority of the respondents were vaccinated when this study was conducted. This finding is supported by previous studies conducted by Lau *et al.* (2021) in Malaysia and Harapan *et al.* (2020) in Indonesia, where most of their respondents were willing to accept a free COVID-19 vaccine provided by the government. In Indonesia there is active ramping for COVID-19 vaccination efforts to achieve herd immunity as the global campaign against the mutating virus persists (Theresia, & Reñosa, 2023). In addition, although the Malaysian government has not made COVID-19 vaccination mandatory, the government stipulates that unvaccinated individuals will lose out on privileges, including not being allowed to enter shopping malls, dine in restaurants, or enter a building for religious services, which further strengthens the acceptance of this vaccine (Dasgupta, 2022; Wong *et al.,* 2022). Studies also show that the acceptance of this vaccine is increasing due to the disease severity, hospitalizations, and deaths (Lazarus *et al.,* 2023).

One-third of the respondents were concerned or worried about the COVID-19 vaccines, which was mostly due to insufficient confidence in the source of the vaccine and information about the side effects. Saeid *et al*. (2021) also reported similar concerns among their study sample. Several influences can be factors in the COVID-19 vaccination. In this study, half of the respondents rated their general health condition as good. Previous studies by Soares *et al.* (2021) and İkiışık *et al.* (2021) reported similar findings among the general adult population in Portugal and Turkey. More than half of the respondents had no health problems, as the study has a high proportion of younger respondents, which corresponds to other studies conducted in Malaysia and Jordan where most of the respondents were among the younger group and reported having no medical illness (Mohamed *et al.,* 2021; Syed Alwi *et al.,* 2021; Al-Qerem & Jarab, 2021).

Most of the respondents had no comorbidities. The findings are slightly different from the study by Soares *et al.* (2021), where only half of the respondents had no comorbidities. The slight difference might be due to their larger sample size and wider population coverage. As the majority of the respondents were married, more than half of them had school-aged children. Lau *et al.* (2021) also reported similar results, where sixty-seven percent of the respondents had children.

Nearly all the respondents were confident in the government's health services to respond to the pandemic caused by COVID-19. This is inconsistent with a study conducted among communities in Portugal (Soares *et al.,* 2021). However, their study was conducted when the vaccine was just introduced to the public, whereas the study was conducted over a year after the national vaccination program began. This shows that the acceptance of the public increases when they start to view the effectiveness of the vaccine and the efforts carried out by the government in dealing with these issues (Hamdan, Fahrni, & Lazzarino, 2022).

The information regarding protection measures against COVID-19 provided by the authorities was found to be clear and understandable by the majority. This finding was contradicted by Soares *et al.* (2021), whereby only half of the respondents claimed the information to be clear and understandable. The prior study's large population coverage and the fact that it was conducted during the early phases of vaccination internationally may account for the difference. The study, however, was carried out more than a year after the vaccine was first available and was effectively promoted in Malaysia. Most of the respondents stated that the measures implemented by the government have been adequate to combat the pandemic caused by COVID-19. This was almost like the study by Soares *et al.* (2021).

More than half of the respondents self-perceived the risk of becoming infected with COVID-19 as moderate to high. This was similar to previous studies conducted in Malaysia, Portugal, Jordan, and Egypt (Lau *et al.,* 2021; Soares *et al.,* 2021; Saied *et al.,* 2021; Al-Qerem & Jarab, 2021).

However, it was contradicted by a study by Harapan *et al.* (2020) in Indonesia, in which the majority of the respondents claimed their risk of becoming infected with COVID-19 was low to no risk. As this study was conducted during the earlier stages of the pandemic in Indonesia, information regarding the COVID-19 disease was new among their population. As for the self-perceived risk of developing severe disease following COVID-19 infection, about half of the respondents in this study reported moderate to high risk, which was similar to the study by Soares *et al.* (2021) but contradicted another study in Malaysia.

The respondents in this study reported being mentally affected due to the physical distancing measures during the COVID-19 pandemic, as almost half of them felt agitated, sad, or anxious. This was similar to the study done by Soares *et al.* (2021).

Most of the respondents stated they were confident in the COVID-19 vaccine that was being developed. Soares *et al.* (2021) also reported similar findings, where the majority of their respondents also claimed that they were confident with the COVID-19 vaccines. This, however, was contradicted by a study done among healthcare workers in Egypt, where more than half indicated a lack of confidence regarding the vaccine and its safety (Hussein *et al.,* 2021).

In addition, this study found that most of the respondents answered "yes" to the sufficiency of information regarding COVID-19 vaccine safety. Some previous studies, however, had opposite findings, where most of their respondents said otherwise (Saied *et al.,* 2021; Lucia, Kelekar, & Afonso, 2021; Dzieciolowska *et al.,* 2021). The contradiction in the study findings might be because the previous studies were conducted in the early days of the vaccination campaign.

Half of the study sample perceived to have good knowledge about COVID-19 disease; almost half had chosen neutral, while the rest perceived their knowledge about COVID-19 disease as bad. This study's findings are similar to previous studies done in Malaysia by Mohamed *et al.* (2021) and Saied *et al.* (2021) in Egypt, where half of the respondents rated their COVID-19-related knowledge as good.

About half of the respondents have been previously infected with COVID-19. However, in other studies, these findings were not in line with previous studies by Saied *et al.* (2021) and İkiışık *et al.* (2021), where only a small number of the respondents had a COVID-19 infection. The difference might be due to the study being conducted two years after the pandemic hit Malaysia, while the previous study was conducted in the earlier stages of the pandemic in their country, resulting in fewer positive cases among the respondents. Meanwhile, the majority stated that they knew someone close to them who had a COVID-19 infection, and this result resembles the previous studies (Saied *et al.,* 2021; İkiışık *et al.,* 2021).

The association was found between demographic characteristics and intent to vaccinate. Malay ethnicity, government workers, and no income loss were associated with COVID-19 vaccine acceptance. Ethnicity was also mentioned as a predictor of vaccine uptake in previous studies done in Malaysia (Syed Alwi *et al.,* 2021; Lau *et al.,* 2021), but had no association in other Western studies (Randolph & Barreiro, 2020; Pogue *et al.,* 2020). More studies found that there was an association between COVID-19 vaccine acceptance and occupation, which is working in the medical field and as healthcare workers (Harapan *et al.,* 2020; Al-Qerem & Jarab, 2021). Having no income loss was also mentioned as a predictor of vaccination in a previous study (Al-Qerem & Jarab, 2021).

Those that rate their health as 'good' had the highest rate of vaccine acceptance, consistent with other studies (Saied *et al.,* 2021; Hwang, Kim, & Heo, 2022). Soares *et al.* (2021) described confidence in the ability of health services to respond to the pandemic, a clear and understandable view of the information provided by health authorities, and an adequate perception of measures implemented by the government as having an association with vaccine acceptance. The high self-perceived risk of getting COVID-19 infection and developing severe disease following COVID-19 infection were both associated with COVID-19 vaccine acceptance. According to Betsch and Wicker (2012), the perception of risk was a key predictor of the intention of prevention and protective health behaviors. Despite that, other studies by Lucia, Kelekar, and Afonso (2021) reported otherwise, where a high level of perception was instead associated with vaccine hesitancy.

Although in the effort to deal with the COVID-19 pandemic, it has been successfully controlled in Malaysia, the incidence of this disease is still there, and the ups and downs change with the current situation. The government needs to continue to provide adequate information to convince the public of the importance of COVID-19 vaccination and the action of preventive and control measures in curbing its existence. The key approach to reducing the COVID-19 pandemic was vaccination. The fear of the consequences and the action implemented by the government have proven the acceptance of the COVID-19 vaccination in Malaysia. Guided by the scientific community, policymakers initially anticipated that herd immunity and COVID-19 vaccination uptake would be driven by behavioral factors including an enabling environment, social influences, and motivation. It is important to continuously identify recent evidence on the need to maintain immunity via booster shots, which means that the highest possible vaccination rates will be needed going forward. Lessons should also be taken from the previous incident so that a sufficient preparation plan for preventing any new emerging outbreak can be made.

CONCLUSION

This study was able to give an insight into the COVID-19 vaccination intention among the Malaysian population and the factors that influence it. COVID-19 vaccine acceptance in this study was high despite the many

factors that can influence their intent to vaccinate. Generally, Malaysians had positive attitudes towards the COVID-19 vaccine, health authorities, and the government. However, a small minority still has doubts, concerns, and distrust that might cause hesitancy to be vaccinated.

Conflict of Interest

The authors declare that they have no competing interests.

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