

The Acceptance of COVID-19 Vaccine: The Projection from the First Year of COVID-19 Pandemic in Indonesia

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ARTICLE INFO	ABSTRACT
ORCID ID Author 1: https://orcid.org/0000-0003-2486-5546 Author 2: - Author 3: -	The Pandemic of COVID-19 affected not only the health sector but also other sectors. Herd immunity through vaccination was recommended by experts. This study purposed to describe the acceptance of the COVID-19 vaccine and to discover predictive factors of COVID-19 vaccine acceptance in Indonesia. This is a cross-sectional study. Data collection used an online platform conducted in August 2020. The questionnaire based on Survey Tool and Guidance by WHO Regional Office for Europe. Logistic regression was run to identify associated factors and to build a predictive model of vaccine acceptance. There were 164 respondents aged 19 – 56 years. About 70.1 percent of respondents showed a willingness to accept the vaccine for COVID-19. The predictive model consisted of age, perceived probability that has been infected and trust in government press releases with performance reaching 73 percent. The trust of people in the government was the most important key to engaging people in vaccination. Evidence-based messaging delivered regularly by the government and consistent action between the government and health officers would educate and lead people's risk perceived and the decision to be vaccinated.
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1. Introduction

It had been a year since coronavirus disease (COVID-19) was declared as a Public Health Emergency of International Concern by WHO (World Health Organization, 2020a). On January 2021, at least 96 million cases were confirmed with more than 2 million deaths globally (World Health Organization, 2021). Not only the health sector, the pandemic of COVID-19 also affected the transportation, tourism, trade, and economic sector. An example, in economic sector alone, World Bank reported COVID-19 caused the deepest recession since the Second World war, with the largest fraction of economies experiencing declines in per capita output since 1870 (Susilawati et al., 2020). The most effective way to tackle this pandemic was needed. WHO supported achieving “herd immunity” through vaccination (World Health Organization, 2020b).

Vaccination played a central role in global health improvement. Global coverage of vaccination against many important infectious diseases of childhood. Smallpox and rinderpest, two major infections, had been eradicated by vaccination (Greenwood, 2014). Also, increasing access to vaccines in developing countries could drastically reduce illnesses and death. Expanded use of the measles vaccine globally between 1990 and 2008 dropped measles-related mortality in children by 86% (Van Den Ent et al., 2011). Vaccines not only bring

individual benefits but also many societal benefits. By preventing illness in children, vaccines gave children positive long-term educational, social, and economic. Healthy children could attend school regularly, they could be better to learn, and can be more productive as adults compared to non-vaccinated children (Bloom et al., 2005).

A study found that global trends (between 2015 – 2019) in vaccine confidence (the importance, safety, and effectiveness) was fall in Afghanistan, Pakistan, South Korea, Philippines and Indonesia (de Figueiredo et al., 2020). It was an important note for Indonesia to start vaccine-induced immunity for COVID-19. Therefore, this study aimed to describe the acceptance of COVID-19 vaccine and to discover predictive factors of COVID-19 vaccine acceptance as information for COVID-19 task force to support the success of COVID-19 vaccine coverage.

2. Method

This was a cross-sectional study. Data were collected using an electronic questionnaire via Google Forms in August 2020. Invitation to participate was distributed on WhatsApp. Respondents were Indonesian aged 18 years old or older, able to read and understand Bahasa Indonesia, and had a Gmail account with access to the internet via smartphone or other device. Participation in this study was voluntary.

The questionnaire was based on Survey Tool and Guidance: Behavioral Insight on COVID-19, April 17, 2020 by WHO Regional Office for Europe WHO (2014), consisted of questions about individual information (age, sex, education level, occupation) risk perception about COVID-19 (perception on probability of been infected, risk of been infected, severity of COVID-19) and trust in the source of information (television, radio, online news pages, social media (Facebook, Twitter, YouTube, WhatsApp), government press release, and celebrities/ social media influencers). As the main outcome, the acceptance of COVID-19 vaccine was asked by the following question, “If a vaccine become available and is recommended for me, I would get it.” Outcome variables, risk perceptions, trust in source of information, and vaccine acceptance was dichotomy.

Data were analyzed in descriptive statistic (frequencies, percentages). Chi-square test was used to compare the proportion difference between categorical variables on vaccine acceptance. Logistic regression was used to assess the association between variables and main outcome and also to build predictive model of vaccine acceptance.

3. Result and Discussion

There were 164 respondents, 100 (60.9%) females, median age 30 years old (range 19 – 56 years old), and 134 (84.2%) graduated from university. The occupation of respondents varied, such as housewives, employees, trader/ businessman, civil servant, teachers/lecturers, and students. As many as 115 (70.1%) said would accept the COVID-19 vaccine if it was available and was recommended for them.

Based on the risk perception about COVID-19, this study found that as much as 95 (58%) respondents realized that their social environment had been infected with COVID-19, 94 (57.3%) said possible to be infected, 90 (54.9%) thought themselves were susceptible to be infected, and 134 (81.7) agreed that this novel corona virus caused severe illness. Since it was a new disease and be a pandemic, all people around the world seemed to compete get update information about it. Among all the source of information, the most trusted was the

government press release 124 (75.6%), followed by television 104 (63.4%), newspaper 102 (62.2%), radio 96 (58.5%), online news 73 (44.5%), social media 67 (40.8%), and celebrities/social media influencer 37 (22.6%). Table 1 explain about distribution of Respondent's Characteristics, Risk Perception about COVID-19 and Trust in Source of Information.

Table 1. Distribution of Respondent's Characteristics, Risk Perception about COVID-19 and Trust in Source of Information

Variables	Vaccine Acceptance				Total		P value
	Yes		No		n	%	
	n	%	n	%			
Sex							
Male	48	41.7	16	32.6	64	39.1	0.275
Female	67	58.3	33	67.4	100	60.9	
Age							
19 – 45	80	69.6	21	42.9	101	61.6	0.001
46 – 56	35	30.4	28	57.1	63	38.4	
Education Level (graduated)							
Senior High School	19	16.5	7	14.3	26	15.8	0.720
University	96	83.5	42	85.7	138	84.2	
Occupation							
Housewife	3	2.6	3	6.1	6	3.6	0.245
Employee	10	8.7	7	14.3	17	10.4	
Trader/ businessman	8	7.0	4	8.2	12	7.3	
Civil Servant	29	25.2	8	16.3	37	22.6	
Student	30	26.1	7	14.3	37	22.6	
teacher/ lecturer	35	30.4	20	40.8	55	33.5	
Social environment had been infected with COVID-19							
No	49	42.6	23	47.0	72	43.9	0.428
Not know	15	13.0	3	6.0	18	11.0	
Yes	51	44.4	23	47.0	74	45.1	
Perception on possibility to be infected with COVID-19							
Unlikely	40	34.8	30	61.2	70	42.7	0.002
Likely	75	65.2	19	38.8	94	57.3	
Perception on susceptibility to be infected with COVID-19							
Not at all susceptible	46	40.0	28	57.1	74	45.1	0.043
Susceptible	69	60.0	21	42.9	90	54.9	
Perception on severity of COVID-19							
Not severe	12	10.4	18	36.7	30	18.3	<0.001
Severe	103	89.6	31	63.3	134	81.7	
Trust in source of information (television)							
Not trust							<0.001
Trust	32	27.8	28	57.1	60	36.6	
	83	72.2	21	42.9	104	63.4	
Trust in source of information (newspaper)							
Not trust							0.003
Trust	35	30.4	27	55.1	62	37.8	
	80	69.6	22	44.9	102	62.2	
Trust in source of information (radio)							
Not trust							0.008
Trust	40	34.8	28	57.1	68	41.5	
	75	65.2	21	42.9	96	58.5	

Variables	Vaccine Acceptance				Total		P value
	Yes		No		n	%	
	n	%	n	%			
Trust in source of information (online news)							
Not trust							
Trust	64	55.6	27	55.1	91	55.5	0.948
	51	44.4	22	44.9	73	44.5	
Trust in source of information (facebook, twitter, youtube, whatsapp)							
Not trust							
Trust	69	60.0	28	57.1	97	59.1	0.733
	46	40.0	21	42.9	67	40.9	
Trust in source of information (government press release)							
Not trust	19	16.5	21	42.9	40	24.4	<0.001
Trust	96	83.5	28	57.1	124	75.6	
Trust in source of information celebrities/ social media influencer							
Not trust							
Trust	90	78.3	37	75.5	127	77.4	0.700
	25	21.7	12	24.5	37	22.6	

There was notable difference proportion with among respondents who would accept the vaccine compared who would decline the vaccine (table 2). It was also identified in age group, perception on probability of been infected, perception on susceptibility to be infected, perception on severity of disease, and the trust of source of information about COVID-19. For example, either respondent who would accept nor would decline the vaccine, the highest level of education was university level, but respondent in age group 19 – 45 years old majority would accept the vaccine while in age group 46 – 56 years old majority respondents would decline the vaccine. Table 2 explain about association between respondent's characteristics, risk perception about covid-19 and trust in source of information with the acceptance of COVID-19 vaccine.

Table 2. Association between Respondent's Characteristics, Risk Perception about COVID-19 and Trust in Source of Information with The Acceptance of COVID-19 Vaccine

Variables	Crude OR	95%CI	P value
Sex			
Male	1		
Female	0.67	0.33 – 1.36	0.276
Age			
19 – 45	1		
46 – 56	0.33	0.16 – 0.65	0.002
Education Level (graduated)			
Senior High School	1		
University	0.84	0.33 – 2.15	0.720
Occupation			
Housewife	1		
Employee	1.43	0.22 – 9.26	0.708
Trader/ businessman	2	0.27 – 14.78	0.497
Civil Servant	3.62	0.61 – 21.52	0.157
Student	4.28	0.71 – 25.91	0.113

Variables	Crude OR	95%CI	P value
teacher/ lecturer	1.75	0.32 – 9.50	0.517
Social environment had been infected with COVID-19			
No	1		
Not know	2.34	0.62 – 8.92	0.210
Yes	1.04	0.52 – 2.09	0.911
Perception on possibility to be infected with COVID-19			
Unlikely	1		
Likely	2.96	1.48 – 5.91	0.002
Perception on susceptibility to be infected with COVID-19			
Not at all susceptible	2	1.01 – 3.94	0.045
Susceptible			
Perception on severity of COVID-19			
Not severe	1		
Severe	4.98	2.16 – 11.46	<0.001
Trust in source of information (television)			
Not trust	1		
Trust	3.45	1.72 – 6.95	<0.001
Trust in source of information (newspaper)			
Not trust	1		
Trust	2.80	1.40 – 5.58	0.003
Trust in source of information (radio)			
Not trust	1		
Trust	2.5	1.26 – 4.95	0.009
Trust in source of information (online news)			
Not trust	1		
Trust	0.97	0.49 – 1.91	0.948
Trust in source of information (facebook, twitter, youtube, whatsapp)			
Not trust	1		
Trust	0.89	0.45 – 1.75	0.733
Trust in source of information (government press release)			
Not trust	3.78	1.79 – 8.02	<0.001
Trust			
Trust in source of information celebrities/ social media influencer			
Not trust	1		
Trust	0.85	0.39 – 1.88	0.700

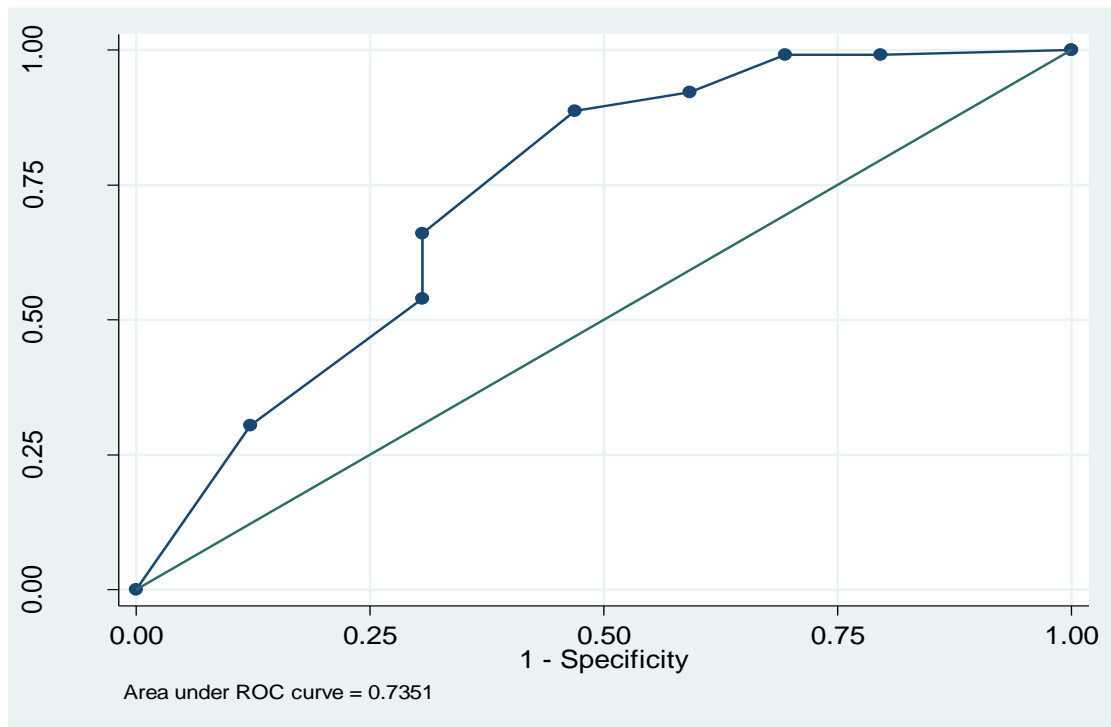
Among 15 variables there were 8 variables statistically significant associated with the acceptance of COVID-19 vaccine. Based on the table 2, respondents in age range 46 – 56 years old had a probability three times lower than respondents in age range 19 – 45 to accept vaccine. Risk perception about the severity of COVID-19 was identified as the most variable with high contribution to the acceptance of vaccine. Respondent who thought that the COVID-19 was severe more likely to accept the vaccine 4.98 times higher than the respondent who thought that COVID-19 was not severe. The trust of respondents about COVID-19 information shown in television, newspaper and the government press release give contribution to the acceptance of vaccine.

Since only variable with p value ($p < 0.25$) was included in predictive model, full model of predictive model was consisted of age, risk perception (perception on possibility, susceptibility, and severity on COVID-19) and source of information (television, newspaper,

radio, press release). In final model, age, perception on possibility to be infected with COVID-19 and trust in source information (government press release) were the explanatory variables with area under curve (AUC) of 73%. Table 3 explain about final model and full model to predict the acceptance of COVID-19 vaccine.

Table 3. Final Model and Full Model to Predict the Acceptance of COVID-19 Vaccine

Variables	Full Model		Final Model	
	aOR (95%CI)	P Value	aOR (95%CI)	P Value
Age				
19 – 45	1		1	
46 – 56	0.29 (0.13 – 0.65)	0.003	0.25 (0.12 – 0.56)	0.001
Perception on possibility to be infected with COVID-19				
Unlikely	1		1	
Likely	3.35 (1.32 – 8.52)	2.55	3.33 (1.54 – 7.18)	0.002
Perception on susceptibility to be infected with COVID-19				
Not at all susceptible	1			
Susceptible	0.72 (0.27 – 1.95)	0.526		
Perception on severity of COVID-19				
Not severe	1			
Severe	2.32 (0.79 – 6.81)	0.126		
Trust in source of information (television)				
Not trust	1			
Trust	1.84 (0.41 – 8.27)	0.423		
Trust in source of information (newspaper)				
Not trust	1			
Trust	0.82 (0.19 – 3.49)	0.789		
Trust in source of information (radio)				
Not trust	1			
Trust	0.83 (0.28 – 2.44)	0.736		
Trust in source of information (government press release)				
Not trust	1		1	
Trust	2.59 (0.79 – 8.38)	0.114	3.83 (1.67 – 8.79)	0.002



Source: Primary Data

Figure 1. ROC Curve for the final predictive model logit on The Acceptance of COVID-19 Vaccine

Data collection was held when vaccine of COVID-19 was still developed and it was found that as much as 70.1% of respondents showed willingness to accept the vaccine if it was already available and recommended. It was higher than in Canada (68.7%), Singapore (67.9%), and Russia (54.8%) (Lazarus et al., 2020). This percentage was also higher than the estimation of the world population acceptance of COVID-19 vaccine (68.4%) (Wang et al., 2020).

Since COVID-19 was highly contagious disease, at least 60-70% of population with immunity was needed to break the chain of transmission (World Health Organization, 2020b). It could be happened either through natural infection or by vaccination. A recent study found that people infected by COVID-19 and recovered made antibodies against the virus. They produced a robust response in immune cell called T cells (Prajapati & Kumar, 2020). This natural pattern would take a long time rather than through vaccination. But, the notable concern was herd immunity through vaccination required a high rate of vaccination in the community (M.Persons, 2020). Although the sufficient level of vaccine acceptance needed to reach herd immunity yet clearly state, some studies had been already try to estimate it (Kwok et al., 2020), (Omer et al., 2020), (Wang et al., 2020).

The acceptance of vaccine was not an automatic response. There were many factors influenced the willingness of people to be vaccinated. During pandemic, risk of infection, effectiveness of vaccine, and the body to advance the vaccine been the important factors determining the acceptance of vaccine than other factors, such as age, sex, educational level, and region (Determann et al., 2016), (Nguyen et al., 2011).

A number of study found that age influenced the acceptance of people to be vaccinated with COVID-19 vaccine (de Figueiredo et al., 2020), (Harapan et al., 2020), (Kreps et al., 2020), (Lazarus et al., 2020), (Loomba et al., 2020), (Neumann-Böhme et al., 2020), (Kemenkes RI, 2020). They showed a linear trend that the more old people the more high probability to accept the vaccine (Harapan et al., 2020), (Lazarus et al., 2020), (Neumann-Böhme et al., 2020), (Kemenkes RI, 2020). The opposite trend was identified in this study. The lower probability to accept the vaccine belonged to older people (aged 46-56 years) than younger people (aged 19-45 years). Several factors played important role, such as an employed status and information-seeking behavior. Recent studies observed that younger people tend to take vaccine based on employer's recommendation and more likely to have high information-seeking behavior (de Figueiredo et al., 2020), (Lazarus et al., 2020). The role of employed status was indirectly described by the distribution of respondents to accept vaccine by occupation. In all types of occupation, the percentage of vaccine acceptance was high. It might reflect that by getting the vaccine, respondents could keep working and had lower risk to be infected with COVID-19 as long as adhered with the health protocols (World Health Organization, 2020c).

Information about COVID-19 developed fast and almost uncontrolled. Misinformation about COVID-19 vaccine came to light as one of challenges to reach the high coverage. A survey in The UK and US found misinformation about this vaccine impact on the fall in vaccination intent (Loomba et al., 2020). It was consistent with the previous study showing negative correlation between increased susceptibility of misinformation and willingness to be vaccinated and the likelihood of complying with public health guidance (Roozenbeek et al., 2020). Further, susceptibility of misinformation was laid on following factors, being exposed to information on social media and age. The exposure of misinformation could give different information-seeking behavior. It could trigger individual to seek additional information to verify the information either based on their judgment and knowledge, their social circle, or another authentic source. On the other hand, it also might prevent individual from seeking new information and instead might trigger motivated processing to protect their preexisting attitudes or beliefs (Kim et al., 2020).

Disease trend following with environmental and social contexts were a combination to build perceived probability to be infected. Perceived of probability to be infected with COVID-19 among health-care workers came from their activities and working environment laid them to a high risk to be infected in the future (Fu et al., 2020). Unfortunately, not all people had understanding of this disease well and could assess their risk to be infected, so their risk perception was often using mental shortcuts based on judging events or situation (García & Cerda, 2020). As exemplified, the accelerated timeline of developing vaccine could have given impression that the vaccine was rushed, not safe, and not tested thoroughly. It also could lead to assumption about the politicization of vaccine, the motives of health workers, pharmaceutical companies or other actors, and also could lead to build false conspiracy theories (García & Cerda, 2020). The management of information about COVID-19 was the solely way to anticipate people got misinformation or disinformation eroded their confidence and acceptance to be vaccinated.

The latest news about COVID-19 been always the highlight of every single media, but not all of them trusted. Government press release identified as the most trusted source information. It had positive association on the acceptance of vaccine (Determann et al., 2016), (Lazarus et al., 2020), (Lim et al., 2020). Maintaining people trust on government either

response or messaging need consistently and rationally calibrated. In Indonesia, daily-messaging on diseases trend and diseases control steps delivered by the COVID-19 task force. Before distributing, the vaccine of COVID-19 had been declared as halal by The Indonesian Ulema Council (MUI) to break the hesitant because of religion values since Indonesia was the largest Muslim population in a country and the president of Indonesia been the first received the vaccine dose to show the safety of vaccine (German-Indonesia Chamber of Industry and Commerce, 2021).

4. Conclusion

The finding of this study might be influenced by the bias selection since respondents needed internet access, WhatsApp and Gmail account to participate. The number of respondents was small enough to represent the Indonesian population. But this study successfully delivered a sufficient predictive model of COVID-19 vaccine acceptance. The trust of people in the government was the most important key to engage people in the vaccination. The evidence-based messaging delivered regularly by the government, and the consistency action between the government and the health officer would educate and lead people's risk perceived and decision to be vaccinated.

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