

# Factors Associated with COVID-19 Vaccine Acceptance Among Adult Patients in Primary Care Clinics in Laguna, Las Piñas and Parañaque: A Cross Sectional Study

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**Background:** Since its surfacing in 2019, COVID-19 has spread all over the world and became an international concern. Vaccines against COVID-19 are expected to be the key in controlling this pandemic. To achieve this, studying factors that affect COVID-19 vaccine acceptance is crucial in order to increase the vaccine uptake rate of Filipinos to attain herd immunity.

**Objective:** The study aimed to determine the factors affecting COVID-19 vaccine acceptance among adult patients in primary care clinics in Laguna, Las Piñas and Parañaque.

**Methods:** This cross-sectional study was conducted last June 2021 with 137 adult patients from 6 clinics. The participants were given self-administered questionnaires containing items on sociodemographic profile and perception on vaccines. MS Excel and IBM SPSS were used for statistical analysis. Categorical variables were summarized as frequencies and percentages and continuous variables as means and standard deviations. Chi square was used to compare outcomes. Variables with statistically significant differences (p-value of <0.05) were included in multinomial regression analysis to determine association with vaccine acceptance.

**Results:** Residence (p=0.0166), educational level (p=0.017), perceived effectiveness of vaccines to prevent and control COVID-19 (p=0.001), safety (p=0.001), doctor's recommendation (p=0.039), risk of being infected (p=0.025) and refusal of any type of vaccine in the past (p=0.003) were associated with COVID-19 vaccine acceptance.

**Conclusion:** Through this study, the authors found that most of the respondents are willing to get vaccinated regardless of their sociodemographic characteristics. Concerns about vaccine availability and accessibility can hinder the promotion of vaccine uptake in the future. This study can be used as a basis for development and planning of COVID -19 vaccination programs.

**Key words:** COVID-19, vaccine acceptance, cross-sectional

## INTRODUCTION

Since its surfacing in December 2019, the coronavirus disease 2019 (COVID-19) has spread across the globe and eventually became a pandemic of international concern.<sup>1</sup> This pandemic is expected to carry on and impose huge burdens of morbidity and mortality while turning societies and economies worldwide upside down.<sup>2</sup> As immunization is one of the most successful and cost - effective health interventions to prevent emerging infectious diseases, vaccines against COVID-19 are deemed to be of great importance as key to prevent and control

COVID-19.<sup>3</sup> Once available, governments worldwide must be ready to secure large scale, fair access, and distribution of a COVID-19 vaccine. To achieve this, sufficient health system capacity as well as deliberate plans to raise trust and acceptance of the vaccine and those who deliver it<sup>2</sup>. "Vaccine acceptance reflects the overall perception of disease risk, vaccine attitudes and demand within the general population which is vital for the success of immunization programs to achieve high coverage rates of vaccination especially for newly emerging infectious diseases."<sup>4</sup> In the Philippines, an important factor to consider is the population's adherence to vaccines and it can be crucial to overcome this pandemic.

However, adherence depends on how ready the population is to receive the vaccine.<sup>5</sup>

The success of immunization programs is only achieved if there are high rates of acceptance and coverage.<sup>6</sup> According to a systematic review done by Sallam, et al. 2021, which included 31 studies on COVID-19 vaccine acceptance, large variability in COVID-19 vaccine acceptance rates was reported in different countries and regions of the world.<sup>7</sup> A sizable number of studies reported COVID-19 acceptance rates below 60%, which would pose a serious problem for efforts to control the current COVID-19 pandemic. In a cross-sectional study conducted by Wang, et al. 2020, among respondents who accepted vaccination, significant factors influencing their vaccination acceptance were gender, marriage status, risk perception, influenza vaccination history, belief of COVID-19 vaccine efficacy, valuing doctor's recommendations, vaccination convenience or vaccine price.<sup>4</sup> As reported in the same study, the pandemic has had a profound impact on the work, income, or daily life of the respondents.

A preponderance of studies on COVID-19 vaccine acceptance were intended for health care providers. Majority of these studies are usually conducted in other countries and only a handful are done in the Philippines. According to a national survey conducted by Pulse Asia last November to December 2020 which revealed that almost half of the Filipinos (47%) were not willing to get vaccinated against COVID-19.<sup>8</sup> In a country wherein COVID-19 cases continue to rise, determining the factors associated with COVID-19 vaccination acceptance of the general population is of great importance.

This study aimed to determine the factors associated with COVID-19 vaccine acceptance among the general population in the primary care setting. This can shed light on the current awareness and perception of the public regarding the acceptability of the COVID-19 vaccines. Through this study, there would be a better understanding of the factors that affect vaccine acceptance which is key to increasing the vaccination acceptance rates as well as the improvement of strategies and approaches for the roll out of vaccination programs in the future.

### **General Objective**

This study aimed to determine the factors associated with COVID-19 vaccine acceptance among adult patients in a chain of primary care clinics in Laguna, Las Piñas and Parañaque.

### **Specific Objectives**

1. Compare vaccination acceptance among participants grouped based on:
  - a. Socio-demographic characteristics (age, residence, sex, marital status, education, employment status, family income, health status)
  - b. Perceived risk for COVID-19 infection
  - c. Perceived impact of COVID-19 pandemic (work/income and daily life)
  - d. Vaccination history (such as influenza vaccination in the past season)

2. Determine the factors associated with COVID-19 vaccine acceptance among adult patients in a chain of primary care clinics in Laguna, Las Piñas and Parañaque.

## **METHODS**

### **Study Design and Setting**

This is a cross-sectional study conducted from 2nd to 3rd week of June 2021 with adult patients as participants from a total of 6 clinics in Laguna (South City and Sta. Rosa branches), Las Piñas (Fenina and Pilar branches), and Parañaque (Better Living and Valley 1 branches). These are community-based primary care clinics under Healthway Medical, Inc. which provides primary healthcare services to thousands of families in an outpatient setting.

### **Study Population**

The sample design used in this study was a non-probability purposive sampling method. The study participants were adult patients (18-59 years old) who sought consultation at the Healthway Family Clinics, including those who were already vaccinated against COVID-19. Adults who refused to participate, unable to give written consent and presented with unstable vital signs and COVID symptoms were excluded from the study. At 95% confidence level and power of 0.90 and assuming an effect size of 0.40, the computed sample size for this study was 137 and this was divided among the six clinics included in the study. The 45 participants came from Parañaque (Better Living – 23, Valley 1 – 22), 46 participants came from Las Piñas (Fenina – 23, Pilar – 23), and 46 participants from Laguna clinics (Sta Rosa – 23, South City – 23).

### **Data Collection**

A pretest of the questionnaire was done prior to the actual data collection. The first ten respondents who met the study's inclusion criteria regardless of their clinic location were considered as pretest participants. No changes from the questionnaire were made after the pretest since the questions were clear and easily understood. The data from the pretest respondents were not included in the actual data gathered in our study. All patients who met the inclusion criteria for the study were recruited to participate in the study. After obtaining informed consent and explaining the survey process, self-administered questionnaires were personally handed. These questions aim to obtain data on 1) socio-demographic characteristics which includes age, sex, marital status, education, employment status, family, and perceived health status, 2) perceived risk for COVID-19 infection, 3) perceived impact of COVID-19 pandemic on income, and daily life, 4) flu vaccination history, 5) perceived doctor's recommendation regarding COVID-19 vaccine and 6) perceived safety, availability and accessibility of COVID-19 vaccine. Items were close-ended questions using tick boxes corresponding to options for response. It took the participants around 5-10 minutes to complete the questionnaire. The questionnaires were immediately collected and stored separately from the informed consent. Only fully completed questionnaires were used for data analysis.

## Data Management and Analysis

MS Excel and IBM SPSS were used for statistical analysis. Categorical variables were summarized as frequencies and percentages and continuous variables as means and standard deviations. Chi square was used to compare outcomes. Variables with statistically significant differences ( $p$ -value of  $<0.05$ ) were included in multinomial logistic regression analysis to determine association with vaccine acceptance.

## Ethical Considerations

Prior to data collection, the researchers sought informed consent from the participants through a consent form. This form included the objectives and design of the study, associated risks and benefits, confidentiality of records, the researchers' contact details and a statement that the participation was voluntary. Participants were also advised that they could freely withdraw from the study. No risks to the study participants were identified. Number codes instead of participants' names were used to ensure confidentiality. All the data and information from the participants collected were strictly kept confidential and were only accessible to the researchers and statisticians. Physical data will be stored for one year after the conclusion of the study and will be discarded and shredded thereafter. On the other hand, electronic data was stored in a secure computer. The results produced from this study were used to contribute a better understanding on the factors that affect the COVID-19 vaccine acceptance of patients from a primary care clinic setting. This research was reviewed and approved by the company's management team together with the Legal and Data Privacy Officers.

COVID-19 infection as moderate followed by those who perceived low risk of getting infected 34.31% (47), 46.72% (64) and 51.82% (71) of the respondents thought that the vaccines were not available and not accessible, respectively. Among the respondents 35.04% (48) perceived that the different COVID-19 vaccines were equally effective, a same number of respondents 35.04% (48) on the other hand were unsure. The pandemic was seen to have a big effect on more than half of the respondents as 62.77% (86) and 56.93% (78) of respondents thought that the impact of pandemic on their daily life and work income was very large, respectively.

Among these factors on perception and awareness, perceived risk ( $p=0.0146$ ), refusal of any type of vaccine in the past ( $p=0.0002$ ), vaccination as an effective way to prevent and control COVID-19 ( $p=0.0000$ ), vaccine is safe ( $p=0.0000$ ), recommended by doctors ( $p=0.0000$ ), and perceived equal effect of COVID-19 vaccines ( $p=0.0000$ ) showed a significant association with vaccination acceptance.

The residence of the respondents showed a significant association with COVID-19 acceptance. As shown in table 3, Laguna residents were more likely to get vaccinated as compared to those from Parañaque. In terms of educational attainment, college graduates are two times more likely to get vaccinated than high school graduates. For the perceived risk of getting infected with COVID-19, those who perceived a high risk of having COVID-10 are two times more likely to get vaccinated than those who perceived a moderate risk. Despite not being sure about safety, participants are twenty-one times more likely to get vaccinated in comparison with those who perceived that vaccines are not safe. In addition, those who perceived that doctor's recommendation is an important factor that affect decision making in receiving the vaccine are twenty-one times more likely to get COVID-19 vaccine in comparison to those who think that it is not important.

## RESULTS

In total, 137 enrolled respondents out of 137 recruited completed the questionnaires, with a response rate of 100%. 27.01% (37) of the respondents were between 31 and 40 years old, 62.77% (86) were female, 48.07% (48) were single, and 67.88% (93) were employed. Regarding education, 59.85% (82) finished college. 27.74% (38) had a total family income between P46,761 - P81,832 a month then followed by income of less than P11,690, 26.8% (36). From the total number of respondents, 71.53% (98) claim that they do not have any existing chronic medical condition.

In this study 73.72% (101) were willing to accept the COVID-19 vaccine including the 18.9% (26) respondents who were already vaccinated.

Among the sociodemographic profiles of the respondents, residence ( $p=0.0166$ ) and educational level ( $p=0.017$ ) were noted to have a significant association with COVID-19 vaccine acceptance.

Of the total 137 respondents, 72.26% (99) thought that vaccination would be an effective way to prevent and control COVID-19. Most of the respondents considered that perceived doctor's recommendation on COVID-19 vaccine 83.21% (114) and perceived safety of these vaccines 66.42% (91) were important factors affecting their vaccine acceptance. During the survey, almost half 48.91% (67) perceived the risk of

## DISCUSSION

This study revealed that there is a high COVID-19 vaccine acceptance (73.72%) among the 137 respondents. The sociodemographic profiles of the respondents did not show significant association with COVID-19 vaccine acceptance. This was inconsistent with a global survey of potential acceptance of a COVID-19 vaccine done by Lazarus, et al. 2020. In their study, there was a significant association with income and acceptance. Respondents who have higher income were most likely to accept the vaccine than those who have low income. In another study done in China, it revealed that male gender and married respondents were more likely to accept COVID-19 vaccine.<sup>4</sup>

The result of this study shows that the assurance that COVID-19 vaccines are safe and effective, that the vaccines are recommended by doctors and knowing that their risk of being infected with COVID-19 is high, may persuade more people to get vaccinated.

This is in relation to a local study done by Bautista, et al. 2021, which revealed that the most important factors that affect the respondents' willingness to receive COVID-19 vaccine was vaccine safety and effectiveness.<sup>20</sup> Most of the respondents who were willing to get a vaccine believe that the vaccines will make them safe from COVID-19, and that the vaccines are safe. On the contrary, the majority of those who were unwilling thought that the vaccines were not safe.

**Table 1.** Participant characteristics.

		Willingness to receive COVID-19 Vaccine								(chi-square) p-value
		Total (n=137)		No (n=16)		Not sure (n=20)		Yes (n=101)		
<i>Socio Demographic Profile</i>		<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>	
<b>Age</b>	18-25	28	20.44	3	18.75	6	30	19	18.81	0.3277
	26-30	23	16.79	4	25	4	20	15	14.85	
	31-40	37	27.01	4	25	4	20	29	28.71	
	41-50	23	16.79	0	0	3	15	20	19.8	
	51-59	26	18.98	5	31.25	3	15	18	17.82	
<b>Sex</b>	Male	51	37.23	6	37.5	10	50	35	34.65	0.431
	Female	86	62.77	10	62.5	10	50	66	65.35	
<b>City of Residence</b>	Laguna	46	33.58	8	50	6	30	32	31.68	0.0166
	Las Piñas	46	33.58	2	12.5	4	20	40	39.6	
	Parañaque	45	32.85	6	37.5	10	50	29	28.71	
<b>Educational Attainment</b>	Elementary level	12	8.76	1	6.25	4	20	7	6.93	0.0107
	High School level	43	31.39	7	43.75	9	45	27	26.73	
	College level	82	59.85	8	50	7	35	67	66.34	
<b>Civil Status</b>	Single	66	48.18	9	56.25	14	70	43	42.57	0.1564
	Married	59	43.07	5	31.25	6	30	48	47.52	
	Widow	11	8.03	2	12.5	0	0	9	8.91	
	Separated	1	0.73	0	0	0	0	1	0.99	
<b>Employment</b>	Employed	93	67.88	10	62.5	14	70	69	68.32	0.877
	Unemployed	44	32.12	6	37.5	6	30	32	31.68	
<b>Monthly Family Income</b>	Less than P11,690.00	36	26.28	7	43.75	9	45	20	19.8	0.077
	Between P11,690.00 - P23,381	30	21.9	5	31.25	3	15	22	21.78	
	Between P23,381 - P46,761	27	19.71	3	18.75	1	5	23	22.77	
	Between P46,761 - P81,832	38	27.74	0	0	7	35	31	30.69	
	Between P81,832 - P140,284	4	2.92	1	6.25	0	0	3	2.97	
	Between P140,284 - 233,806	1	0.73	0	0	0	0	1	0.99	
	At least P233,806	1	0.73	0	0	0	0	1	0.99	
<b>With chronic medical condition</b>	Yes	39	28.47	5	31.25	5	25	29	28.71	0.9131
	No	98	71.53	11	68.75	15	75	72	71.29	
<b>Refused any type of vaccine in the past</b>	No	121	88.32	11	68.75	14	70	96	95.05	0.0002
	Yes	16	11.68	5	31.25	6	30	5	4.95	
<b>Received Flu shot last season</b>	Yes	29	21.17	0	0	4	20	25	24.75	0.0785
	No	108	78.83	16	100	16	80	76	75.25	

**Table 2.** Comparison of COVID-19 vaccine acceptance among adult patients in Laguna, Las Piñas and Parañaque based on perception and awareness of COVID-19 vaccine.

		Willingness to receive COVID-19 Vaccine								(chi-square) p-value
		Total (n=137)		No (n=16)		Not sure (n=20)		Yes (n=101)		
		f	%	f	%	f	%	f	%	
<b>Is COVID-19 vaccination an effective way to prevent and control COVID-19?</b>	No	2	1.46	2	12.5	0	0	0	0	0
	Not sure	36	26.28	12	75	14	70	10	9.9	
	Yes	99	72.26	2	12.5	6	30	91	90.1	
<b>Is COVID 19 vaccine safe?</b>	No	3	2.19	3	6.25	0	0	0	0	0
	Not sure	43	31.39	12	75	14	70	17	16.83	
	Yes	91	66.42	1	18.75	6	30	84	83.17	
<b>Is COVID 19 vaccination recommended by doctors?</b>	No	2	1.46	0	0	1	5	1	0.99	0
	Not sure	21	15.33	5	31.25	9	45	7	6.93	
	Yes	114	83.21	11	68.75	10	50	93	92.07921	
<b>Are all COVID-19 vaccines equally effective?</b>	No	41	29.93	10	62.5	3	15	28	27.72277	0
	Not sure	48	35.04	5	31.25	14	70	29	28.71287	
	Yes	48	35.04	1	6.25	3	15	44	43.56436	
<b>Is COVID 19 vaccine available?</b>	No	64	46.72	9	56.25	9	45	46	45.54455	0.416
	Not sure	38	27.74	5	31.25	6	30	27	26.73267	
	Yes	35	25.55	2	12.5	5	25	28	27.72277	
<b>Is COVID-19 vaccine accessible?</b>	No	71	51.82	9	56.25	8	40	54	53.46535	0.2264
	Not sure	32	23.36	5	31.25	6	30	21	20.79208	
	Yes	34	24.82	2	12.5	6	30	26	25.74257	
<b>How would you describe your current health status?</b>	Fair	48	35.04	7	43.75	8	40	33	32.67327	0.2465
	Good	70	51.09	9	56.25	10	50	51	50.49505	
	Poor	3	2.19	0	0	0	0	3	2.970297	
	Very good	16	11.68	0	0	2	10	14	13.86139	
<b>Have you been vaccinated against COVID 19?</b>	Yes	26	18.98	0	0	0	0	26	25.74257	0.09996
	No	111	81.02	16	100	20	100	75	74.25743	
<b>Perceived Risk of getting COVID-19</b>	Low	47	34.31	8	50	11	55	28	27.72	0.0146
	Moderate	67	48.91	8	50	8	40	51	50.5	
	High	23	16.79	0	0	1	5	22	21.78	
<b>Perceived Impacts of COVID-19 on Income</b>	None	11	8.03	1	6.25	1	5	9	8.91	0.6673
	Small	2	1.46	0	0	0	0	2	1.98	
	Fair	13	9.49	1	6.25	2	10	10	9.9	
	Large	33	24.09	6	37.5	5	25	22	21.78	
	Very Large	78	56.93	8	50	12	60	58	57.43	
<b>Perceived Impacts of COVID-19 on Daily life</b>	None	2	1.46	0	0	0	0	2	1.98	0.3814
	Small	3	2.19	0	0	0	0	3	2.97	
	Fair	13	9.49	1	6.25	2	10	10	9.9	
	Large	33	24.09	7	43.75	4	20	22	21.78	
	Very Large	86	62.77	8	50	14	70	64	63.37	
<b>Vaccination History</b>	Yes	29	21.17	0	0	4	20	25	24.75	0.0785
	No	108	78.83	16	100	16	80	76	75.25	

**Table 3.** Regression analysis on the socio-demographic profile and factors of adult patients from a primary care setting associated with COVID-19 vaccination acceptance.

<b>Residence</b>	<b>B</b>	<b>SE</b>	<b>Wald</b>	<b>Sig</b>	<b>Odds ratio</b>	<b>Lower bound</b>	<b>Upper bound</b>
Laguna	0.098	0.256	0.147	0.001	1.208	0.374	3.9
Las Pinas	-1.238	0.64	3.742	0.498	0.242	0.045	1.284
Paranaque (constant)	0.322	0.244	1.739	0.187	0.29	0.083	1.016
<b>Educational Attainment</b>							
Elementary	-0.775	0.566	1.88	0.17	0.461	0.152	1.395
College	0.539	0.736	0.537	0.464	1.714	0.406	7.247
High School (constant)	-1.16	0.553	4.4	0.036	0.313	0.106	0.927
<b>Refused vaccination</b>							
Yes	-2.166	0.708	9.362	0.002	0.115	0.029	0.459
No (constant)	-2.108	0.67	9.904	0.002	0.122	0.033	0.452
<b>Perceived risk</b>							
Low	-1.239	1.091	1.289	0.256	0.29	0.034	2.458
High	0.918	0.521	3.108	0.078	2.504	0.902	6.951
Moderate (constant)	0.6	0.235	1.178	0.278	1.821	0.617	5.38
<b>COVID-19 vaccination is an effective way to prevent and control COVID-19</b>							
Yes	-0.847	1.065	0.633	0.426	0.429	0.053	3.456
No (constant)	-0.912	1.601	0.324	0.569	0.402	0.017	9.269
Not sure	2.189	0.911	5.77	0.016	8.925	1.496	53.243
<b>Perceived safety of the vaccine</b>							
Yes	1.123	0.812	2.271	0.132	3.398	3.083	3.083
No (constant)	0.179	0.923	0.038	0.846	1.196	0.0196	7.296
Not sure	3.055	1.179	6.715	0.01	21.232	2.105	214.04
<b>Doctor's recommendation is an important factor in vaccination decision-making</b>							
Yes	3.05	1.363	5.01	0.025	21.123	1.461	305.314
No (constant)	1.223	0.812	2.271	0.132	3.398	3.083	3.083
Not sure	-1.542	0.654	0.098	0.569	0.402	0.017	9.269
<b>Are all COVID-19 vaccines equally effective?</b>							
Yes	-1.239	1.091	1.289	0.256	0.29	0.034	2.458
No (constant)	0.918	0.521	3.108	0.078	2.504	0.902	6.951
Not sure	2.189	0.911	5.77	0.016	8.925	1.496	53.243

The study on factors associated with decision making on COVID-19 vaccine acceptance shared similar results of a study done by Tam, et al. 2020 by which perceived doctor's recommendation was significantly associated with vaccine acceptance ( $F [2, 973] = 56.26, p < .001$ ).<sup>21</sup> These findings were consistent with a US national survey that suggests that a provider recommendation can increase the acceptance of COVID-19 vaccine.<sup>23</sup> Regarding this advice, a guidance regarding effective COVID-19 vaccine conversations in clinics which also highlighted the influences of healthcare providers on recommending patients to receive vaccines against COVID-19 was released by CDC.

The results of this study also revealed that perceived risk of getting infected with COVID-19 is significantly associated with COVID-19 vaccine acceptance. According to a study of Harapan, et al. 2020, "Previous studies in Asia have found that perceived risk or perceived susceptibility to an infection is associated with positive support for vaccination."<sup>22</sup> This was same for a study on associated factors with COVID-19 vaccine acceptance among the general community in Saudi Arabia and health care providers in China. Therefore, increasing the perceived risk among communities is important since our study found that 47 (34.31%) of the respondents had a low perceived risk of infection compared to 23 (16.79%) who perceived a higher risk of infection. Risk perception may not only be correlated with willingness to get a vaccine but also adherence to health safety measures such as wearing masks, face shields and observing social distancing.

This study has several limitations. Firstly, generalizability of the collected data may be impacted by the sample size of the study and non-probability sampling methodology. In addition, the respondents were limited to outpatient consults who have no COVID-19 symptoms. The findings may not represent the true picture of the larger population of residents in Laguna, Las Piñas and Parañaque. Lastly, acceptance was assessed using a hypothetical vaccine which may vary from participant's actual preference in a real-life situation.

#### CONCLUSION AND RECOMMENDATIONS

This is one of the few community-based studies in the country that evaluated the general public's acceptance of COVID-19 vaccines. This study reflected that most of the respondents are willing to get vaccinated, regardless of their socio demographic profile, perceived risk of COVID-19 infection, perceived availability and accessibility of vaccines, perceived health status, perceived impact of pandemic on life and work income and history of getting a Flu shot last season.

Perceived effectiveness of the vaccine to control the pandemic, perceived safety of the vaccine, perceived doctor's recommendation of COVID-19 vaccine, perceived risk, and history of refusal of any type of vaccine in the past were found to be significant factors that affect the respondents' willingness to get a COVID-19 vaccine. As Family and Community medicine practitioners we strongly advocate that prevention is better than cure and it should not end there. We can recommend these lifesaving vaccines to our patients during consultations. The results from this study can help provide awareness of the factors affecting vaccine acceptance and formulate better strategies in implementing vaccine programs with higher acceptance rates in the future, which in

turn gives our country a better chance of achieving herd immunity thus controlling and preventing the spread of COVID-19.

For future studies, the researchers must conduct a more systematic, probability-based sampling method to achieve more representative and generalizable results. In addition to this, factors that affect COVID-19 vaccine acceptance among other targeted populations and settings may also be assessed. Future researchers may also want to resort to other possible instruments on vaccine hesitancy and include vaccination promotion strategies questions, turnaround time during the vaccination, problems in COVID-19 vaccination, vaccine side effects, price, vaccine brand, and origin of vaccine development and production.

#### REFERENCES

1. Coronavirus disease (COVID-19). (2021, March 11). <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
2. Lazarus JV, Ratzan SC, Palayew A, Gostin LO, Larson HJ, Rabin K, Kimball S & El-Mohandes A. A global survey of potential acceptance of a COVID-19 vaccine. *Nature Medicine* 2020; 27(2): 225–8. <https://doi.org/10.1038/s41591-020-1124-9>
3. Lurie N, Saville M, Hatchett R, Halton J. Developing COVID-19 vaccines at pandemic speed. *New Engl J Med* 2020; 382: 1969-73. DOI: 10.1056/NEJMp2005630
4. Wang J, Jing R, Lai X, Zhang H, Lyu Y, Knoll MD & Fang H. Acceptance of COVID-19 vaccination during the COVID-19 pandemic in China. *Vaccines* 2020; 8(3): 482. <https://doi.org/10.3390/vaccines8030482>
5. Reyes MSGL, Dee EC & Ho BL. Vaccination in the Philippines: experiences from history and lessons for the future. *Human Vaccines & Immunotherapeutics* 2020; 1–4. <https://doi.org/10.1080/21645515.2020.1841541>
6. Malik AA, McFadden SAM, Elharake J & Omer SB. (2020). Determinants of COVID-19 vaccine acceptance in the US. *EclinicalMedicine* 2020; 26: 100495. <https://doi.org/10.1016/j.eclinm.2020.100495>
7. Sallam M. COVID-19 vaccine hesitancy worldwide: A concise systematic review of vaccine acceptance rates. *Vaccines* 2021; 9(2): 160. <https://doi.org/10.3390/vaccines9020160>
8. Xinhua (2021, January 8). Philippine government urges Filipinos to get COVID-19 vaccine. [http://www.xinhuanet.com/english/2021-01/08/c\\_139652257.htm](http://www.xinhuanet.com/english/2021-01/08/c_139652257.htm)
9. The Diplomat. (2021, March 9). From Dengvaxia to Sinovac: Vaccine Hesitancy in the Philippines. <https://thediplomat.com/2021/03/from-dengvaxia-to-sinovac-vaccine-hesitancy-in-the-philippines/>
10. Xiao C, Li X, Liu S, Sang Y, Gao S-J & Gao F. HIV-1 did not contribute to the 2019-nCoV genome. *Emerging Microbes & Infections* 2020; 9(1): 378–81. <https://doi.org/10.1080/22221751.2020.1727299>
11. Graham BS, Mascola JR & Fauci AS. Novel vaccine technologies. *JAMA* 2018; 319(14): 1431. <https://doi.org/10.1001/jama.2018.0345>
12. Charlton Hume HK & Lua LHL. Platform technologies for modern vaccine manufacturing. *Vaccine* 2017; 35(35): 4480–5. <https://doi.org/10.1016/j.vaccine.2017.02.069>
13. Fadda M, Albanese E & Suggs LS. When a COVID-19 vaccine is ready, will we all be ready for it? *Int J Public Health* 2020; 65(6): 711–2. <https://doi.org/10.1007/s00038-020-01404-4>
14. Enserink M & Cohen J. The Novel H1N1 Influenza. *Science* 2009; 326(5960): 1607. <https://doi.org/10.1126/science.326.5960.1607>
15. Fact-checking Judy Mikovits, the controversial virologist attacking Anthony Fauci in a viral conspiracy video. (2020, May 11). *Science | AAAS*. <https://www.sciencemag.org/news/2020/05/fact-checking-judy-mikovits-controversial-virologist-attacking-anthony-fauci-viral>
16. Cornwall W. Officials gird for a war on vaccine misinformation. *Science* 2020; 369(6499): 14–5. <https://doi.org/10.1126/science.369.6499.14>

17. MacDonald NE. Vaccine hesitancy: Definition, scope, and determinants. *Vaccine* 2015; 33(34): 4161–4. <https://doi.org/10.1016/j.vaccine.2015.04.036>
18. Salva EP, Villarama JB, Lopez EB, Sayo AR, Villanueva AMG, Edwards T, Han SM, Suzuki S, Seposo X, Ariyoshi K & Smith C. Epidemiological and clinical characteristics of patients with suspected COVID-19 admitted in Metro Manila, Philippines. *Tropical Medicine and Health* 2020; 48(1): 48–51. <https://doi.org/10.1186/s41182-020-00241-8>
19. The Philippine National COVID-19 Vaccination Deployment Plan. (2021). Doh. Gov.Ph. <https://doh.gov.ph/sites/default/files/basic-page/The%20Philippine%20National%20COVID-19%20Vaccination%20Deployment%20Plan.pdf>
20. Bautista Jr. AP, Bleza DG, Balibrea DM & Equiza C. (2021). Acceptability of vaccination against COVID-19 among selected residents of the cities of Caloocan, Malabon, and Navotas, Philippines. 2021. Published. <https://doi.org/10.20944/preprints202104.0702.v1>
21. Tam CC, Qiao S & Li X. Factors associated with decision making on COVID-19 vaccine acceptance among college students in South Carolina. 2020. Published. <https://doi.org/10.1101/2020.12.03.20243543>
22. Harapan H, Wagner AL, Yufika A, Winardi W, Anwar S, Gan AK, Setiawan AM, Rajamoorthy Y, Sofyan H & Mudatsir M. Acceptance of a COVID-19 vaccine in Southeast Asia: A cross-sectional study in Indonesia. *Frontiers in Public Health* 2020; 8. <https://doi.org/10.3389/fpubh.2020.00381>
23. Kasting ML, Head KJ, Hartsock JA, Sturm L & Zimet GD. Public perceptions of the effectiveness of recommended non-pharmaceutical intervention behaviors to mitigate the spread of SARS-CoV-2. *PloS one* 2020; 15(11): e0241662. <https://doi.org/10.1371/journal.pone.0241662>