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Acceptability and attributes of the COVID-19 vaccine

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ABSTRACT

With the Philippines' experience on vaccine hesitancy, the study aimed to determine the acceptability of COVID-19 vaccination in the country and understand its attributes using the diffusion of innovation (DoI) theory. The cross-sectional study included 327 respondents recruited for four weeks through various social media platforms. Participants were requested to answer a self-administered online questionnaire. Majority of the respondents were belonged to age group 21-30 (46.2%), mostly female (65.4%), relatively healthy (86.2%), college graduate (37.6%), and currently unemployed (50.8%). While the majority had the intention to get vaccinated against COVID-19 (70.0%), only 16.8% are innovators belonging to the age group 21-30 (p value=0.03), male (p value <0.001), and employed (p value=0.01). Relative advantage (p value <0.001), compatibility (p value <0.001), observability (p value <0.001), and perceived risk (p value <0.001) are significantly associated with the intention for COVID-19 vaccination and adopter category. Findings provde that the attributes of DoI are predictors for the acceptability and timing of COVID-19 vaccination. Strategies that promote trust, information transparency, and better information dissemination on the benefits and safety of vaccination can motivate more Filipinos to adopt the innovation.

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1. INTRODUCTION

The COVID-19 pandemic has continuously affected millions of people worldwide and as of April 2022, the world health organization (WHO) has reported a total of more than 500 million confirmed cases including more than 6 million deaths [1]. Globally, the disease has posed enormous health burden and disrupted the society and economies. Since there is still no clear end to this pandemic, the hope of many people is for a safe and effective vaccine to be the answer in order for life to go back to the pre-pandemic normalcy.

But while researchers and scientists are into further improving COVID-19 vaccine, vaccine hesitancy is another issue that the government and scientific community must face now that the solution is available [2]. Vaccine hesitancy reflects concerns about the decision to vaccinate oneself or one's children. Factors contributing to it include its compulsory nature, adverse health outcomes, unfamiliarity with its benefits, and lack of trust in public health agencies [3]. These factors would mean that even when vaccine is available, the challenge remains on how the general population will accept the innovation.

In the Philippines, the country's Department of Health (DOH) has reported vaccine hesitancy as one of the reasons for the measles and polio outbreaks in 2019. Loss of public confidence and trust in vaccines was even made worst by the Dengvaxia controversy when there were documented reports of adverse outcomes among vaccinated individuals [4]. Furthermore, The Vaccine Confidence Project reported a dramatic drop in vaccine confidence in terms of its importance from 93% to only 32% in 2018 and in terms of effectiveness, it dropped from 82% in 2015 to only 22% in 2018 [5].

One of the most common theories used in public health to understand how an innovation can diffuse through a social system is the Diffusion of Innovation. The theory has been applied in various settings and in health care, interventions based on the theory has led to higher immunization rate [6]. With limited data as to the Filipinos' acceptability of COVID-19 vaccine and their pre-existing hesitancy on immunization caused by their past experiences, it is the aim of this study to determine the acceptability of COVID-19 vaccine in the country. The study used the constructs of Diffusion of Innovation to understand better the population in terms of their willingness for vaccination and the factors that can affect their future decision. Obtaining this information can help authorities in planning and implementing program protocols that can address the challenge in COVID-19 vaccination in the country.

2. RESEARCH METHOD

The study was a cross-sectional descriptive type. Participants of the study were Filipinos currently living in the Philippines, and who were willing to answer the online questionnaire. In order to participate in the study, they should at least be 18 years old, should have access to the internet, and be mentally fit to answer the questionnaire. Filipinos who are currently living outside the country were excluded from the study.

Since this is an online survey, participants were selected through convenience sampling technique. The researchers aimed to recruit at least 300 eligible participants through various social media platforms. The researchers posted the online questionnaire in private accounts and pages, and public groups and asked permission from the administrators of various organizations to post the link of the survey questionnaire on their official online page. The questionnaire remained posted on various social media platforms for four weeks, starting from December 10, 2020, until January 7, 2021.

The researchers constructed the questionnaire that was used in the study. It consisted of 4 sections– demographic profile, acceptability of COVID-19 vaccine, adopter categories, and the attributes of the innovation. The attributes of the innovation were reported on a 1-5 Likert scale, which range from strongly agree to strongly disagree.

Prior to the actual data collection, the questionnaire was validated by experts in the field, pilot tested among participants with the same characteristics as the target of the study, and checked for internal consistency. Cronbach's alpha was calculated and result was 0.791 which is considered to be within acceptable range. It was then converted into a Google Form to facilitate the online survey.

This study was approved for conduct by the AUF-OVPRI ethics review committee (2020-239). All participants were asked to click on the "I agree" button found on the first page of the online questionnaire before they proceeded with the actual research questions. They also had the option not to proceed with the questionnaire by clicking on the "I do not want to proceed" button. The respondents did not receive any incentive or compensation for participating in the study. All information obtained during the course of the study was treated with extreme confidentiality.

For the data analysis, the mean, standard deviation, frequency, and percentage will be used to describe the acceptability of the participants. Statistical tests such as tests for association and tests for the difference will be performed as needed in order to answer the study objectives. Pearson's Chi-square was used to identify the association of various variables in order to determine if attributes of the vaccination can predict the respondent's ability to adapt to the innovation.

3. RESULTS AND DISCUSSION

Out of the 352 respondents who answered the online questionnaire, 327 of them qualified to be included in the final analysis of the study based on the inclusion criteria set. The six respondents were not included because one of them has a non-Filipino citizenship, and the other five respondents are currently living outside the Philippines. In addition to this, another 19 participants were excluded since they gave multiple answers in items requiring only one answer.

Table 1 shows that the majority of the respondents (46.2%) are 21 to 30 years old, mostly female (65.4%), relatively healthy (86.2%), college graduate (37.6%), and currently unemployed (50.8%). While the majority has the intention to get vaccinated against COVID-19 (70.0%), only 16.8% are innovators who will

get the vaccine immediately once it becomes available. The majority (40.4%) are classified as laggards who will get the vaccine "only after several years when all scientific data show that it is effective and/or COVID-19 vaccination becomes compulsory".

Table 1. Demographic profile of the participants (n=327)

Parameter	n (%)
Age	
18-20 years old	82 (25.1%)
21-30 years old	151 (46.2%)
31-40 years old	42 (12.8%)
41-50 years old	33 (10.1%)
>50 years old	19 (5.8%)
Sex	
Male	113 (34.6%)
Female	214 (65.4%)
Health status	
With an existing health condition	45 (13.8%)
Relatively healthy	282 (86.2%)
Educational attainment	
Grade school	1 (0.3%)
High school graduate	27 (8.3%)
College undergraduate	111 (33.9%)
College graduate	123 (37.6%)
Post-graduate	65 (19.9%)
Occupation	
Employed	161 (49.2%)
Unemployed	166 (50.8%)
Acceptability to get vaccinated	
Agree	229 (70.0%)
Disagree	98 (30.0%)
Adopter category	
Innovators	55 (16.8%)
Early adopters	34 (10.4%)
Early majority	50 (15.3%)
Late majority	56 (17.1%)
Laggards	132 (40.4%)

Findings also reveal that sex is a significant variable on the intention to get vaccinated, with more females agreeing to it than males (p-value<0.001). Furthermore, age (p-value=0.03), sex (p-value<0.001), and employment status (p-value=0.01) show significant association with the adopter category were 21-30 years old, males, and those employed are mostly the innovators.

The age group 21-30 years old considers compatibility as a significantly important attribute of innovation (p-value=0.02), whereas more females consider relative advantage p-value<0.001) and perceived risk p-value<0.001) as important attributes of the innovation. For college graduates, they put more value on the relative advantage p-value<0.001), compatibility (p-value<0.001), and observability (p-value<0.001), while for the employed respondents, they find relative advantage (p-value<0.001) and compatibility (p-value<0.001) of the vaccine as significantly important attributes as presented in Table 2.

Table 2. Pearson's chi-square association of demographic profile with vaccine acceptability, adopter category, and attributes of the innovation

Parameter	Acceptability	Adopter category	Attributes of the innovation			
			Relative advantage	Compatibility	Observability	Perceived risk
Age	0.24	0.03*	0.33	0.02*	0.39	0.38
Sex	<0.001*	<0.001*	<0.001*	0.05	0.08	<0.001*
Health status	0.06	0.41	0.62	0.38	0.53	0.60
Educational attainment	0.33	0.21	<0.001*	<0.001*	0.01*	0.38
Employment status	0.43	0.01*	<0.001*	<0.001*	0.13	0.47

*Significant at p-value<0.05

Further analysis of data shows that all four attributes of the innovation are significantly associated with the intention of the respondents to get vaccinated (p-value<0.001). Table 3 also shows that the four attributes of the innovation–relative advantage, compatibility, observability, and perceived risks- are significant predictors of the respondent's decision as to when they will have the COVID-19 vaccination.

Table 3. Pearson's chi-square association of vaccine acceptability and adopter category with attributes of the innovation

Parameter	Attributes of the innovation			
	Relative advantage	Compatibility	Observability	Perceived risk
Acceptability	<0.001*	<0.001*	<0.001*	<0.001*
Adopter category	<0.001*	<0.001*	<0.001*	<0.001*

*Significant at p-value<0.05

COVID-19 has taken millions of lives, disrupted people, and has caused the collapse of economies worldwide. While health authorities hope that the availability of a safe and effective vaccine can put a stop on this pandemic and bring back life to normal, there is limited information on how the general population will take the idea of vaccination at this point in time. Using the Diffusion of Innovation (DoI) theory, the present study tried to explore the acceptability and the attributes of the COVID-19 vaccine among Filipinos currently living in the Philippines.

The present study shows that 70.2% of the respondents are willing to get the vaccine once it becomes available. This is similar with a global survey conducted in June 2020 where researchers reported that in 19 countries they surveyed, 71.5% will accept the vaccine [7]. However, older respondents were more likely to be motivated to get the vaccine. Younger respondents and those with lower educational attainment are less willing to get vaccinated [8]. Factors affecting the acceptability rate include level of trust in information from government sources, employer's advice, vaccine efficacy, and perceived risk of COVID-19 infection [7], [9].

Furthermore, previous studies show that trust to public institutions and effective communication strategy are key areas to focus to help the diffusion of an innovation such as vaccination [10]. However, current situation in the Philippines mirrors the same political disagreement observed during the Dengvaxia controversy. Disagreement on the brand of vaccine to purchase and the lack of transparency in the procurement process put the citizens in a blind spot [11]. While willingness for vaccination among the respondents of the study is initially high, it is important to note that the present survey did not consider the brand and efficacy report of vaccines when the respondents were asked about their intention to get vaccinated. As a result, the present acceptability rate may change similar with what was observed in a study in Indonesia where acceptability decreased from 93.3% for vaccines with 95% efficacy to only 67.0% for vaccines found to be only 50% effective [9]. The same scenario was noted in Canada where most respondents reported willingness to wait months for their preferred vaccine [12].

Considering that DoI includes time as one of its important constructs, results also show that while 70.1% are willing to get the vaccine, only 17.2% are innovators- who will get the vaccine once it becomes available and majority of them (40.1%) are laggards. Laggards are the people who very conservative, skeptical of change, and considered as the hardest group to bring on board. In order to create an appeal to them, health authorities may need to use statistics, fear, and pressure [13]. In one study employing the theory of Diffusion of Innovation in implementing rotavirus immunization, researchers recommend that for the innovation to be successful, federal authorities need to issue an official recommendation [14]. Since diffusion of an innovation occurs within a social system, it was also noted that the influence of health workers, community leaders, and other influential leaders can promote the vaccination in the community [15]. But while these strategies help, vaccine hesitancy is a complex issue that is also rooted to trust on science, health care professionals, health care system, and the social and political system [16]. While the laggards in the study answered that they will get vaccination only when vaccination becomes mandatory, there is still ethics surrounding the possible mandatory vaccination. Even with other vaccines like flu and human papilloma virus (HPV), mandatory immunization has its own ethical issues to face since this can violate a person's right to refuse unwanted treatment [17], [18].

Of the respondents willing to get vaccinated, females, younger adults, and the employed are the innovators who will get the vaccine immediately once it becomes available. Results are interesting considering that in other previous studies, it is the male and older adults who are more likely to get vaccinated compared with other population [19], [20]. However then again, according to other studies, there are multiple and complex layers of gender-bias with respect to innovation and it is difficult to distinguish between the extent to which studies of innovativeness report gender-differences and the extent to which these differences actually exist [21].

Because adopting an innovation depends directly on how it is conveyed to future adopters, the innovation– which in this case is COVID-19 vaccination- must have attributes in order for the general population to be attracted to it. According to Rogers, the perceived attributes of an innovation are meaningful predictors of use and adoption rate [22]. Results of the present study showed that all attributes of the

innovation– relative advantage, compatibility, observability, and perceived risk are significantly associated with the type of adopter category and the acceptability of the innovation.

Significant association observed with relative advantage affirms that this attribute is the strongest predictor of the rate of adoption of an innovation. Future adopters first assess the benefits versus the burden of the innovation. In the study, the participants agree that "the vaccine will protect them from the dreaded disease" and it will give them "greater control over their health and life in general". This is in line with the view of the World Health Organization that COVID-19 vaccination is the key step in the transition from the current pandemic to business as usual [23]. Health experts also agree that currently available vaccines help prevent and/or reduce the severity of COVID-19 infection. With combination of safety protocols, vaccination offers the best protection against the disease [24].

The next attribute significantly associated with the acceptability and rate of adoption of vaccination is compatibility. This is when adopters consider the innovation in line with their existing values, past experiences, and needs. Considering that the Philippines continues to be on community quarantine and various alert level systems and has reported to have the longest lockdown in the world [25], Filipinos have been experiencing lockdown fatigue [26] and possibly, participants of the study find that COVID-19 vaccination is the solution to getting their previous life back. Based on the results, younger age groups, college graduates, and employed participants perceive that vaccination is compatible with their current needs. When adopters perceive the innovation to fit their way of life, they tend to adopt it faster [27].

Observability is the third attribute found to be associated with the acceptability and rate of adoption of the vaccination. When individuals see respected and influential people take the innovation, the adoption rate becomes faster. This is because the "visibility" of the innovation stimulates peer discussion and offer demonstration for its application. For example, it was noted that in surgery, new techniques are adopted quickly by some clinicians because of the fear of being left behind [28]. The same principle can be applied in the COVID-19 vaccine. When people who have been vaccinated begin to freely mingle with others, become immune to the disease, and travel freely, this can motivate other individuals to get vaccinated as well.

The last attribute of the innovation studied is the perceived risk which arises from doubt related to the consistency of the anticipated outcome. In the context of vaccination, fear of adverse reactions and safety issues due to the unprecedented speed of vaccine development are the main hindrances affecting the acceptability and rate of adoption. This is because historically, the development of new vaccines takes several years, and the decades of research has been shortened with the COVID-19 vaccine. In order to avoid this attribute from bearing a negative effect on the adoption of innovation, the concerns must be addressed and assurance that the innovation is safe and trustworthy must be provided by experts [27].

Considering the current situation in the Philippines, data show that increasing the vaccine confidence from the general population may still be far from the target. Recalling the lessons from *Dengvaxia issue*, the vaccine was then rolled out in an expedited manner in the national immunization program due to the high incidence of dengue in the country. It should also be noted that the presence of political discord, inadequate social preparation, and the adverse reactions reported all contributed to the decrease in vaccine confidence [29]. While lessons from the past experiences should not be forgotten, as of this writing, the country has the same formula seen during the Dengvaxia immunization that can actually decrease the people's confidence in accepting the innovation– political discord, lack of transparency, and political goodwill instead of scientific evidence in vaccine purchase, and the reluctance of higher officials to make vaccination public. Instead of allaying fears, higher officials responded by saying that Filipinos cannot be choosy with the brand of vaccine they will get [30]. Since vaccine safety remains to be a significant issue, other studies recommend that concerns should be addressed before and during vaccine roll outs. Continuous public information regarding testing and monitoring of vaccine should be in place and an individual's contribution to herd immunity should be emphasized [31].

4. CONCLUSION

The present findings suggest the need to highlight on the relative advantage, compatibility and observability and reduce the perceived risks of COVID-19 vaccine. Emphasizing the benefits, aligning the vaccination with the current needs of people, increasing support from influential authorities, and providing assurance on its safety can help move more individuals to become innovators. But since the diffusion of innovation also occurs within a social system and communication channels are crucial, trust in the government and information transparency and dissemination should be given key priorities and targeted among older adults, unemployed, and male population who are more hesitant to get the COVID-19 vaccine.

While the study offers a timely approach in understanding the adoption of COVID-19 vaccination in a developing country with high incidence of infection like the Philippines, it has its own limitations. Since the study used convenience sampling technique and was conducted during a time where community quarantine was still in place, the researchers were limited to the reach of the social media networks for the

data collection. Thus, results cannot be generalized to the entire population. Further research with wider coverage is needed to fully understand the adoption of the innovation.

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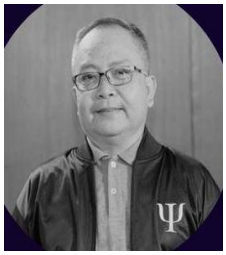

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