

Knowledge about and attitude towards COVID-19 vaccination of rural residents in Zambales, Philippines

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ABSTRACT

Vaccines are among the most effective preventive measures developed to minimize the risks of COVID-19. This cross-sectional study employs an online survey to determine the knowledge and attitude toward COVID-19 vaccination among the general population in rural Zambales, Philippines. A total of 690 residents responded to the knowledge and attitude towards COVID-19 vaccination survey questionnaire (KAC19V-SQ) regarding the residents' knowledge about and attitude towards COVID-19 vaccination. Television, Facebook and YouTube are the residents' primary sources of COVID-19 vaccine information. Almost all of them (98.0%) know about the COVID-19 vaccine, but only 81.3% of the residents know about its effectiveness. Most (69.7%) indicated they want to get vaccinated. Zambales residents' knowledge about COVID-19 vaccination was low. Despite having a low level of knowledge, respondents showed a favorable attitude (mean±SD:2.76±0.47) toward COVID-19 vaccination. Women had a less favorable attitude than men. Furthermore, a moderately positive correlation ($r=0.511$, $p<0.01$) was noted between knowledge and attitude towards COVID-19 vaccination. It is imperative that the government works in tandem with public health experts, local government officials, and academic institutions to develop and implement initiatives geared towards enhancing public awareness and fostering a positive outlook towards COVID-19 vaccination.

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1. INTRODUCTION

The coronavirus disease (COVID-19) has affected most countries worldwide. The new coronavirus strain SARS-CoV-2 pandemic brought about serious health and safety problems worldwide [1]. By the end of May 2020, over five million people across 215 countries were reported infected, and more than 300,000 died worldwide [2].

As a result of the multi-faceted adverse effects of the COVID-19 outbreak, international efforts have increased, attempting to develop effective prevention methods to keep the outbreaks under control. The COVID-19 vaccine developments have reached over 100 candidates currently in various developmental stages, and several vaccines are already licensed [2]. Vaccines are among the essential preventive strategies to contain an infectious disease [3], [4].

Although vaccine development has advanced quickly, public acceptability and negative attitudes about COVID-19 vaccines are challenges [4]. In pursuing this, for a vaccine to become effective in reducing the burden of disease, it should be accepted and applied to a high proportion of the population.

The COVID-19 vaccine acceptance rates have been studied in 33 countries worldwide [5]. The findings revealed that among the surveyed adult's representative of the general public, this rate ranges from Ecuador at 97.0%, Malaysia at 94.3%, Indonesia at 93.3%, and China at 91.35%, countries with the highest, to Kuwait with 23.6%, Jordan 28.4%, Italy 53.7%, Russia 54.9%, Poland 56.3%, United States of America 56.9%, and France 58.9%, which had the lowest COVID-19 vaccine acceptance rates. Moreover, vaccination acceptance rates in healthcare professionals ranged from 27.7% in the Democratic Republic of Congo to 78.1% in Israel [5]. In most countries studied, the level of acceptance of COVID-19 vaccination was less than or equal to 70%. Especially in the Middle East, Russia, Africa, and many European countries, low rates of COVID-19 vaccine acceptance have been recorded [5].

Features associated with COVID-19 vaccine acceptability have also been studied. For instance, attitudes towards vaccines and their perceived safety and effectiveness were associated with vaccine acceptability in the general population of the United States of America, and similar results were also found for Japan and China [4]. Mannan and Farhana [6] mentioned that the respondents with higher levels of trust in government information were more likely to accept a vaccine. A systematic intervention has been found to alleviate vaccination hesitancy and increase the acceptance rate. These findings prompt further investigation of the roots of vaccine hesitancy and underline the need for public COVID-19 vaccination awareness programs and campaigns because only two-thirds of the respondents were concerned about the COVID-19 outbreak [6].

Nevertheless, most studies show that people perceive COVID-19 as a serious disease [7]. Trust in the safety of the approved vaccines is the best guarantee for getting vaccinated, and those who perceive COVID-19 as a severe illness are more likely to get a COVID-19 vaccine [7]. Health authorities should prioritise disseminating information about the safety and efficacy of COVID-19 vaccines to reach a high level of vaccine acceptance [7]. Governments must be prepared to ensure large-scale, equitable access to and delivery of COVID-19 vaccines, necessitating adequate health system ability and strategies to increase public acceptance and trust [8].

This study aims to determine the knowledge and attitude of the adult population of rural Zambales, Philippines, toward COVID-19 vaccination. The presented research findings substantially challenge the recent COVID-19 pandemic's global preventive efforts and vaccine acceptance. The present study is also a contribution to literature in the local context.

2. RESEARCH METHOD

2.1. Research design

The study employed a quantitative cross-sectional survey research design to collect and analyze quantifiable data. This is to discover patterns and averages, make predictions, test possible causal relationships, and conclude larger groups [9]. Cross-sectional survey was chosen by researchers to gather the data quickly.

2.2. Respondents and location

The research respondents were residents of Zambales from Subic to Sta. Cruz, whereby the researchers selected 690 residents using the snowball sampling technique. In snowball sampling, the initial participants are selected based on specific criteria relevant to the research study. These participants are asked to refer or nominate other individuals who meet the same standards and are likely to contribute valuable information to the study.

Most respondents were in the age range of 18-32 years (84.9%). Approximately 65.1% of the respondents were female. The highest proportion of respondents were college undergraduates (42.5%) as shown in Table 1. The majority of the respondents belong to the youth sector aged 18-30 years old (83.3%) and were students (57.1%).

2.3. Research instrument

The study utilized the knowledge and attitude instrument regarding COVID-19 vaccination, which has been on the information of the World Health Organization [10], the Department of Health [11] as well as the research questions of the survey of Ritvo *et al.* [12] and Islam *et al.* [1]. We used an online survey tool, Google Form, to collect the data. The questionnaire comprises three parts: Part I is about the demographic profile, Part II is about the attitudes towards COVID-19 vaccination, and Part III is about the intention to get COVID-19 vaccination.

The 16 items of Part II inquiring knowledge about COVID-19 vaccination have three response categories (true, false, and I don't know). Further, 20 items of Part II assessing the attitude towards COVID-19 vaccination used a 4-point Likert scale (scored from 1=strongly disagree to 4=strongly agree).

The knowledge about the COVID-19 vaccination part had a Cronbach alpha coefficient of $\alpha=0.897$, and the attitude towards COVID-19 vaccination had a reliability of $\alpha=0.878$.

Table 1. Demographic characteristics of the respondents

Attribute	Frequency (n=690)	Percent (100.0)
Age		
18-32	586	84.9
33-42	67	9.7
43-55	31	4.5
56-88	6	0.9
Gender		
Male	241	34.9
Female	449	65.1
Highest educational attainment		
Elementary undergraduate	3	0.4
Elementary graduate	4	0.6
High school undergraduate	11	1.6
High school graduate	118	17.0
College undergraduate	293	42.5
College graduate	220	31.9
Masters graduate	35	5.1
Doctorate graduate	6	0.9
Sector		
Senior citizen (60 years old and above)	1	0.1
Youth (18-30 years old)	575	83.3
Differently-abled person	12	1.7
Indigenous people	4	0.6
None	98	14.2
Monthly family income		
Below P10,957	328	47.5
P10,958 to P21,914	163	23.6
P21,915 to P43,828	152	0.1
P43,829 to P76,669	34	22.0
P76,670 to P131,484	7	0.7
P131,485 to P219, 140	1	4.9
P219, 141 and above	5	1.0
Religion		
Roman Catholic	461	66.8
Protestant	207	30.0
Islam	3	0.4
Others	19	2.8
Marital status		
Single	559	81.0
Married	128	18.6
Widow/Widower	3	0.4
Location		
Botolan	24	3.5
Cabangan	13	1.9
Candelaria	7	1.0
Castillejos	196	28.4
Iba	47	6.8
Masinloc	26	3.8
Palauig	8	1.2
San Antonio	88	12.8
San Felipe	14	2.0
San Marcelino	195	28.3
San Narciso	28	4.1
Sta. Cruz	6	0.9
Subic	38	5.5
Occupation		
Professional and Managerial	187	27.1
Industrial worker	11	1.6
Self-employed	39	5.7
Farmer	1	0.1
Service personnel	10	1.4
Housekeeper	6	0.9
Unemployed	41	5.9
Student	394	57.1

2.4. Data collection and analysis

Data was gathered between May 13, 2021, and June 20, 2021, and the public was informed of the survey via Facebook and Messenger. The College Ethics Committee No. 2021-003 approved the data collection. The researchers analyzed the data using SPSS v. 25 (IBM Corp., NY, USA) and MS Excel 2016 (Microsoft, USA). Frequency counts, and percentages were used to describe categorical data. One-way analysis of variance (ANOVA) was used to assess the difference in the respondents' knowledge and attitude towards COVID-19 vaccination grouped according to sociodemographic variables. The Pearson correlation coefficient was computed to determine the relationship between the respondents' knowledge and attitude towards COVID-19 vaccination.

3. RESULTS AND DISCUSSION

3.1. Source of information about COVID-19 vaccination and awareness

Television (84.9%), Facebook (82.3%) and YouTube (58.1%) were the top three sources of COVID-19 vaccine information. More than half of the respondents used the official government websites (54.35%), health care workers (52.61%), or family and relatives (51.30%) as shown in Table 2.

Table 2. Residents' COVID-19 vaccination profile

Category	Frequency (n=690)	Percent (100.0)
Sources of information about COVID-19 vaccines*		
Television	586	84.9
Facebook	568	82.3
YouTube	401	58.1
Official government websites	375	54.3
Health care workers	363	52.6
Family and Relatives	354	51.3
LGU leaders	298	43.2
Friends and Neighbors	245	35.5
Social media influencer	233	33.8
Radio	197	28.6
Newspaper	161	23.3
IEC materials (pamphlets, poster, flyers)	104	15.1
Others	2	0.3
Awareness of COVID-19 vaccines		
I know about the COVID-19 vaccine		
Yes	676	98.0
No	14	2.0
I know about the effectiveness of the COVID-19 vaccine		
Yes	561	81.3
No	129	18.7
Who should be first to get vaccination?*		
Workers in frontline health service	647	93.8
Frontline personnel in essential sectors, including uniformed personnel	391	56.7
All senior citizens	379	54.9
Social workers	217	31.4
Teachers	216	31.3
Other government workers	132	19.1
Persons with comorbidities	121	17.5
Other essential workers	84	12.2
Socio-demographic groups at significantly higher risk than senior citizens and poor population based on the NHTS-PR	64	9.3
Overseas Filipino workers	51	7.4
Indigenous population	43	6.2
Rest of the Filipino population not otherwise included in the above groups	32	4.6
Other remaining workforce	4	0.6

Notes: LGU (Local Government Unit), IEC (Information, education and communication), NHTS-PR (National Household Targeting System for Poverty Reduction)

Almost all of the respondents (98.0%) knew about the COVID-19 vaccine, but only 81.3% claimed to know about its effectiveness. According to the respondents, the first to get COVID-19 vaccination were the workers in frontline health service (93.8%), the frontline personnel in essential sectors, including uniformed personnel (56.7%), and all senior citizens (54.9%), followed by persons with comorbidities (17.5%), other essential workers (12.2%), socio-demographic groups at significantly higher risk than senior citizens, and the poor population based on the NHTS-PR (9.3%) as shown in Table 2.

Al-Marshoudi *et al.* [13] indicated that most of the respondents in Oman (88%) know about COVID-19 vaccines. The top sources of information about COVID-19 vaccines were various social media platforms (67%) in Oman, followed by television (56%). The findings also conform to the recent studies on the knowledge about COVID-19 vaccination [14]–[17].

3.2. Knowledge about COVID-19 vaccination

The overall percentage of correct responses was only 45.8% as shown in Table 3. This finding is similar to the study of Islam *et al.* [1], that the knowledge of the respondents in Bangladesh regarding COVID-19 vaccinations was low in more than half of the general population. This low level of knowledge towards COVID-19 vaccines presented in the study was possibly due to the partial government acquaintance to information and profile-raising regarding COVID-19 vaccinations ever since the vaccine rollout started [1]. Previous studies also found low knowledge of COVID-19 vaccines [18], while some other studies reported good knowledge [19]–[21].

Table 3. Knowledge about COVID-19 vaccination

Questions	% Of correct response	VD
Vaccination is a simple, safe, and effective way of protecting people against the COVID-19 virus.	70.0	H
Vaccination uses your body's natural defences to build resistance to COVID-19 infection and make your immune system stronger.	5.5	VL
Vaccination is not safe and not effective way to prevent COVID-19 and not effective to save lives. *	0.4	VL
Before a vaccine can be used, it must go through extensive testing to ensure its safety.	82.2	VH
The antibodies help our bodies recognize and fight diseases.	90.9	VH
Even with precautions, pregnant women cannot get the COVID-19 vaccination. *	13.3	VL
Patients with cancer are not safe to be vaccinated against COVID-19. *	18.1	VL
People who get vaccinated are less likely to spread the COVID-19 virus to others.	61.6	H
Food or drug allergies, inhalant/environmental allergens, insect bites, or latex allergies were not related to the vaccine or its components.	39.3	L
The COVID-19 vaccine is not safe and effective for those with hypertension. *	26.4	L
There was no connection being found between getting vaccinated and confirmed COVID-19 deaths.	28.1	L
After getting vaccinated, there will be no longer contract of COVID-19. *	53.9	H
There is a possibility to acquire COVID-19 from the vaccine itself. *	35.4	L
People with medical conditions should see a health professional first before getting vaccinated.	90.6	VH
After getting COVID-19 vaccination, a person might experience fever, muscle pain, itchiness, dizziness and redness in the injection area as its side effects.	67.5	H
After a person has been completely vaccinated, it will usually take two weeks for their body to develop protection against the COVID-19 virus.	48.8	L
Overall	45.8	L

Note: Very high (VH) 76.0-100.0; High (H) 51.0-75.0; Low (L) 26.0-50.0; Very low (VL) 1.0-25.0; VD-Verbal description *marked with asterisk are with the correct response 'false'

3.3. Attitude towards COVID-19 vaccination

The overall mean score (\pm standard deviation) of the attitude scale was 2.76 ± 0.47 , which indicates a favorable attitude toward the COVID-19 vaccination Table 4. This suggests that, on average, respondents held a positive attitude toward COVID-19 vaccination. The standard deviation of 0.47 indicates that the attitudes of the respondents were relatively consistent.

The highest scores were noted for responses to the following statements: the COVID-19 vaccine must be distributed equally to the people (3.43), available vaccines against COVID-19 are tested thoroughly to ensure individual's safety (3.38), and I will get vaccinated if I will be given adequate information about it (3.33). This shows that the residents favor vaccine deployment equity, had a favorable view on the thorough testing of vaccines prior to use, and the need to be fully informed about the benefits of vaccination. The findings are similar to recent studies [22]–[24].

3.4. Intention to get COVID-19 vaccinated

Most respondents (69.7%) indicated they wanted to get vaccinated. The primary reason for the respondents to get COVID-19 vaccinated is to keep them safe and protected against the SARS-CoV-2 virus (61.4%). Also, keeping their family safe and protected against the SARS-CoV-2 virus was an important aspect (59% agreement) as shown in Table 5.

Lin *et al.* [2] reported that among 3,541 surveyed respondents in China, the majority (over 83%) reported that they definitely or probably intend to get COVID-19. Al-Marshoudi *et al.* [13] reported that 57%

of the general population in Oman were willing to take the COVID-19 vaccination, with 59.3% having the primary reason to keep them safe as well as their family and friends of contracting COVID-19. In a similar study, 52.9% of 191 respondents consented to take a vaccination, while the rest were either undecided (27.7%) or did not plan to get vaccinated (15.7%) [25]. Most of the Malaysian population was reported to accept COVID-19 vaccinations [26]. Also, other studies showed a high percentage of COVID-19 vaccine acceptance [27]–[29].

Table 4. Attitudes towards COVID-19 vaccination

Indicators	M	SD	VD
Available vaccines against COVID-19 are tested thoroughly to ensure individual's safety.	3.38	0.75	F
The precautions used in the production of COVID-19 vaccines are weak and not effective. *	2.74	0.87	F
The COVID-19 vaccines are among the most successful and least expensive medical interventions ever formulated.	2.68	0.82	F
Without vaccine, there is no way to minimize the occurrence of COVID-19.	2.82	0.94	F
I am worried about taking a newly developed vaccine against COVID-19, even though it has been thoroughly tested. *	1.90	0.90	U
I am against COVID-19 vaccination, because of the information I read from the social media. *	2.76	0.95	F
I am one of the people who are against COVID-19 vaccination for the reason that there is no enough information regarding how it works and how it becomes effective to fight COVID-19. *	2.64	1.01	F
Given the international situation and the threats of bioterrorism, I will definitely accept the vaccine against COVID-19.	2.67	0.85	F
Given the international situation and the threats of bioterrorism, I will definitely accept any vaccine against COVID-19 recommended by the national government and its medical advisors.	2.72	0.86	F
I understand exactly what a COVID-19 vaccine is and how it works.	2.99	0.75	F
I will get vaccinated if I will be given adequate information about it.	3.33	0.78	F
I will only get vaccinated if the COVID-19 vaccine is widely used in public. *	1.94	0.88	U
Vaccination is a positive thing and it reduces my fear of contracting COVID-19.	2.98	0.81	F
Getting vaccinated can reduce my chances of contracting COVID-19 or its complications.	3.00	0.79	F
I will get a COVID-19 vaccine without any reluctance if it is available in our place.	2.70	0.92	F
I will also encourage my family/friends/relatives to get vaccinated against COVID-19.	2.84	0.90	F
It is impossible to decrease the COVID-19 incidence without vaccination.	2.76	0.90	F
The COVID-19 vaccine must be distributed equally to the people.	3.43	0.75	F
Getting the COVID-19 vaccine is against the teachings of my religion. *	3.06	0.92	F
I am concerned that I might have a serious side effect from a COVID-19 vaccine. *	1.93	0.87	U
Overall	2.76	0.47	F

Note: Very favorable (VF) 3.50-4.00; Favorable (F) 2.50-3.49; Unfavorable (U) 1.50-2.49; Very unfavorable (VU) 1.00-1.49 *reverse coded

Table 5. COVID-19 vaccination intent

Category	Frequency (n=690)	Percentage (100.0)
I want to receive a COVID-19 Vaccine		
Definitely Yes	228	33.0
Probably Yes	253	36.7
Probably No	111	16.1
Definitely No	98	14.2
Reasons for getting COVID-19 vaccination*		
To keep me safe and protected against the SARS-CoV-2 virus	424	61.4
To keep my family safe and protected against the SARS-CoV-2 virus	407	59.0
To end the COVID-19 pandemic	281	40.7
To get back to normal	277	40.1
Not applicable, since I answer definitely no and probably no in the previous question	190	27.5
To get back to work normally	187	27.1
Others	5	0.7

Note: *multiple responses

3.5. Knowledge and attitude towards COVID-19 vaccination in relation to respondents' sociodemographic features

Respondents' knowledge about COVID-19 vaccination was different according to the highest educational attainment ($p < 0.001$), monthly family income ($p < 0.001$), and occupation ($p = 0.001$). Islam *et al.* [1] found respondents acquiring the highest education status have higher knowledge about COVID-19 vaccination. In this study from Bangladesh, respondents with high-paying jobs were more likely to show concern about their health and well-being. No significant differences were found between the respondent's knowledge of COVID-19 vaccination when grouped according to age ($p = 0.092$), gender (0.054), sector (0.092), religion ($p = 0.112$), marital status (0.659), and location ($p = 0.520$) Islam *et al.* [1], also found no

differences according to respondents' gender. We found that there were significant differences between the attitude towards COVID-19 vaccination when grouped according to gender ($p=0.043$), highest educational attainment ($p=0.001$), monthly family income ($p<0.001$), and occupation ($p=0.012$). In contrast, there were no significant differences between the respondent's attitudes toward COVID-19 vaccination when grouped according to age ($p=0.736$), sector ($p=0.108$), religion ($p=0.571$), marital status ($p=0.823$), and location ($p=0.225$).

3.6. Relationship between knowledge and attitude towards COVID-19 vaccination

The correlation between COVID-19 knowledge and attitude was moderately positive ($r=0.511$, $p<0.01$). Islam *et al.* [1] also pointed out that the general population in Bangladesh has an inadequate or lower knowledge level but a more positive attitude towards COVID-19 vaccination. Some studies even found a negative correlation or no correlation between knowledge scores and attitude scores towards COVID-19 vaccination [30]–[32].

4. CONCLUSION

In response to the COVID-19 outbreaks, international efforts have increased to develop preventive measures and control the rapid growth of cases. Various vaccines have been developed and introduced to the public, but challenges remain due to negative attitudes and low knowledge about the vaccine's effectiveness. Residents indicated that their main reasons for getting the COVID-19 vaccine were to keep themselves and their families safe and protected against the virus. While most residents are aware of the vaccine, only a few know about its effectiveness. A majority want to get vaccinated, but some do not intend to. Overall, the level of knowledge about COVID-19 vaccination is low among Zambales residents, but they have a favorable attitude towards it.

Based on these findings, the study suggests that the government, in coordination with public health experts, local leaders, and the academe, should implement programs to increase knowledge and improve attitudes towards COVID-19 vaccination. Information dissemination campaigns can be done through visual materials and seminars/webinars to provide accurate information and support community members. This can lead to a higher acceptance rate and decrease vaccine hesitancy in the public, particularly among senior citizens and less knowledgeable individuals in far-flung communities.

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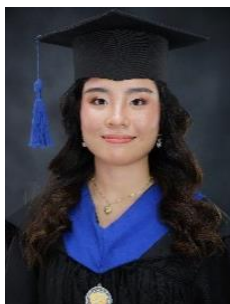
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