

## Determining factors of COVID-19 vaccination uptake among elderly in Indonesia

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### ABSTRACT

The elderly is the most vulnerable population group during coronavirus disease 2019 (COVID-19) pandemic. Unfortunately, the vaccination uptake against COVID-19 among the seniors was considered low. This research aimed to point out the most significant factor as the recommendation for government to develop strategy in increasing COVID-19 participation among elderly. The variables are the health belief model, trust in health authorities and media, the experience regarding COVID-19, the general vaccination behaviour, and the novel contribution is the addition of the health protocol compliance as the determining factors of COVID-19 vaccination uptake action among the elderly in Indonesia. The online survey using a structured questionnaire obtained 213 respondents aged  $\geq 55$  years old. Structured equation modelling was employed to test the model. The result showed that the health belief model ( $\beta=0.296$ ), trust in media and authorities ( $\beta=0.524$ ), and general vaccination behaviour ( $\beta=0.319$ ) significantly affect health protocol compliance. The health belief model ( $\beta=0.699$ ), trust in media authorities ( $\beta=0.933$ ), and health protocol compliance ( $\beta=0.406$ ) significantly affected the COVID-19 vaccination uptake behaviour. This result gives the implication that the government should focus on improving the trust in media and authorities among the elderly. This action would improve the knowledge of COVID-19 and increase the vaccination coverage among the elderly.

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## 1. INTRODUCTION

The global spread of severe acute respiratory syndrome coronavirus disease 2019 (COVID-19) allows us to learn about the effect of this viral disease on the elderly [1], [2] As the case worsens, the elderly are the most vulnerable population group since patients older than 60 are more likely to develop severe illness after infection [3]. The worse consequences occur among the elderly with an underlying medical condition [4]. The case fatality rate (CFR) of elderly patients with COVID-19 showed 8.0% for adults aged 70–80 years old and 14.8% for adults 80 [5], [6]. The number is higher than the world CFR outlined 4% [7].

Several public health strategies have been implemented to respond to the COVID-19. Vaccination against COVID-19 has become one of the most vital strategies to end the pandemic due to its ability to minimize the disease burden [8], [9]. COVID-19 vaccines have been researched, developed, tested, evaluated, and conditionally approved at an unprecedented speed [10]. The elderly group becomes one of the priority targets of the COVID-19 vaccine in every country. The United Kingdom (UK) includes people aged 50 and in the priority risk group at the first vaccination phase [11]. Germany categorized the elderly into

three priority groups, i.e., people between 60-69 years old as people with high priority, people 70-79 years old as people with higher priority, and people aged 80 or older as of the people with the highest priority [12]. Indonesia targets 21.5 million elderly in the first batch of COVID-19 vaccination [13]. The effort was made with the hope to flatten the curve.

Unfortunately, the vaccination uptake against COVID-19 among the seniors was considered low. By June, 2021, the COVID-19 vaccination coverage in Indonesia for the elderly group only reaches 19.68%. The number shows a huge gap between health workers, with 100% coverage, and public servants, with 99.03% coverage [14]. It happens primarily due to the lack of participation among the targeted group [15]. The elderly with or without comorbidities concern about vaccination's side effects [16]. In many cases, the family forbids the elderly from getting vaccinated because of the misleading news regarding COVID-19 vaccination [15], [17], [18]. The complicated online registration process also generates reluctance among the elderly to get vaccinated.

There are a considered number of studies regarding the attitude towards vaccination against COVID-19. Most studies investigated the hesitancy, willingness, or intention to get COVID-19 vaccination [19]. The studies had found the willingness and acceptance of COVID-19 vaccination reaching up to 77.6% in the general population and declined in older group age [20], [21]. However, there was a gap between the vaccination willingness as an attitude and actual uptake as an action in the Chinese elderly against Influenza, Pneumonia, and Herpes Zoster [22]. Thus, the study of attitude towards vaccination is incapable of capturing the real challenge in the vaccination program.

The COVID-19 vaccination uptake could be classified as health-related behaviour. Health belief model (HBM) proved to influence health-related behavior to take collateral cancer screening among the general population [23]. During the COVID-19 pandemic, HBM also becomes a strong predictor of vaccination willingness [24]. Trust in health authorities and government is required to generate people's willingness to follow public health admonitions [25]. Having self-experience with COVID-19 or acknowledge someone experiencing COVID-19 is associated with the low outright refusal of COVID-19 vaccination [26]. General vaccination behavior in the group with routine immunization practice has a higher probability of accepting COVID-19 vaccination than those who never take any immunization [27]. However, most studies didn't assess the causality of each predictor associating with COVID-19 vaccination uptake [28], [29]. Moreover, compliance toward COVID-19 health protocol has never been investigated to be the determining factor of COVID-19 vaccination uptake action. In addition, by far, there hasn't been any study focusing on vaccination uptake, especially among the elderly in Indonesia. Therefore, the objectives of this research are mainly to investigate the HBM, trust in Health Authorities and media, the experience regarding COVID-19, the general vaccination behavior, and expand the examination by adding the health protocol compliance as the determining factors of COVID-19 vaccination uptake action among the elderly in Indonesia. This research aimed to point out the most significant factor as the recommendation for government to develop strategy in increasing COVID-19 participation among elderly

Health belief model (HBM) is an important theory in health-related behaviour to understand the factors influencing the adoption of certain actions or behavior [30]. HBM stated perceived severity, perceived susceptibility, perceived benefit, and perceived barriers simultaneously influence behaviour [31]. Perceived severity is described as the perception regarding the seriousness of the symptoms if someone contacted a disease. Perceived susceptibility represents the individual likelihood perception of them being infected. Perceived benefit refers to the perception of positive outcomes associated with action or behaviour. Perceived barrier is defined as personal assessment regarding obstacles that prevent them from acting. HBM has been widely employed to examine the uptake behaviour in the context of vaccination, especially in the influenza vaccination [29]. Perceived benefit and perceived severity are significant predictors of the intention to get vaccinated against COVID-19 [24]. Perceived severity and perceived susceptibility generate the protective behaviour to avoid the disease. Individuals who perceive to have a low risk of getting infected, less worry about the disease, unbelievers that vaccination is effective reported to have less intention to take vaccination [29], [32], [33].

This paper provides the novel model of the determining factors of COVID-19 vaccination uptake among elderly in Indonesia. The proposed model identified four determining factors of health protocol compliance, i.e., health believe model, trust in media and authorities, COVID-19 experience, and general vaccination behavior. Furthermore, the proposed model also identified five determining factors of COVID-19 vaccination uptake among elderly, i.e., health believe model, trust in media and authorities, COVID-19 experience, and general vaccination behavior, and health protocol compliance. Figure 1 shows the proposed model.

H1: Health belief model (HBM) significantly influence the health protocol compliance

H2: Health belief model (HBM) significantly influence the COVID-19 vaccination uptake

Trust in media and authorities describe the trust of people in the media and institution that have authority to provide both information and policy related to COVID-19. Trust in health authorities associates with the vaccination uptake behaviour. The person who trusts the government is more likely to

support public policy, including health protocols and vaccination programs. The group willing to be vaccinated against COVID-19 tend to believe that the government has responded effectively to the COVID-19 [34]. Most of the individuals who have the intention to obtain vaccination against COVID-19 reported accessing information from the healthcare provider and government [35]. A study report shows polarization among people with an opposing political orientation that creates different behaviour of consuming the information. This polarization produces two major opinions: the belief that COVID-19 information is trustworthy; and the idea that COVID-19 news is exaggerated [36]. Moreover, the respondents who declare themselves as the governing-party partisanship were significantly choosing to be vaccinated and comply with government advice [37].

H3: Trust in media and authorities significantly influence the health protocol compliance

H4: Trust in media and authorities significantly influence the COVID-19 vaccination uptake

COVID-19 experience describes the overall experience of a person being contracted COVID-19 or the family, relatives, or colleagues that diagnosed COVID-19. Individuals with a bad experience more certainly protect themselves by avoiding the harm of the experience [38]. A study reported that 30% of the person who considers taking COVID-19 vaccination have the family, colleagues, relatives, or neighbours who infected COVID-19 [39]. A person with COVID-19 experience is allowed to have direct access to learn the consequences of the infection. This experience is projected to increase the compliance towards health protocol and action to get COVID-19 vaccination among the population. The group who experienced a high burden of COVID-19 has higher encouragement for taking vaccination [40].

H5: COVID-19 experiences significantly influence the health protocol compliance

H6: COVID-19 experiences significantly influence the COVID-19 vaccination uptake

General vaccination behaviour represents the behaviour toward public vaccination and immunization program. The most given reason to avoid COVID-19 vaccination among the population is that the refusal of vaccination in general [19]. Among the US respondents, 72% refuse to vaccinate their children against COVID-19 because they are anti-vaccine by nature [41]. The students with past vaccination uptake behaviour positively correspond to COVID-19 vaccination uptake intention [42]. The trust in the general immunization program is positively associated with the confidence in taking flu vaccination [43]. The group that takes the general vaccination program is expected to be more aware of preventive behavior and vaccination against COVID-19.

H7: General vaccination behaviour significantly influence the health protocol compliance

H8: General vaccination behaviour significantly influence the COVID-19 vaccination uptake

COVID-19 pandemic could be controlled by performing a set of protective behaviour, i.e., washing the hand regularly, wearing the mask properly, managing social distancing, avoiding the crowd, and staying at home, that later named as health protocol. The person with a lower perception of being infected by COVID-19 is more likely to avoid protective behavior [40]. The intention to comply with the health protocol is influenced by the perceived severity and perceived susceptibility [30]. Hence, compliance with health protocol is expected to affect the COVID-19 vaccination uptake behaviour because of the deep understanding of the severity and risk of being infected by COVID-19.

H9: Health protocol compliance significantly influence the COVID-19 vaccination uptake

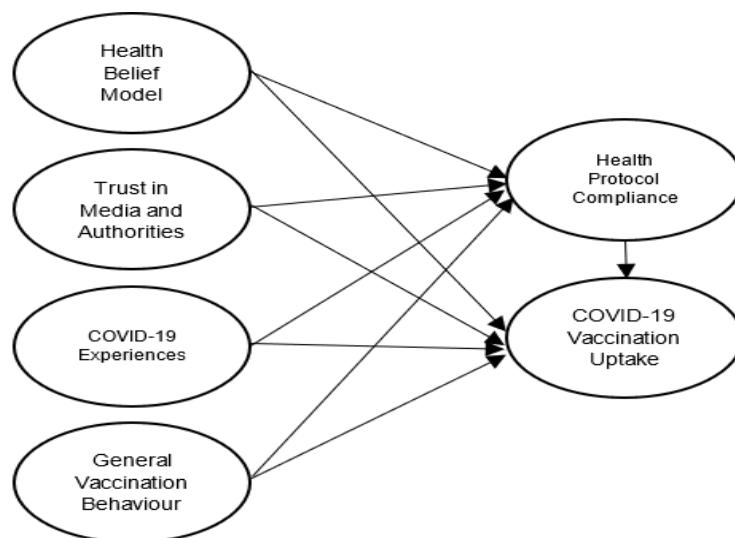


Figure 1. Proposed model of COVID-19 vaccination uptake behaviour

## 2. RESEARCH METHOD

### 2.1. Study design and participants

A cross-sectional study was conducted from July 6-27, 2021 to determine influencing factors of vaccination uptake behavior among the elderly in Indonesia. An online survey was performed among Indonesian with inclusion criteria as follows: i) elderly aged 55 years old or based on the Indonesian Ministry of Labor regulation regarding the minimum age of retirement [44]; ii) were living in Indonesia from the first COVID-19 outbreak on March 2, 2020 until the survey was conducted; and iii) was able to fill in the online questionnaire or had someone to assist. The exclusion criterion was the elderly who unable to get vaccinated against COVID-19 due to medical reason. There were 213 respondents collected. The number of respondents was acceptable because it exceeds the requirement of the statistical analysis multiple regression analysis. The minimal sample required was five times the total 22 indicators, equal to 110 respondents [45].

### 2.2. Data collection and measurement

A self-administered constructed questionnaire was employed using Google Form. Anonymity was adopted to maintain the respondent's confidentiality due to health-related information questions. One account one input was set to avoid double participation. The questionnaire consisted of 29 questions divided into three chapters: i) the purpose of the study and informed consent, ii) seven questions of demographic characteristics, iii) the 22 questions related to the indicator to measure the variables. The indicators were adapted from previous studies to verify the content validity [46] through systematic literature review. The previous studies adapted to construct the indicator were published by reputable publisher within five years (2016-2021). The survey acquired a five-point Likert scale as shown in Table 1 (see Appendix). All respondents were invited to take the survey through social media platforms (Facebook, WhatsApp, and Instagram) to avoid direct contact due to social restrictions.

### 2.3. Statistical analysis

The analysis operation consists of three stages. The first stage was exploratory factor analysis to examine the validity and reliability of the measurement instrument using Kaiser-Meyer-Olkin (KMO) value, Bartlett's test of sphericity, loading factor value, and Cronbach's alpha. The second stage is the confirmatory factor analysis (CFA) to examine the relation among indicators and variables using several parameters such as p-value, minimum discrepancy per degree of freedom (CMIN/DIF), root-mean-square error of approximation (RMSEA), revelstoke mountain resort (RMR), comparative fit index (CFI), and Tucker-Lewis index (TLI). The third stage was structural equation modeling (SEM). SEM analysis has two objectives which are to test the fitness of the whole proposed model using path coefficient analysis and to observe the mediation effect for each variable using the Sobel test [53]. The Sobel test was calculated using the equation:

$$Z\text{-value} = a*b/\text{SQRT}(b^2*s_a^2 + a^2*s_b^2 + s_a^2*s_b^2)$$

where:

- $a$  = unstandardized regression coefficient for the association between variable 1 and mediator.
- $s_a$  = standard error of  $a$ .
- $b$  = unstandardized regression coefficient for the association between the mediator and variable 2
- $s_b$  = standard error of  $b$

This statistical analysis employed IBM SPSS version 26 to tabulate and analyze the data and analysis of a moment structures (AMOS) graphics version 24 to construct and test the model.

## 3. RESULTS

### 3.1. Demographic characteristics

The demographic characteristics show that the number of male and female participants is almost equaled. This research is dominated by 55-59 years old seniors who belong to middle-class employees and have a well-education background, as shown in Table 2. The situation was understandable since the data collection was conducted by online questionnaire through social media. The early elderly are more likely to access information through the internet and become familiar with gadgets than older groups. Most of the respondents are reported without any underlying medical condition because most of them belong to the youngest group of elderly who presumably have a better physical condition than the older group of elderly.

### 3.2. Exploratory factor analysis

Exploratory factor analysis as the validity and reliability tests is shown in Table 3, the KMO value for each variable was the threshold of 0.6, and the significance probability value was  $p=0.000$  ( $<0.05$ ), the

loading factor of each measurement was 0.05, and the Cronbach's alpha value was 0.6 [48]. Hence, the instrument was considered both valid and reliable.

Table 2. Demographic characteristics of the respondent

Characteristic	Frequency	Percentage
Gender		
Male	120	56
Female	93	44
Age		
55-59	128	60
60-64	55	26
65-70	15	7
70-75	6	3
76-80	6	3
≥81	3	1
Education level		
Not attending school	1	0.4
Middle school and bellow	15	7
High school	33	15.5
Diploma	6	2.8
Bachelor	87	41
Master	71	33.3
Religious		
Islam	166	78
Christian	17	7.9
Hinduism	29	13.6
Buddist	1	0.5
Marital status		
Single	2	1
Married	181	85
Other (divorce, widowed)	30	14
Employment status		
Employee	114	54
Self-employed	22	10
Retired	51	24
Unemployed	26	12
Family income		
≤ IDR 1,500,000	24	11
IDR 1,500,000-2,999,999	30	14
IDR 3,000,000-4,999,999	59	28
IDR 5,000,000-10,000,000	72	34
≥IDR 10,000,000	28	13
Comorbidity		
None	184	86
Hypertension	12	6
Diabetes	8	4
Cardiovascular disease	5	2
Other	4	2

Table 3. Validity and reliability test result

Variable	Code	KMO	Bartlett's test (sig.)	Loading factor	$\alpha$
Health belief model	<i>HBM2</i>	0.699	0.000	0.740	0.757
	<i>HBM3</i>			0.828	
	<i>HBM4</i>			0.833	
Trust in health authority and information	<i>THA1</i>	0.871	0.000	0.882	0.910
	<i>THA2</i>			0.916	
	<i>THA3</i>			0.851	
	<i>THA4</i>			0.901	
	<i>THA5</i>			0.741	
COVID-19 experience	<i>CE2</i>	0.627	0.000	0.884	0.765
	<i>CE3</i>			0.781	
General vaccination behavior	<i>GVB1</i>	0.612	0.000	0.823	0.755
	<i>GVB3</i>			0.798	
Health protocols compliance	<i>HPC1</i>	0.754	0.000	0.738	0.819
	<i>HPC2</i>			0.813	
	<i>HPC3</i>			0.836	
	<i>HPC5</i>			0.795	
COVID-19 vaccination uptake behavior	<i>CVB1</i>	0.716	0.000	0.888	0.732
	<i>CVB2</i>			0.888	

### 3.3. Confirmatory factor analysis (CFA)

The initial model was developed using the measurement established in Table 1. The confirmatory factor analysis (CFA) was carried out to examine the fitness of the model. The measurement values the threshold were eliminated to accomplish model fitness. The deleted measurements were THA1, THA2, THA4, and HPC2. Table 4 displays the result of the fitness test before and after the CFA test was conducted. All the indexes meet the requirement indicating that the model was a good fit.

Table 4. Statistical value of fitting degree index

Indices	Recommendation	Initial model	Final model
P value	≥0.05	0.00	0.132
CMIN/DIF	<3	3.529	1.204
RMSEA	<0.08	0.109	0.031
RMR	<0.08	0.176	0.044
CFI	>0.90	0.753	0.986
TLI	>0.90	0.714	0.979

### 3.4. Structural equation modeling (SEM)

According to the assumed measurement significance of the initial model, some paths in the model were eliminated appropriately, and then the modified model was verified and analyzed. A model modification index is often used to simplify the SEM and improve the model's fitting index [48]. According to the model modification index of AMOS, covariance was added to the error variables, and causality was eliminated from the latent variables on the premise of ensuring that the correlation between the modified "construction waste quantified variables" conformed to the theoretical hypothesis. The model was modified by adding correlation coefficients between e2 and e13. The modification was applied without violating the hypothetical assumption.

Table 5 shows the result of the path coefficients analysis of each variable. H1, H2, H3, H4, H7, H9 were accepted. Therefore, the health belief model, trust in media and authorities, and general vaccination behaviour significantly affect health protocol compliance. The trust in media and authorities variable has the strongest effect on health protocol compliance. The health belief model, trust in media authorities, and health protocol compliance significantly affect the COVID-19 vaccination uptake behaviour. The trust in media and authorities variable has the strongest effect on COVID-19 vaccination behaviour. COVID-19 experience did not have a significant impact on both health protocol compliance and COVID-19 vaccination uptake. General vaccination behaviour did not significantly affect COVID-19 vaccination uptake. The regression models squared multiple correlations (R<sup>2</sup>) were 0.810 indicates the variables explained 81% variance of the independent variable.

The significant value of indirect effect for each exogenous variable to COVID-19 vaccination uptake was determined using the Sobel test [54]. The critical value of significance level 0.05 is between ±1.96 of the Sobel test ratio. Table 6 reveals the result of the indirect effect of exogenous variables on COVID-19 vaccination uptake behavior. The general vaccination behaviour significantly affects the COVID-19 vaccination uptake through health protocol compliance as a mediator, in a negative manner. COVID-19 experience did not have a significant effect on COVID-19 vaccination uptake behaviour, both direct and indirect. The health belief model and trust in media and authorities have a stronger direct effect compared to the indirect effect score.

Table 5. Summary of path coefficients of COVID-19 vaccination uptake model

Hypothesis path		Standardize estimate (β)	Squared error	Critical ratio	p-value	Result
Health protocol compliance ← (HBM)	H1	0.296	0.109	4.022	***	Accepted
COVID-19 vaccination uptake ← (HBM)	H2	0.699	0.326	2.309	***	Accepted
Health protocol compliance ← Trust in media and authorities	H3	0.524	0.084	3.006	***	Accepted
COVID-19 vaccination uptake ← Trust in media and authorities	H4	0.933	0.071	14.464	***	Accepted
Health protocol compliance ← COVID-19 experiences	H5	0.017	0.004	0.280	0.780	Rejected
COVID-19 vaccination uptake ← COVID-19 experiences	H6	0.029	0.012	0.287	0.774	Rejected
Health protocol compliance ← General vaccination behaviour	H7	0.319	0.159	3.573	***	Accepted
COVID-19 vaccination uptake ← General vaccination behaviour	H8	-0.254	1.635	-1.224	0.221	Rejected
COVID-19 vaccination uptake ← Health protocol compliance	H9	0.406	0.251	3.206	***	Accepted

\*\*\* indicates the p-value ≤ 0.05

Table 6. Summary of the indirect effect of each exogenous variable on convention and visitor bureau (CVB)

Path	Indirect effect	Sobel test	Result
HBM → HPC → CVB	0.330	2.510	Significant
THA → HPC → CVB	0.259	2.192	Significant
CE → HPC → CVB	0.000	0.249	Unsignificant
GVB → HPC → CVB	-1.135	2.386	Significant

#### 4. DISCUSSION

To date, the COVID-19 global pandemic is a problem that has not been solved completely. Health protocol and COVID-19 vaccination are the strategies to flatten the curve. The research that explored the COVID-19 vaccination as the action or behavior is limited. Furthermore, the examination of health protocol compliance as a driving factor of COVID-19 vaccination is unavailable. Therefore, this study was conducted by involving the effect of five variables, i.e., health belief model; trust in media and health authorities, COVID-19 experience, general vaccination behaviour, and health protocol compliance to COVID-19 vaccination uptake behaviour

The first finding shows HBM significantly affects both health protocol compliance and COVID-19 vaccination uptake. People who perceive COVID-19 as a severe disease, risk of getting infected, and believe that vaccination effectively decreases the severity will comply with the health protocol and take COVID-19 vaccination to protect themselves from getting contracted. Empirically, this finding aligns with the theory that HBM significantly affects protective behaviour to avoid sickness [23], [55]. In the COVID-19 vaccination context, the finding supports the earlier studies that HBM theory is significantly associated with COVID-19 vaccination intention [24], [35], [52]. Thus, this research has expanded the HBM theory's scope to significantly affect the compliance of COVID-19 health protocol and COVID-19 vaccination uptake behaviour.

Trust in media and health authorities significantly affects both health protocol compliance and COVID-19 vaccination uptake behaviour. This variable becomes the strongest driver for health protocol compliance and COVID-19 vaccination uptake. Health protocol is a health-related program created by the government to decline the curve of the COVID-19 case. Individuals who trust the government and health authorities will instantly obey the rule and follow the advice given by the government. The finding was harmonized with previous studies that found trust in health authorities and government will increase the willingness to comply with health protocol and the vaccination program [37], [56]. Media plays an important role in promoting the practice of health protocol and the vaccination program. People who trust media and consider COVID-19 information important will comply with health protocol and vaccination against COVID-19. This finding supports earlier research discovering the trust in media and information associated with COVID-19 vaccination intention [8], [35], [36].

COVID-19 experience was found to have no significant effect both on health protocol compliance and COVID-19 vaccination uptake. Respondents were dominated by the elderly who have never been infected with COVID-19, while the person who contracted COVID-19 was not someone they were close to. The same situation was found in the research among France respondents who observed no difference between the person diagnosed with COVID-19 and the person who has never experienced COVID-19 infection [48], [56].

General vaccination behaviour negatively affects health protocol compliance and indirectly negatively affects COVID-19 vaccination uptake through health protocol compliance as a moderator. This finding shows that people who take general vaccination avoid taking COVID-19 vaccination. The observation aligned with research conducted in Belgium that found people are favorable to take the general vaccination but reject to get vaccinated against COVID-19 [48]. People with routine vaccination intake were probably hesitant to take COVID-19 vaccination due to the lack of scientific information about vaccination efficacy. It has been a while since the first COVID-19 vaccination rolled out. However, the effectiveness of the vaccination for the long term is still waiting for further study.

Health protocol compliance significantly affects the COVID-19 vaccination uptake behaviour. The health protocol is considered as preventive behaviour against COVID-19. The person who has social norms of COVID-19 preventive behaviour is more likely to have the social norm of taking COVID-19 vaccination. The decision to comply with the health protocol was generated from the awareness of COVID-19 severity and the risk of getting infected. The availability of COVID-19 vaccination will provide more protection for those who have already performed the health protocol. Thus, the person who complies with health protocol as the preventive behaviour of COVID-19 infection will take COVID-19 vaccination simultaneously. The finding is in line with the earlier research among American citizens. It found the low social norm of preventive behaviour associated with the low intention for taking COVID-19 vaccination [53].

## 5. CONCLUSION

This study concluded that the trust in media and health authorities and the health belief model as the strong driving factors of health protocol compliance and COVID-19 vaccination uptake behaviour. Hence, the government should tailor the specific strategies to increase the trust of the elderly in the government and COVID-19 information. This action would increase the knowledge regarding COVID-19 and the importance of COVID-19 to improve the vaccination coverage among the Indonesian elderly.

This research is subjected to limitations. First, although the number of respondents has already complied with statistical measurement, the sample has not represented the population of Indonesian elderly. The future study should be carried out with a larger sample to represent the population better. Second, the study only captures limited variables that affecting the COVID-19 uptake. The future study should expand the variable observation to other dimensions to find the broader model of vaccination uptake behaviour. Despite the limitation, this study provides new insight into the possible scope of future studies and scientific findings as COVID-19 vaccination-related decision-making recommendations to the stakeholder.

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## APPENDIX

Table 1. Variable and measurement

Variable	Measurement	Scale	Adapted from
Health belief model	COVID-19 causes severe ill		[31], [34],
	I am at risk of being infected with COVID-19	Strongly disagree (1)	[41], [47], [48]
	COVID-19 vaccination protects against the COVID-19 severity	Strongly agree (5)	
Trust in health authority and information	I am concern of COVID-19 vaccination side effect		
	I have trust in the government		[8], [34]–[36]
	The local government has responded effectively to the COVID-19 pandemic		
	The healthcare provider will respond fairly to the health needs regardless of race, ethnicity, demographic characteristics	Strongly disagree (1)	
COVID-19 experience	The media has provided honest information/been transparent about the COVID-19 pandemic to the public		
	COVID-19 information and news are trustworthy		
	I had contracted COVID-19	Never (1); Uncertain (2); Have symptoms but not confirmed with a test (3); Asymptomatic but confirmed positive (4); Have symptoms and confirmed positive (5)	[26], [31], [48]
	Someone I know has a severe condition due to COVID-19	No one (1); Uncertain (2);	
	Someone I know has died due to COVID-19	Yes, but not my circle (3); Yes, my friend and relatives (4); Yes, my family member (5)	

Table 1. Variable and measurement (*Continue*)

Variable	Measurement	Scale	Adapted from
General vaccination behavior	I support the general vaccination program	Strongly disagree (1) Strongly agree (5)	[42], [43], [49]
	Have you got a vaccination before?	Never (1);	
Health protocols compliance	Have you got your children taking vaccination before?	Uncertain (2); Yes, once (3); Yes, I completed the mandatory vaccination (4); Yes, I completed both the mandatory and recommended one (5)	[50]
	I wash my hand properly		
	I wear a mask correctly when I am going out		
	I manage social distancing when I am going out	Strongly disagree (1) Strongly agree (5)	
COVID-19 vaccination uptake behavior	I avoid the crowd when I am going out		[42], [51], [52]
	I only leave my house for the essential reason (work, health, grocery)		
COVID-19 vaccination uptake behavior	Have you got the COVID-19 vaccination?	Never (1); Hesitate (2); I have a plan (3); Yes, the first dose (4); Yes, complete vaccination (5)	[42], [51], [52]
	Have you encouraged your family and relatives to get the COVID-19 vaccination?	Never (1); Hesitate (2); Yes, once (3); Yes, sometimes (4); Yes, always (5)	