

# **Knowledge, Attitudes, Risk Perceptions, and Intention towards 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 once they become available. The current study utilized a sequential mixed methods study design to measure the knowledge, attitudes, risk perceptions, and intention towards COVID-19 and vaccination among adult residents of the city of Manila, Philippines. A self-administered questionnaire was used to measure the study variables of interest. Frequencies and proportions were calculated to describe the level of COVID-related knowledge, attitude, risk perception and intention to receive the COVID-19 vaccination. Logistic regression analyses were done to determine the factors associated with outcome variables. 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, 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 information that is easy to understand and access 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 towards COVID-19 vaccines and the government's vaccination program.

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

## Introduction

The world has experienced a number of pandemics in the past but none can parallel the speed of spread as well as the health, social, economic, and development impact brought about by the novel Coronavirus disease 2019 (COVID-19). 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 [1]. Meanwhile, the Philippines has logged a cumulative total of 1,193,976 cases and 20,169 deaths [2].

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 a higher risk to COVID-19 infection, will not hesitate to receive the vaccines once they become available and the target herd immunity is attained. Unfortunately, with the proliferation of fake news about the questionable efficacy and safety of possible COVID-19 vaccines, full compliance to vaccination will remain a challenge and an elusive goal. There is 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 [3,4]. However, there is dearth of information about the factors that influence compliance to COVID-19 vaccines once they become available, including studies on intention to comply to COVID-19 vaccination.

Therefore, there is a need to determine the knowledge, attitudes, risk perceptions, and intention towards COVID-19 vaccination. This study aims to generate knowledge, attitudes, risk perceptions and intention of the people towards COVID-19 and vaccination. The results of the study will be used to design a risk communication intervention that will improve the perceptions and behavioral intention of the target beneficiaries towards the COVID-19 vaccine.

## Methodology

### *Study design*

Analytical cross-sectional study design was used to determine knowledge, attitudes, risk perceptions, and intention of the general population towards COVID-19 and 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. 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, unable to read and write, 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 5% margin of error. Based on these parameters, at least 385 participants were needed. Adjusting for a 20% non-response rate, a minimum sample size of 482 adults were 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 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 by similar

research from China [5], Malaysia [6], the Philippines [3,7], and the United States [8,9]. 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 vaccine; 4) attitudes towards COVID-19 vaccine; and 5) perceptions and intentions towards COVID-19 vaccine and 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 translated to Tagalog and then back translated into English to further improve clarity and 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 the response options. 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, attitude, risk perception and intention to receive the COVID-19 vaccination. Logistic regression analyses were done to determine the factors associated with outcome variables (risk perception and intention). The unadjusted and adjusted odds ratios and their corresponding 95% confidence interval were recorded. A 0.05 level of significance was used. The R software was utilized in the analyses of data.

## Results

### *Characteristics of the participants*

While 383 residents agreed to participate in the study, seven decided not to respond to any questions, thus, the study only had 376 respondents. Their average age was 43.6 years old. Table 1 presents the demographic characteristics of the participants. The majority of the respondents were female (78.5%), married (53.5%), Roman Catholic (91.2%), and had reached high school level of education (63.0%). About 45% were either unemployed, students or retirees and about half reported a family income of less than 5,000 pesos.

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

Characteristic	Frequency	Percent
<b>Sex</b>		
Female	295	78.5
Male	81	21.5
<b>Marital status</b>		
Living with a partner	43	11.4
Married	201	53.5
Separated/divorced	14	3.7
Single	77	20.5
Widowed	38	10.1
No data	3	0.8
<b>Religion</b>		
Other	33	8.8
Roman Catholic	343	91.2
<b>Educational attainment</b>		
Elementary level	36	9.6
High school level/Vocational	237	63.0
At least college level	103	27.4
<b>Employment status</b>		
Employed	67	17.8
Self employed	137	36.4
Unemployed/student/retired	172	45.7
<b>Monthly family income</b>		
<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 participants reported having been exposed to somebody with known COVID-19 infection in the past month prior to 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 cough, four had cold, while two experienced difficulty breathing, loss of taste, and loss of smell.

About one in four participants (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 participants according to experience of COVID-19 (n = 376)

Characteristic	Frequency	Percent
<b>Had been exposed to a person with infection</b>		
No	369	98.1
Unsure	5	1.3
Yes	2	0.5
<b>Experienced signs and symptoms of COVID-19</b>		
No	351	93.4
Unsure	20	5.3
Yes	5	1.3
<b>Experienced COVID-19 symptoms*</b>		
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
<b>Perceived severity of COVID-19 infection</b>		
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
<b>Perceived susceptibility to COVID-19 infection</b>		
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

### *Knowledge of the participants about COVID-19*

The majority of the participants (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.

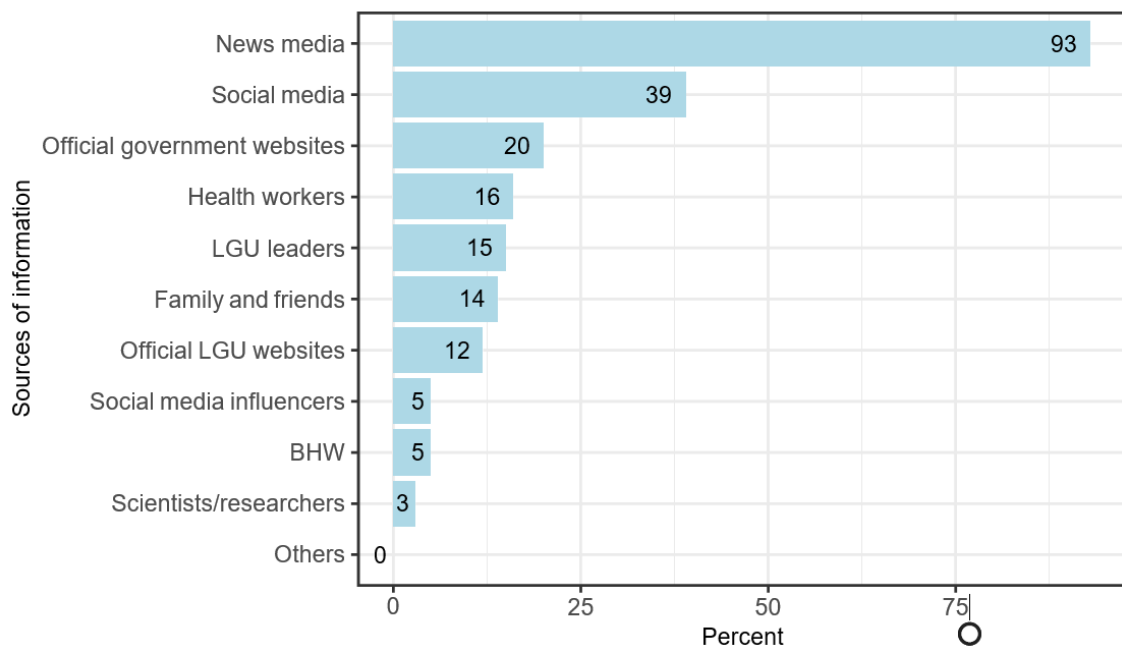


Figure 1: Source of information about COVID-19 infection, (n = 376)

Table 3 presents the proportion of participants 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 participants 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, have good knowledge about COVID-19 virus infection.



Table 3: Proportion of participants with correct answers on knowledge questions (n = 376)

Knowledge item	frequency	Percent
The COVID-19 virus spreads via 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 <a href="#">public transportation</a> .	331	88.0
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 participants according to number of correct answers (n = 376)

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

### *Knowledge of the participants about COVID-19 vaccine*

More than half (58.2%) of the respondents said that they know a little about the COVID-19 vaccine. Only six (6) said that they know a lot about the COVID-19 vaccine (Table 5). Two-thirds reported that they would see or hear conflicting information on the COVID-19 vaccine from different sources. One in five participants believed that none of the information that they get about the COVID-19 vaccine seemed fake or made up and half said that only a little of these information on the COVID-19 vaccine 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 participants according to perception on COVID-19 vaccine (n = 376)

Item	frequency	Percent
<b>Perceived level of knowledge on COVID-19 vaccine</b>		
Nothing at all	95	25.3
A little	219	58.2
A moderate amount	56	14.9
A lot	6	1.6
<b>Description of information seen or heard about COVID-19 vaccines</b>		
Same information across different sources	114	30.3
Conflicting information across different sources	250	66.5
Other	11	2.9
missing	1	0.3
<b>Amount of info about COVID-19 vaccines that seemed fake or made up</b>		
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
<b>Information believed to be fake or made up</b>		
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 participants reported that the news media are trustworthy source of information about the COVID-19 vaccine. 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.

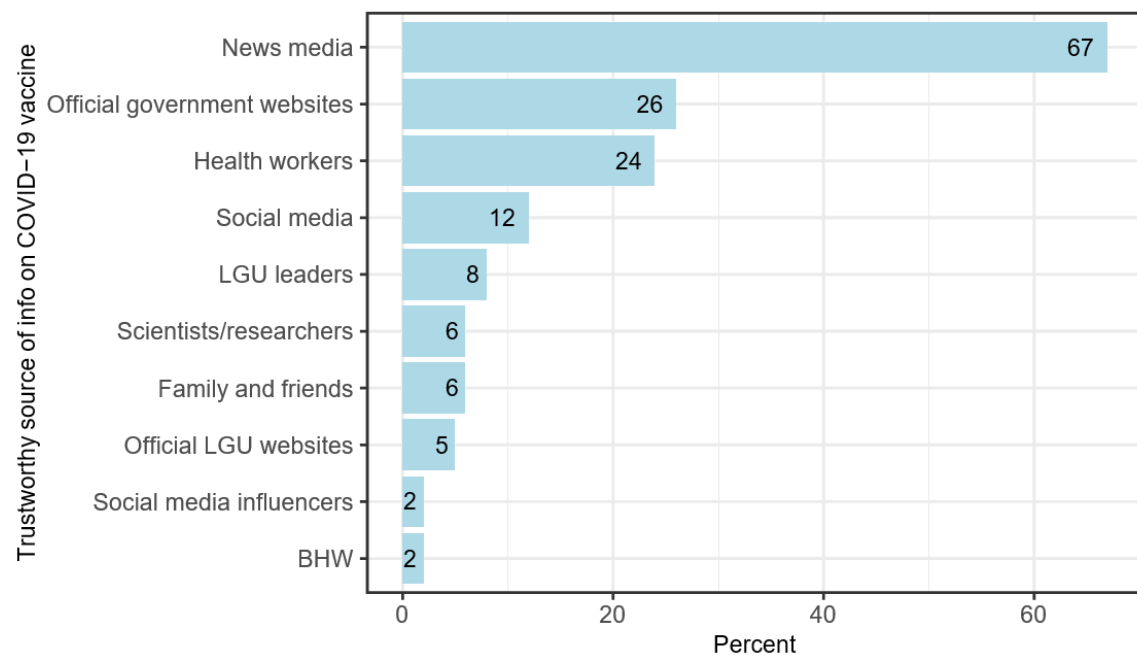


Figure 2: Trustworthy source of information about COVID-19 Vaccine (n = 376)

### *Attitudes toward COVID-19 vaccine*

Table 6 presents the responses of the participants on several attitudes items on the COVID-19 vaccine. Only 16.7% said that they trust the information they hear about the COVID-19 vaccine. About 40% said that they are concerned that they might have a serious side effect 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 covered by health insurance, respectively. Only 12% were willing to participate in a clinical trial (Table 6).

Table 6: Attitude of the participants 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 a 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/friend 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 HC/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 be helpful in controlling 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 my 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 the COVID-19 vaccine 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 be helpful in controlling 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).

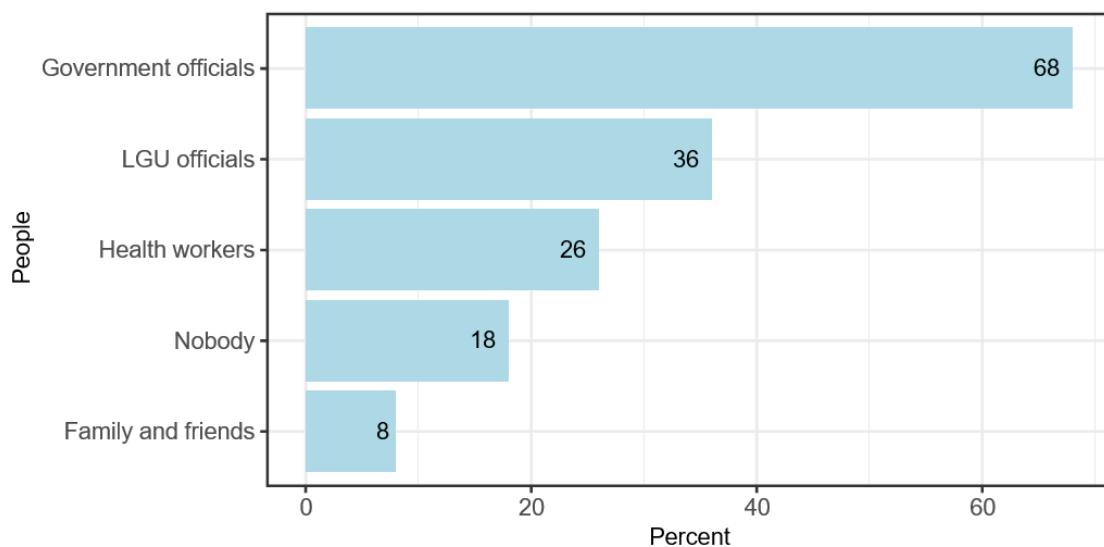


Figure 3: People the participants wanted to see get the vaccine first before they get vaccinated (n = 376)

### *Intentions towards COVID-19 vaccination*

Two participants reported to have been vaccinated. For the rest of the participants, 25% (95% confidence interval: 20.7% – 29.5%) 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 and things go back to normal. As regards 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 intention to get vaccinated*

Table 7 presents the results of the logistic regression analyses that were performed to determine the factors associated with intention to get vaccinated. Without controlling for any variables, males were more likely to have intention to get vaccinated than females. Similarly, those with higher education had higher odds of having intention to get vaccinated than those who only reached elementary level of education. Those who were self-employed or unemployed had lesser odds of having intention to get vaccinated than the employed. Moreover, those with good knowledge on prevention of COVID-19 infection had higher odds of having intention to get vaccinated. As regards attitudes toward COVID-19 vaccine, those with positive social norms, perceived self-efficacy, behavioral intention, external cues to action, perceived benefit and perceived efficacy had higher odds of having 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 intention to get vaccinated. Controlling for the other variables, the Roman Catholics had 10.79 times the odds of having intention to get vaccinated compared to those with other religion (95% CI: 1.78% – 65.54%). Those whose families were said to earn at least 5,000 pesos monthly had at least 2.41 times the odds of having intention to get vaccinated than those who earn lower. Those who had good knowledge on prevention had about 23 times the odds of having intention to get vaccinated compared to those with poor knowledge (95% CI: 3.52% – 149.72%). Those with positive behavioral intention as well as positive perceived benefits of COVID-19 vaccination had 9.88 and 12.25 times the odds of having 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 on treatment had 89% lower odds of having intention to get vaccinated than those with poor knowledge. Similarly, those with positive attitude towards perceived barriers had 66% lower odds of having 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	
<b>Sex (Female)</b>								
Male	2.14	1.26	3.66	0.0051	1.91	0.61	6.05	0.2691
Age	1.00	0.99	1.02	0.6685	0.98	0.95	1.02	0.3643
<b>Marital status (Single)</b>								
Married/Living with a partner	0.75	0.41	1.35	0.3321	3.31	0.86	12.70	0.0810
Separated/divorced/Widowed	1.02	0.67	1.54	0.9412	1.07	0.49	2.33	0.8655
<b>Religion (Other)</b>								
Roman Catholic	2.01	0.75	5.36	0.1649	10.53	1.70	65.44	0.0115
<b>Educational attainment (Elementary)</b>								
High school level/Vocational	2.60	1.32	5.15	0.0060	2.01	0.55	7.39	0.2916
At least college level	1.63	1.01	2.64	0.0452	1.60	0.69	3.70	0.2702
<b>Monthly family income (&lt;5,000)</b>								
5,001 - 15,000	2.99	1.92	4.64	0.0000	4.24	1.62	11.15	0.0033
>15,000	1.43	0.93	2.19	0.1022	2.51	1.11	5.64	0.0263
<b>Employment status (Employed)</b>								
Self employed	0.37	0.19	0.71	0.0026	0.46	0.12	1.77	0.2620
Unemployed/student/retired	0.39	0.21	0.72	0.0027	0.39	0.10	1.57	0.1867
<b>Knowledge on transmission (poor)</b>								
Good	1.16	0.66	2.06	0.6065	0.78	0.27	2.30	0.6544
<b>Knowledge on symptoms (poor)</b>								
Good	1.14	0.59	2.19	0.6944	0.92	0.23	3.60	0.8989
<b>Knowledge on prevention (poor)</b>								
Good	5.88	2.07	16.69	0.0009	23.60	3.63	153.37	0.0009
<b>Knowledge on treatment (poor)</b>								
Good	1.76	0.93	3.32	0.0803	0.11	0.03	0.42	0.0011
<b>Perceived risk (negative/unsure)</b>								
Positive	1.34	0.75	2.39	0.3197	1.49	0.45	5.00	0.5152
<b>Perceived severity (not or a little serious)</b>								
Don't know/Unsure	0.94	0.61	1.47	0.7975	0.87	0.38	1.98	0.7436
Moderately or very serious	1.43	0.93	2.18	0.1010	0.95	0.43	2.11	0.8948
<b>Perceived susceptibility (no or low chance)</b>								
Don't know/Unsure	1.70	0.97	2.96	0.0618	0.98	0.36	2.61	0.9607
Moderate or high chance	1.95	1.19	3.18	0.0076	0.77	0.31	1.88	0.5600
<b>Social norms (negative/unsure)</b>								
Positive	4.44	2.35	8.38	0.0000	1.56	0.54	4.46	0.4108
<b>Perceived self-efficacy (negative/unsure)</b>								
Positive	23.28	12.28	44.14	0.0000	2.24	0.67	7.49	0.1885
<b>Behavioral intention (negative/unsure)</b>								
Positive	36.91	18.90	72.09	0.0000	10.72	2.99	38.45	0.0003
<b>External cues to action (negative/unsure)</b>								
Positive	10.87	6.15	19.19	0.0000	2.08	0.78	5.52	0.1411
<b>Perceived benefit (negative/unsure)</b>								
Positive	19.47	10.79	35.13	0.0000	12.07	3.92	37.15	0.0000
<b>Perceived efficacy (negative/unsure)</b>								
Positive	9.60	4.99	18.48	0.0000	3.08	1.10	8.61	0.0321
<b>Perceived barriers (negative/unsure)</b>								
Positive	1.07	0.65	1.78	0.7785	0.34	0.12	0.98	0.0452

## Discussion

The current study aimed to determine the knowledge, attitudes, risk perceptions, and intention of people towards COVID-19 and vaccination. 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, 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 [10], Malaysia [11], China [12], Vietnam [13], and Ecuador [14]. People's knowledge, attitude, and practices in relation to COVID-19 are significant predictors of disease-specific preventive behaviors. According to Lau et al.[3], a 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 literature [10,15]. In terms of trustworthiness, news media was also ranked as 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 participants 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 [16]. 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.

Contrary to the findings of Neumann-Böhme, et al. [17], Biasio et al. [18], Ahmed et al., [19] and Elhadi et al. [20], the intention to receive the vaccine among the participants 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 [21], 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. [22] also reported similar results, with adverse effects of the vaccine being reported by 61% of the respondents as their reason for refusal. Concerns with 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 [23,24,25,26]. The first step in vaccine communication and addressing vaccine hesitancy is to identify the target audience and establish trust with them [27,28]. 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 [29] 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, 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 the study can be explained by the bishops and clergy who were reported to have been infected by COVID-19 and the promotion of the Catholic Church among its followers to get the vaccination. The relationship between low socioeconomic status and refusal of vaccination has also been documented among French adults [30]. 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 [21].

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.

## Conclusion

The findings of the study point towards the importance of health literacy during the COVID-19 pandemic. It is important that individuals are provided with the correct information that is easy to understand and access so that they can make informed choices about their health, especially during the COVID-19 pandemic. Government agencies, the scientific community, the media, and community stakeholders must collaborate in developing effective strategies focused on addressing the public's hesitancy and building trust towards COVID-19 vaccines and the government's vaccination program.

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