

KNOWLEDGE, ATTITUDES, RISK PERCEPTIONS, AND INTENTION TOWARD COVID-19 AND COVID-19 VACCINATION AMONG ADULTS IN THE CITY OF MANILA, PHILIPPINES

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ABSTRACT

Vaccination is a crucial strategy to prevent new COVID-19 infections; however, it will only be optimally effective if people, especially those who are at a higher risk of COVID-19 infection, will not hesitate to receive the vaccines. The current study utilized an analytical cross-sectional study design to measure the knowledge, attitudes, risk perceptions, and intention toward COVID-19 and COVID-19 vaccination among adult residents of the City of Manila, Philippines. A total of 385 respondents participated in this study. A self-administered questionnaire was used to measure the aforementioned study variables. Frequencies and proportions were calculated to describe the level of COVID-related knowledge, attitudes, risk perceptions, and intention to receive the COVID-19 vaccination. Logistic regression analyses were done to determine the factors associated with the outcome variable (intention to receive the COVID-19 vaccine). The results show that a majority of the respondents had good knowledge about COVID-19, with news media as the main source of COVID-related information. Around 40% expressed hesitancy and concerns over the safety of the vaccines. Catholics, those with at least a monthly income of 5,000 pesos, who had good knowledge of prevention, positive behavioral intention, and positive perceived benefits of COVID-19 vaccination were more likely to have the intention to get vaccinated. The study highlights the importance of correct, easy-to-understand, and accessible information so that individuals can make informed choices about their health, especially during the COVID-19 pandemic. Stakeholders must collaborate in developing effective strategies focused on addressing the public's hesitancy and building trust toward COVID-19 vaccines and the government's vaccination program.

Keywords: *attitudes, COVID-19, knowledge, Philippines, risk perception, vaccine*



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INTRODUCTION

The novel Coronavirus disease of 2019 (COVID-19) has spread in many countries, making it a global public health concern. The COVID-19 pandemic has resulted not only in excess mortality but has also revealed inequalities brought about by income, age, race, sex, geographic location, and gaps and weaknesses in health systems. These challenges, among others, have delayed the attainment of our health and economic goals. As of May 2021, the World Health Organization (WHO) has reported a total of 167,492,769 confirmed cases of COVID-19 with 3,482,907 deaths globally. The United States of America, India, and Brazil top the list of countries with the highest number of cases (World Health Organization, 2021). Meanwhile, the Philippines has logged a cumulative total of 1,193,976 cases and 20,169 deaths (Department of Health, 2021).

Vaccination is a crucial strategy to prevent new COVID-19 infections, hence, countries around the world are racing to vaccinate as many people as possible. However, vaccines will only be optimally effective if people, especially those who are at higher risk of COVID-19 infection, will not hesitate to receive the vaccines to attain the target herd immunity. Unfortunately, with the proliferation of fake news about the questionable efficacy and safety of COVID-19 vaccines, full compliance to vaccination will remain a challenge and an elusive goal. Hence, there is a need for more information about the factors that influence compliance with COVID-19 vaccines, including studies on the intention to comply with COVID-19 vaccination in the Philippine setting. Other countries have already accumulated a rich body of evidence that describes the knowledge, attitudes, perceptions, and practices of certain groups of people related to COVID-19 transmission and prevention [Lau et al., 2020; Nkengazong et al., 2020].

In the Philippines, the knowledge, attitudes, risk perceptions, and intention toward COVID-19 vaccination may also be determined to help the country in combating the pandemic. Thus, this study aims to generate the aforementioned variables toward COVID-19 and COVID-19 vaccination. The information that will be derived from such investigation is beneficial to risk communication interventions that may help improve the perceptions and behavioral intentions of the target beneficiaries towards the COVID-19 vaccines.

METHODOLOGY

Study Design

An analytic cross-sectional study design was used to determine the knowledge, attitudes, risk perceptions, and intention of the general population toward COVID-19 and COVID-19 vaccination.

Study Setting and Participants

The study was conducted in the city of Manila due to its high COVID-19 transmission rates and the strong political will and resources of its local government to procure COVID-19 vaccines. The data collection was done from February 23 to March 31, 2021. Residents of the city of Manila, Philippines who were at least 18 years of age and who have been living in the city for the past 12 months were selected. Adults who did not consent to participate, who were unable to read and write, who displayed symptoms of COVID-19, and who were reported to be in immunocompromised conditions (e.g., on asthma medication) were excluded from the study. Permission to conduct the study was granted by the local government. The study was reviewed and approved by the University of the Philippines Manila Research Ethics Board (UPMREB-2021-016-01).

The sample size for the survey was computed assuming a proportion of adults with good knowledge, attitudes, risk perceptions, and intention towards COVID-19 vaccination of around 50%, a 95% confidence level, and a 5% margin of error. Based on these parameters, at least 385 respondents were needed. Adjusting for a 20% non-response rate, a minimum sample size of 482 adults was invited to participate in the study. The study utilized a two-stage stratified sampling design to systematically select 49 households from each of the 10 randomly selected barangays. One adult selected using convenience sampling, that is, presently at home at the time of data collection who satisfies the aforementioned inclusion-exclusion criteria was asked to participate. No replacement was done for households with adults who were present and eligible for the study but did not give consent.

Data Collection and Analysis

Data collection was done through a self-administered questionnaire aided by trained data enumerators. The survey tool was drafted based on the tools that have been used in similar research from China (Li et al., 2020), Malaysia (Bhagavathula et al., 2020), the Philippines (Lau et al., 2020; Gregorio et al., 2019), and the United States (Reiter et al., 2020; Pogue et al., 2020). The questionnaire is composed of 56 questions divided into the following sections: 1) sociodemographic characteristics; 2) experience of COVID-19; 3) knowledge of COVID-19 and COVID-19 vaccines; 4) attitudes towards COVID-19 vaccines; and 5) perceptions and intentions towards COVID-19 vaccines and COVID-19 vaccination. The members of the study team who are experts on infectious diseases, health promotion and risk communication, biostatistics, and public health research reviewed the survey tool. The survey tool was forward translated to Tagalog and then back-translated into English to further improve clarity. The study team deliberated on the accuracy of the translation and back-translation. The draft survey tool was pretested with at least 10 adults that represented the general population. The pretesting focused on the duration of the interview, clarity, and cultural sensitivity of the instructions, questions, and response options. Furthermore, the pretesting also gathered possible response options to open-ended questions. The survey tool was revised according to the findings of the pretest.

Frequencies and proportions were calculated to describe the level of COVID-related knowledge, attitudes, risk perceptions, and intention to receive the COVID-19 vaccination. Logistic regression analyses were done to determine the factors associated with outcome variable (intention). For the multiple logistic regression, a backward elimination approach was employed. Starting with the full model, which included all the covariates. Those covariates with p-values higher than .05 were one by one removed starting with the highest p-value. The final model was obtained when all the covariates left in the logistic model had p-values of at most .05. The unadjusted and adjusted odds ratios and their corresponding 95% confidence interval were recorded. The authors used a .05 level of significance for this study. The R software was utilized in the analyses of data.

RESULTS

Characteristics of the Respondents

While 383 residents agreed to participate in the study, seven decided not to respond to any questions, thus, the study only had 376 out of the planned 385 respondents, giving a participation rate of 97.66%. Their average age was 43.6 years old. Table 1 presents the demographic characteristics of the respondents.

The majority of the respondents were female (78.5%), married (53.5%), Roman Catholic (91.2%), and had reached a high school level of education (63.0%). About 45% were either unemployed, students, or retirees. About half reported a family income of fewer than 5,000 pesos.

Table 1
Characteristics of the Participants, Manila, April 2021 (n = 376)

Characteristic	Frequency	Percent
Sex		
Female	295	78.5
Male	81	21.5
Marital status		
Married	201	53.5
Single	77	20.5
Living with a partner	43	11.4
Widowed	38	10.1
Separated/divorced	14	3.7
No data	3	0.8
Religion		
Roman Catholic	343	91.2
Other	33	8.8
Educational attainment		
High school level/Vocational	237	63.0
At least college level	103	27.4
Elementary level	36	9.6

Employment status		
Unemployed/student/retired	172	45.7
Self employed	137	36.4
Employed	67	17.8
Monthly family income		
<5,000	176	46.8
5,001 - 15,000	129	34.3
>15,000	66	17.6
missing	5	1.3

Experience of COVID-19 Infection

Two respondents reported having been exposed to somebody with known COVID-19 infection in the past month before data collection, while 98% reported no exposure (Table 2). Five (1.3%) were said to have experienced some symptoms in the past month; all of them have had a cough, four had a cold, while two experienced difficulties of breathing, loss of taste, and loss of smell.

About one in four respondents (26%) did not think that COVID-19 infection is severe at all while 16% thought the infection is a little serious. Only 12.5% said that the infection is very serious. As regards their susceptibility to the COVID-19 infection, 42.8% and 14.6% said that there is no chance and low chance, respectively, that they would get the infection. About 3% said that they have a high chance of being infected with the COVID-19 virus (Table 2).

Table 2
Distribution of the Respondents according to the experience of COVID-19 (n = 376)

Characteristic	Frequency	Percent
Had been exposed to a person with an infection		
No	369	98.1
Unsure	5	1.3
Yes	2	0.5
Experienced signs and symptoms of COVID-19		
No	351	93.4
Unsure	20	5.3
Yes	5	1.3

Experienced COVID-19 symptoms*		
Cough	5	100.0
Cold	4	80.0
Difficulty breathing	2	40.0
Loss of taste	2	40.0
Loss of smell	2	40.0
Diarrhea	2	40.0
Muscle aches	1	20.0
Sore throat	1	20.0
Headache	1	20.0
Fatigue	1	20.0
Perceived severity of COVID-19 infection		
Not at all	98	26.1
A little serious	59	15.7
Moderately serious	28	7.4
Very serious	47	12.5
Don't know/unsure	144	38.3
Perceived susceptibility to COVID-19 infection		
No chance	161	42.8
Low chance	55	14.6
Moderate chance	21	5.6
High chance	10	2.7
Don't know/unsure	129	34.3

**Multiple responses allowed*

Knowledge of the Respondents about COVID-19

The majority of the respondents (93%) said that they get their information about COVID-19 from news media (Figure 1) and 39% get their information from social media. Only at most 20% reported getting their information from official government websites and health workers.

Figure 1
Distribution of Respondents according to their Sources of information about COVID-19 infection, (n = 376)

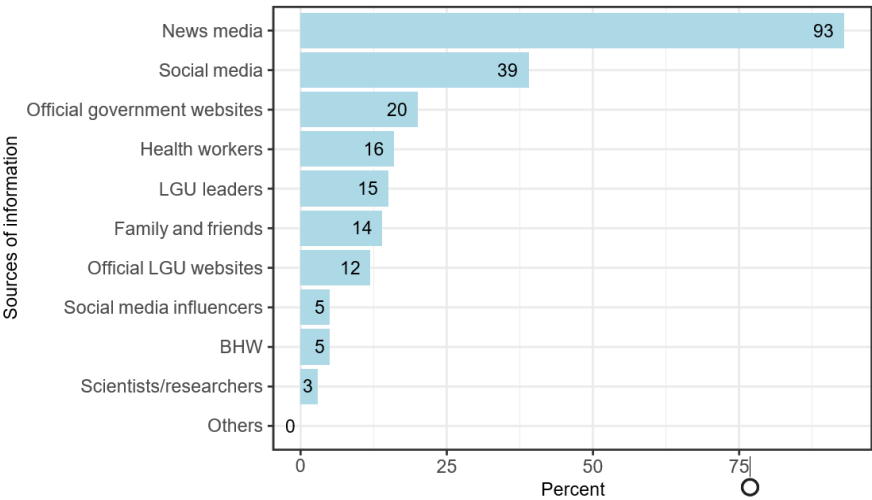


Table 3 presents the proportion of the respondents who had correct answers on each knowledge item. About 90% knew that the COVID-19 virus spreads via respiratory droplets of infected individuals, that isolating and treating the people who are infected with the COVID-19 virus are effective ways to reduce its spread, and one should avoid crowded places and public transportation to prevent getting infected. However, three out of four respondents incorrectly thought that eating or touching wild animals would result in the infection by COVID-19 virus.

About 15% correctly answered all six knowledge questions while almost half (48.4%) got five out of six items correctly (Table 4). Six respondents did not have any correct answers (1.6%). Overall, 63.6% (95% confidence interval: 58.7–68.4%) had correctly answered at least 75% of the knowledge items, thus, having good knowledge about COVID-19 virus infection.

Table 3
Proportion of Respondents with Correct Answers to Knowledge Questions (n = 376)

Knowledge Item	Frequency	Percent
The COVID-19 virus spreads via the respiratory droplets of infected individuals.	339	90.2
Isolation and treatment of people with COVID-19 virus infection are effective ways to reduce its spread.	336	89.4
COVID-19 infection can be prevented by avoiding crowded places and avoiding public	331	88.0

transportation.		
The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and body aches.	311	82.7
There is currently no effective cure for COVID-19.	291	77.4
Eating or touching wild animals would NOT necessarily result in the infection by COVID-19 virus.	89	23.7

Table 4
Proportion of Respondents according to the Number of Correct Answers (n = 376)

No. of Correct Answers	Frequency	Percent
5	182	48.4
4	80	21.3
6	57	15.2
3	33	8.8
1	10	2.7
2	8	2.1
0	6	1.6

Knowledge of the Respondents about COVID-19 Vaccines

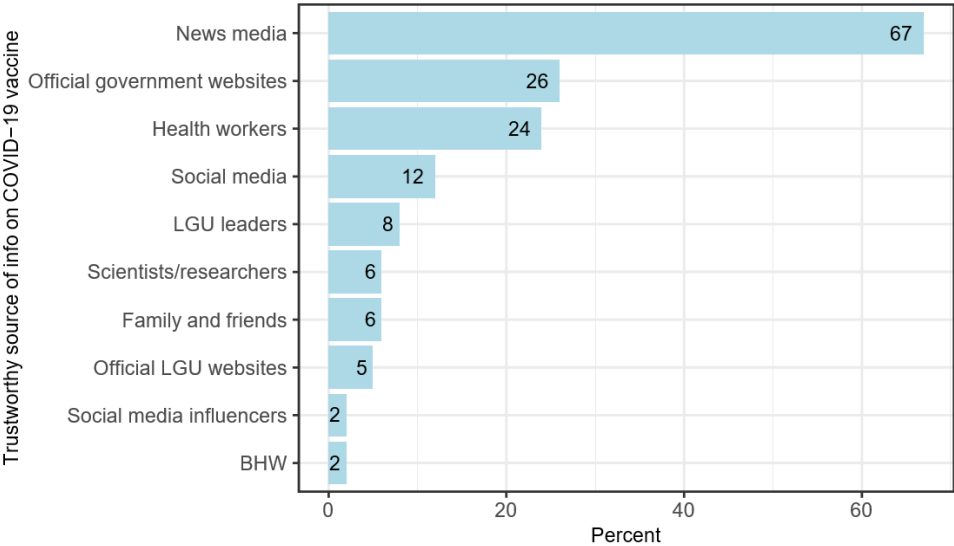
More than half (58.2%) of the respondents said that they know a little about the COVID-19 vaccines. Only six (6) said that they know a lot about the COVID-19 vaccines (Table 5). Two-thirds reported that they would see or hear conflicting information on the COVID-19 vaccines from different sources. One in five respondents believed that none of the information that they get about the COVID-19 vaccines seemed fake or made up, and half said that only a little of this information on the COVID-19 vaccines seemed fake or made up. About one-fifth believed that the information that the vaccine is safe and has no adverse effects on one’s body is fake (Table 5).

Table 5
Distribution of the Respondents according to Perception of COVID-19 Vaccines
(n = 376)

Item	Frequency	Percent
Perceived level of knowledge on COVID-19 vaccines		
Nothing at all	95	25.3
A little	219	58.2
A moderate amount	56	14.9
A lot	6	1.6
Description of information seen or heard about COVID-19 vaccines		
Same information across different sources	114	30.3
Conflicting information across different sources	250	66.5
Other	11	2.9
Missing	1	0.3
Amount of information about COVID-19 vaccines that seemed fake or made up		
None at all	0	0.0
A little	201	53.5
A moderate amount	76	20.2
A lot	16	4.3
Missing	83	22.1
Information believed to be fake or made up		
The effect depends on the body of each person	169	44.9
It is safe and has no adverse effects	80	21.3
It can kill a person	65	17.3
It brings other diseases	53	14.1
It is not effective	41	10.9
It causes allergic reactions	1	0.3

As shown in Figure 2, 67% of the respondents reported that the news media are trustworthy sources of information about the COVID-19 vaccines. Only about 25% thought that social media and health workers are trustworthy sources of information. Meanwhile, less than 10% said that LGU leaders, scientists and researchers, the LGU websites, and barangay health workers (BHWs) are trustworthy sources of information.

Figure 2
Distribution of Respondents according to their Trustworthy Source of Information about COVID-19 Vaccines (n = 376)



Attitudes toward COVID-19 Vaccines

Table 6 presents the responses on several items on attitude towards the COVID-19 vaccines. Only 16.7% said that they trust the information they hear about the COVID-19 vaccines. About 40% said that they are concerned that they might have serious side effects from a COVID-19 vaccine and that the vaccine may not be safe. Forty-three percent were hesitant about the vaccine.

Less than 10% said that getting the COVID-19 vaccine is against the teachings of their religion while 36% were unsure. As regards self-efficacy, only 21% said that they are confident that they will get the vaccine for COVID-19 even if they must go to a health center or hospital (Table 6).

About 23% and 28% said that they are willing to receive the COVID-19 vaccine when it becomes available and that they are willing to receive the COVID-19 vaccine if it is free and is covered by health insurance, respectively. Only 12% were willing to participate in a clinical trial (Table 6).

Table 6*Attitudes of the Respondents on Getting a COVID-19 Vaccine (n = 376)*

Item	Disagree		Unsure		Agree	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
I trust the information I receive about COVID-19 vaccines.	119	31.65	194	51.60	63	16.76
I am concerned that I might have serious side effect from a COVID-19 vaccine.	78	20.74	145	38.56	153	40.69
I am concerned that the vaccine might not be safe.	89	23.67	144	38.30	143	38.03
I am concerned that the vaccine might not protect me from COVID-19.	82	21.81	153	40.69	141	37.50
I am hesitant about the COVID-19 vaccine	76	20.21	137	36.44	163	43.35
Getting the COVID-19 vaccine is against the teachings of my religion.	209	55.59	137	36.44	30	7.98
If my family /friends would recommend that I get the vaccine, I would follow their advice.	141	37.50	151	40.16	84	22.34
I am confident that I will get the vaccine even if I have to go to a health center/hospital.	136	36.17	160	42.55	80	21.28
I am willing to receive the vaccine when it becomes available.	134	35.64	156	41.49	86	22.87
I am willing to receive the vaccine if it is free and covered by health insurance	134	35.64	136	36.17	106	28.19
I am willing to volunteer for a clinical trial for a COVID-19 vaccine.	187	49.73	144	38.30	45	11.97
If my doctor/health provider would recommend that I get the vaccine, I would follow the advice.	113	30.05	159	42.29	104	27.66

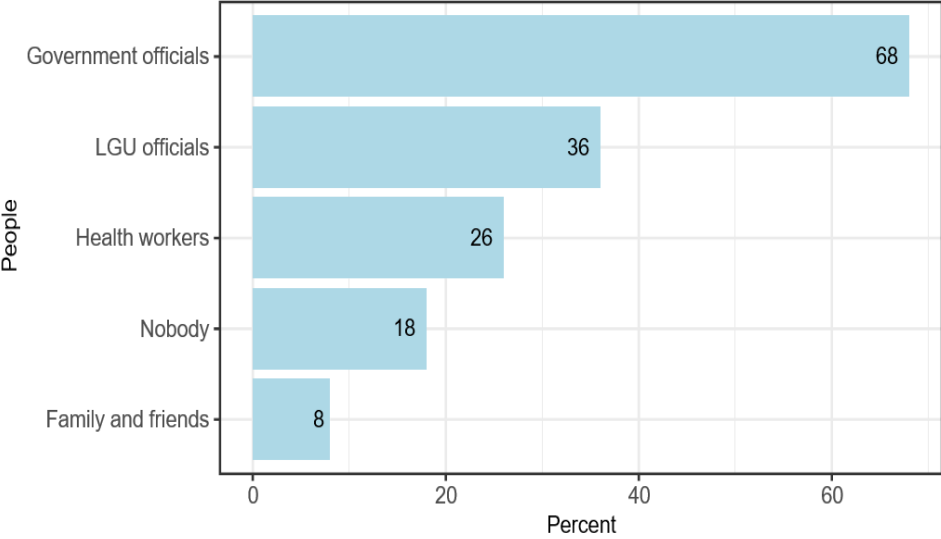
If a celebrity/personality that I admire will get the vaccine, I will also get vaccinated.	179	47.61	137	36.44	60	15.96
I will get vaccinated against COVID-19 if government officials get vaccinated first.	107	28.46	130	34.57	139	36.97
I am likely to get vaccinated against COVID-19 if I have sufficient scientific knowledge about the safety of the vaccine.	75	19.95	130	34.57	171	45.48
Getting the vaccine will protect me from getting infected.	74	19.68	260	69.15	41	10.90
Getting the vaccine will benefit the health of my family and friends.	74	19.68	209	55.59	93	24.73
Other people being vaccinated against COVID-19 will help control the pandemic.	52	13.83	174	46.28	148	39.36
The side effects of the vaccine are likely to be worse than COVID-19 itself.	78	20.74	265	70.48	32	8.51
If the vaccine will not be free and not covered by health insurance, I will not get myself vaccinated.	98	26.06	171	45.48	106	28.19
If my religious leader/spiritual adviser advises me against getting the vaccine, I will follow his advice.	176	46.81	161	42.82	38	10.11
If I do decide to get the COVID-19 vaccine, it would be difficult to find a clinic/health provider that could give me the vaccine.	120	31.91	219	58.24	36	9.57

As regards external cues to action, 37% reported that they are likely to get vaccinated if government officials get vaccinated first (Table 6). Sixty-eight percent said that they want to see government officials get vaccinated first before they get vaccinated followed by LGU officials (36%) (Figure 3).

Only 11% agreed that COVID-19 vaccines will protect them from getting infected while 25% agreed that getting the vaccine for COVID-19 will benefit the health of their family and friends. As regards perceived efficacy, about two in every five (39.4%) said that other people being vaccinated against COVID-19 will help control the pandemic. One in every five (20.7%) did not agree that the side effects of the vaccine are likely to be worse than COVID-19 itself while 70% were unsure (Table 6).

Figure 3

It refers to the people (celebrity/government officials/influencers) whom the respondents want to be vaccinated first before they follow.



Intentions toward COVID-19 Vaccination

Two respondents reported having been vaccinated. For the rest of the respondents, 25% said that they plan to get vaccinated against COVID-19 infection. Some of the reasons given why they plan to get vaccinated were: 1) to keep them and their family safe and protected against the virus, 2) so that they can go back to work, and 3) to end the pandemic so things will go back to normal. As regards the timing of getting vaccinated, the responses given were as follows: 1) right away, 2) once it is available, 3) once it is sure that the vaccine is safe, and 4) once a vaccine with higher efficacy becomes available. Among those who did not plan to get vaccinated, some of the reasons given are the following: 1) afraid of the side effects, 2) afraid to die because of the vaccine, 3) does not trust vaccines, 4) not experiencing any sickness, and 5) afraid of what will happen because of what happened with Dengvaxia.

Factors Associated with the Intention to get Vaccinated

Table 7 presents the results of the logistic regression analyses that were performed to determine the factors associated with the intention to get vaccinated. Without controlling for any variables, males were more likely to have the intention to get vaccinated than females. Similarly, those with higher education had higher odds of having the intention to get vaccinated than those who only reached an elementary level of education. Those who were self-employed or unemployed had lesser odds of having the intention to get vaccinated than the employed. Moreover, those with good knowledge of the prevention of COVID-19 infection had higher odds of having the intention to get vaccinated. As regards attitudes toward the COVID-19 vaccine, those with positive social norms, perceived self-efficacy, behavioral intention, external cues to action, perceived benefits and perceived efficacy had higher odds of having the intention to get vaccinated than those with negative or unsure attitudes.

Putting all these covariates in one model, several variables were found to be statistically associated with the intention to get vaccinated. Controlling for the other variables, Roman Catholics had 7.91 times the odds of having the intention to get vaccinated compared to those with other religions. Those whose families were said to earn at least 5,000 pesos monthly had at least 2.84 times the odds of having the intention to get vaccinated than those who earn lower. Those who reported being unemployed, student, or retired had 70% lower odds of having the intention to get vaccinated than the employed.

Those who had good knowledge of prevention had about 15 times the odds of having the intention to get vaccinated compared to those with poor knowledge. Those with positive behavioral intention, positive perceived benefits, and positive perceived efficacy of COVID-19 vaccination had 22.82, 12.98, and 2.98 times the odds of having the intention to get vaccinated, respectively, compared to those with negative or unsure attitudes. It is interesting to note that, controlling for the other variables, those with good knowledge of treatment had 82% lower odds of having the intention to get vaccinated than those with poor knowledge. Similarly, those with a positive attitude towards perceived barriers had 60% lower odds of having the intention to get vaccinated than those with negative attitudes (Table 7).

Table 7

Results of Logistic Regression on the Factors Associated with Intention to Get the COVID-19 Vaccine

Variable (Reference group)	Simple logistic reg analyses				Multiple logistic reg analysis			
	Crude OR	95% CI	P-value	Adj. OR	95% CI	P-value		
Sex (Female)								
Male	2.14	1.26	3.66	0.0051				
Age	1.00	0.99	1.02	0.6685				
Marital status (Single)								
Married/Living with a partner	0.75	0.41	1.35	0.3321				
Separated/divorced/Widowed	1.02	0.67	1.54	0.9412				
Religion (Other)								
Roman Catholic	2.01	0.75	5.36	0.1649	7.91	1.67	37.49	0.0092
Educational attainment (Elementary)								
High school level/Vocational	2.60	1.32	5.15	0.0060				
At least college level	1.63	1.01	2.64	0.0452				
Monthly family income (<5,000)								
5,001 - 15,000	2.99	1.92	4.64	0.0000	5.00	2.22	11.25	0.0001
>15,000	1.43	0.93	2.19	0.1022	2.84	1.36	5.96	0.0056
Employment status (Employed)								
Self- employed	0.37	0.19	0.71	0.0026				
Unemployed/student/retired	0.39	0.21	0.72	0.0027	0.30	0.09	1.00	0.0497
Knowledge of transmission (poor)								
Good	1.16	0.66	2.06	0.6065				
Knowledge of symptoms (poor)								
Good	1.14	0.59	2.19	0.6944				
Knowledge of prevention (poor)								
Good	5.88	2.07	16.69	0.0009	14.8	3.23	67.88	0.0005
Knowledge of treatment (poor)								
Good	1.76	0.93	3.32	0.0803	0.18	0.06	0.56	0.0029
Perceived risk (negative/unsure)								
Positive	1.34	0.75	2.39	0.3197				
Social norms (negative/unsure)								
Positive	4.44	2.35	8.38	0.0000				
Perceived self-efficacy (negative/unsure)								
Positive	23.28	12.28	44.14	0.0000				
Behavioral intention (negative/unsure)								
Positive	36.91	18.90	72.09	0.0000	22.82	8.84	58.90	<0.0001
External cues to action (negative/unsure)								
Positive	10.87	6.15	19.19	0.0000				
Perceived benefit (negative/unsure)								
Positive	19.47	10.79	35.13	0.0000	12.98	5.00	33.71	<0.0001
Perceived efficacy (negative/unsure)								
Positive	9.60	4.99	18.48	0.0000	2.98	1.17	7.58	0.0220
Perceived barriers (negative/unsure)								
Positive	1.07	0.65	1.78	0.7785	0.40	0.16	0.98	0.0459

DISCUSSION

The current study aimed to determine the knowledge, attitudes, risk perceptions, and intention of people toward COVID-19 and COVID-19 vaccination. The majority of the respondents had good knowledge about COVID-19, with almost all citing news media as their source of COVID-related information. However, two-thirds also reported hearing or seeing conflicting information on COVID-19 vaccines. Around 40% expressed concerns over the safety of the vaccines, and a similar proportion also reported feeling hesitant about the vaccine. This is also reflected by the low proportion of respondents with intent to receive the vaccine. Logistic regression analysis also revealed that Catholics, those with at least a monthly income of 5,000 pesos, who had good knowledge of prevention, positive behavioral intention, and positive perceived benefits of COVID-19 vaccination were more likely to have the intention to get vaccinated.

The good knowledge about COVID-19 demonstrated by the respondents is consistent with the findings of previous studies that were conducted in Nigeria (Reuben et al., 2020), Malaysia (Azlan et al., 2020), China (Yue et al., 2020), Vietnam (Van Nhu et al., 2020), and Ecuador (Bates et al., 2020). People's knowledge, attitude, and practices concerning COVID-19 are significant predictors of disease-specific preventive behaviors. According to Lau et al. (2020), greater number of COVID-19 prevention measures were practiced by those with a higher level of knowledge. These findings indicate that good knowledge, combined with attitudes and practices, can contribute to the suppression and mitigation of COVID-19.

News and social media as the most common sources of COVID-related information were also consistent with the literature (Honarvar et al., 2020; Reuben et al., 2020). In terms of trustworthiness, news media was also ranked the highest, but what is concerning is that only a small proportion of the respondents believed that health workers and scientists were trustworthy. It is also important to note that two-thirds of the respondents reported hearing or seeing conflicting information on COVID-19 vaccines. A study among American adults reported inconsistent messages from public health experts and elected government officials as determinants for reduced vaccine uptake (Thunstrom et al., 2022).

These findings emphasize the important role of collaboration between news and social media and the scientific community in disseminating correct information, mitigating disinformation, and responsible reporting of COVID-related news. In addition, previous research had shown that the varying levels of trust in different sources of information are associated with age, sex, and cultural differences.

For instance, young individuals with higher online information literacy trust web-based information sources more as compared to older individuals who trust experience-based health knowledge (Figueiras et al., 2021).

Contrary to the findings of Ahmed et al. (2021), Biasio et al. (2021), Elhadi et al. (2021), and Neumann-Bohme et al. (2020), the intention to receive the vaccine among the respondents was low. The findings also indicate that vaccine hesitancy remains a major challenge to the country's vaccination program, with a large proportion of the respondents citing safety concerns as a major factor for their hesitation to receive the vaccine. These findings were consistent with Bono et al.'s study (Bono et al., 2021), wherein fear of vaccine side effects and lack of confidence in the effectiveness of the vaccines were the most cited reasons for refusing vaccination. Farha et al. (2021) also reported similar results, with adverse effects of the vaccine being reported by 61% of the respondents as their reason for refusal. Concerns about vaccine safety and distrust towards health professionals are recurring concerns across several studies, as these factors were also cited as common reasons for poor compliance among the general population and even among healthcare workers (Blasi et al., 2012; Falagas et al., 2008; Knowler et al., 2018; Ventola, 2016). The first step in vaccine communication and addressing vaccine hesitancy is to identify the target audience and establish trust with them (Dubé et al., 2020; Thomas et al., 2020). Transparency and honesty in the information being delivered is important, and this can be addressed by presenting both the benefits and risks of getting vaccinated. The World Health Organization (2019) also stressed the need to listen to and engage with stakeholders and members of the target population and obtain their feedback as one of the ways forward for vaccine safety communication.

The present study also found that Catholics, those with at least a monthly income of 5,000 pesos, who had good knowledge of prevention, positive behavioral intention, and positive perceived benefits of COVID-19 vaccination were more likely to have the intention to get vaccinated.

The higher intention to get vaccinated that was observed among Catholics in this study is consistent with the results of a study done in Ethiopia (Handeobo et al., 2021). In the study, it was found that the respondents who are Catholic or Protestant had increased intention to accept the vaccine as compared to individuals affiliated with the Orthodox religion. This may be attributed to several reasons like the perceived lower risk to get infected in certain religious groups, vaccine hesitancy due to religious values, or lack of trust in the healthcare system. The relationship between low socioeconomic status and refusal of vaccination has also been documented among French adults (Peretti-Watel et al., 2021).

In terms of good knowledge of prevention and the perceived benefits of the COVID-19 vaccination, these findings were congruent with the results of an online survey conducted in Malaysia, Thailand, Bangladesh, Democratic Republic of Congo, Benin, Uganda, Malawi, Mali, and Brazil (Bono et al., 2021).

The results reported in this study should be considered in light of some limitations. The study employed an analytic cross-sectional design and thus cannot establish causation between the variables measured. Moreover, since nonprobability sampling was employed due to COVID-19 restrictions in the community, the results of the study may not be generalizable to the target population.

The use of self-administered questionnaires to gather data on the attitudes and risk perceptions of respondents can result in errors of measurement caused by information bias and social desirability bias. Information bias was minimized by pre-testing the self-administered questionnaires. Social desirability bias, on the other hand, was minimized by assuring the respondents that their identities will remain anonymous and that their responses will be kept confidential. The method of data collection also presented certain limitations in data collection, particularly in probing, and response rates.

CONCLUSION

Overall, the majority of the respondents had good knowledge about the symptoms of COVID-19, transmission, and prevention. However, a lower proportion of respondents intend to be vaccinated. The respondents who planned to be vaccinated believe that the vaccine will keep them and their families safe and protected against the virus and will enable them to go back to work. This will end the pandemic resulting in things going back to normal. The majority who hesitated to receive the COVID-19 vaccine expressed fears about the many side effects of the vaccine. The greatest fear is death. Other reasons are the lack of trust in the vaccines, inadequate information regarding the vaccines, and the belief in being healthy.

The factors associated with the intention to get vaccinated were likewise explored. Males are more likely to have the intention to get vaccinated than females. Those with higher education have higher intentions to get vaccinated than those who belong to the elementary education category. Those who are self-employed or unemployed had lesser intentions to get vaccinated than those who are employed. Moreover, those with adequate knowledge of the prevention of COVID-19 infection had higher odds of having intentions to get vaccinated. Finally, the respondents with positive attitudes had higher odds of having the intention to get vaccinated than those with negative or unsure attitudes.

These include the respondents who said that they were confident to get vaccinated even if they have to go to the health center; those who are likely to get vaccinated if government officials get vaccinated first; and those who think that the vaccine is effective.

RECOMMENDATIONS

The findings highlight the need for promoting COVID-19 vaccine literacy to make individuals understand and process the information available for making appropriate health decisions and actions. Specifically, the following should be done: 1) ensure the provision of correct information that is easy to understand and access; 2) government agencies, the scientific community, media, and community stakeholders must strengthen collaboration in developing effective strategies focused on overcoming the public's hesitancy and building trust towards COVID-19 vaccines and the government's vaccination program; and 3) enhance health communication campaigns and dissemination to improve the knowledge and attitude of the general population through the use of interpersonal communication strategies. These health communication campaigns should highlight the efficacy and safety of FDA-approved vaccines, healthy people and those with comorbidities also need to be vaccinated, and the benefits of the vaccination in returning to "normal" in general and family's health in particular.

CONFLICT OF INTEREST

All authors declare no competing interests.

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