

Short Communication

Acceptance and willingness to purchase a hypothetical COVID-19 vaccine in a region under Shariah law: A cross-sectional study in Aceh, Indonesia

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Abstract

Vaccines are urgently needed to control the coronavirus disease 2019 (COVID-19) pandemic. The aim of this study was to determine the acceptance of and willingness to purchase a hypothetical COVID-19 vaccine in the general population of Aceh, a holistic Shariah law implementation province in Indonesia. An online cross-sectional study was conducted using a quota sampling technique between 1 to 24 September 2021. To determine hypothetical vaccine acceptance, respondents were asked if they were willing to accept vaccines with combinations of either 50% or 95% effectiveness and either 5% or 20% risk of adverse effects. Willingness to purchase was assessed by asking whether the participants would pay for such vaccines at certain price points. Logistic regression analysis was used to assess the associated determinants. Out of 377 respondents included in the final analysis, 86.5% were willing to accept a COVID-19 vaccine with 95% effectiveness and 5% adverse effects. The acceptance rate dropped to 45.1% if the risk of adverse effects was 20%. Vaccines with 50% effectiveness and 5% adverse effects were acceptable to 42.2% but the acceptance went down to 17.2% if the risk of adverse effects increased to 20%. Multivariate analysis found that men were twice as likely to accept a vaccine with 95% effectiveness and 5% adverse effects compared to females (aOR: 2.01; 95% CI 1.05–3.86). We found that 156/377 (41.3%) of respondents were willing to purchase a COVID-19 vaccine and of these participants 71.1% were willing to pay between



Indonesian Rupiah (IDR) 50,000–150,000 (US\$ 3.33–10.00). In conclusion, the acceptance rate of a hypothetical COVID-19 vaccine varied based on effectiveness and the risk of adverse effects.

Keywords: Acceptance, vaccine, COVID-19, Syariah law, willingness to purchase

Introduction

The World Health Organization (WHO) declared the outbreak of coronavirus disease 2019 (COVID-19) a pandemic in March 2020 [1]. The virus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is transmitted mainly by droplets and direct contact [2]. Vaccines are essential to achieve sufficient herd immunity against the SARS-CoV-2 infection in order to control the COVID-19 pandemic [3,4].

Vaccine acceptance is a complex process [5]; a recent study found age, sex, education level, and ethnicity to be associated with people's acceptance of a COVID-19 vaccine [6]. In Saudi Arabia, only 64.7% of surveyed individuals were interested in receiving a COVID-19 vaccine [7]. Another study found that the acceptance rate in healthcare workers was higher compared to non-healthcare workers [8]. In Indonesia, the acceptance rate for a COVID-19 vaccine with 95% effectiveness was 93.3%, but this figure decreased to 67.0% if the vaccine had 50% effectiveness [9]. In Aceh, a province in Indonesia that implements a holistic Shariah law, a survey conducted by the Indonesian Ministry of Health and the National Immunization Expert Advisory Committee (ITAGI), found that the acceptance rate was only 46%, making it the lowest compared to other provinces [10].

Several paradigms were identified as factors determining the acceptance of COVID-19 vaccines, including public perception of affordability and efficacy [11]. In the elderly, the main factors that influence vaccination choice were the underlying risk of developing the infectious diseases, including the risk of subsequent dying, and the effectiveness of the vaccine [12]. The willingness to purchase a vaccine among general population is also important [13]. Whilst an Indonesian study showed that 78.3% of the respondents were willing to buy a COVID-19 vaccine [14], there is no data on the acceptance or willingness to purchase COVID-19 vaccines in Aceh, which is the only Indonesian province that implements the holistic Shariah law. Religious reasons underpinning vaccine hesitancy have been identified for decades, particular in Muslims. The aim of this study was to evaluate the acceptance of and willingness to purchase a COVID-19 vaccine within the Acehnese community.

Methods

Study design and setting

An online cross-sectional study among the Acehnese general population was conducted from 1 to 24 September, 2021. The data collection used a pre-validated questionnaire [15]. An online survey was prepared using Google Forms and the link was distributed via WhatsApp Messenger. Acehnese people aged ≥ 20 years and able to read the Indonesian text were eligible for the study. The minimum sample size was calculated to be 377, based on a 5% margin of error and 95% confidence level.

Study variables

Response variables

To evaluate acceptance, respondents were asked their acceptance under different hypothetical effectiveness rates and risk of adverse effects: (i) 95% effectiveness with 5% chance of any adverse effects; (ii) 95% effectiveness with 20% chance of adverse effects; (iii) 50% effectiveness with 5% chance of adverse effects; and (iv) 50% effectiveness with 20% chance of adverse effects. To assess the willingness to purchase, respondents were asked whether they were willing to purchase a COVID-19 vaccine that had 95% effectiveness and 5% chance of adverse effects; those that were willing to purchase such a vaccine were then further asked which price range they would be willing

to pay: in Indonesian Rupiah (IRD) (i) 50,000–150,000, (ii) 151,000–300,000, (iii) 301,000–600,000 or (iv) >600,000.

Explanatory variables

Explanatory variables included were sex, educational attainment, type of job, and monthly income. Educational attainment was divided into basic (equal or less than junior high school), intermediate (senior high school) and advanced (university graduate). The type of job was divided into company or private employee, civil servant, student, retiree and unemployed. The monthly income was divided into three groups: no regular income, below the monthly provincial minimum wage (PMW) or more than the PMW; Aceh PMW being IDR 3,165,030 (USD 212).

Statistical analysis

Logistic regression model was used to identify the determinants of COVID-19 vaccine acceptance of and willingness to purchase. The analysis was conducted for all type of combinations of vaccine effectiveness and chance of adverse effects. All the variables with $p \leq 0.25$ in univariate analysis were included in the adjusted analysis. The crude odds ratio (OR) and adjusted OR (aOR) were assessed in the univariate and multivariate analysis, respectively. All analyses were performed using SPSS software version 22.

Results

A total of 431 Acehnese general population was surveyed; 54 respondents were excluded as they did not meet the inclusion criteria, leaving 377 respondents for final analysis. Almost two-thirds of the respondents were female (65.3%); 46.9% and 51.0% of respondents had intermediate and advanced education, respectively (**Table 1**). Out of the total participants, 17.0% were company and private employees and 12.7% civil servants. Only 22.3% of respondents had monthly income higher than PMW of Aceh province (IDR 3,165,030).

Table 1. Characteristics of respondents (n=377)

Characteristics of respondents	Frequency (n)	Percentage (%)
Sex		
Male	131	34.7
Female	246	65.3
Age group (year), mean ± standard deviation	23±11.45	
Educational attainment		
Basic	8	2.1
Intermediate	177	46.9
Advanced	192	51.0
Type of job		
Company and private employee	64	17.0
Civil servant	48	12.7
Student	233	61.8
Retiree	9	2.4
Unemployed	23	6.1
Income		
No regular income	237	62.9
Below the provincial minimum wage	56	14.8
Equal or higher than the provincial minimum wage	84	22.3

Most of the respondents (326/377, 86.5%) were willing to receive a vaccine with 95% effectiveness and 5% chance of adverse effects; the acceptance rate decreased to 45.1% for a vaccine with 95% effectiveness and 20% chance adverse effects (**Table 2**). Only 42.2% (159/377) and 17.2% (65/377) of respondents were willing to accept a vaccine with 50% effectiveness and 5% chance of adverse effects and 50% effectiveness with 20% chance of adverse effects, respectively.

Our multivariate logistics regression found that only sex was significantly associated with the acceptance of a hypothetical COVID-19 vaccine with 95% effectiveness and 5% chance of adverse effects (**Table 2**). Our results indicated that the acceptance of such vaccine in males was double that of female respondents (aOR: 2.01; 95% CI; 1.05–3.86).

Table 2. Multivariate logistic regression analysis showing the factors associated with acceptance of hypothetical COVID-19 vaccines with different effectiveness and chance of adverse effects

Variable	95% effectiveness with 5% chance of adverse effects			95% effectiveness with 20% chance of adverse effects			50% effectiveness with 5% chance of adverse effects			50% effectiveness with 20% chance of adverse effects		
	Acceptance n (%)	Adjusted OR (95% CI)	p-value	Acceptance n (%)	Adjusted OR (95% CI)	p-value	Acceptance n (%)	Adjusted OR (95% CI)	p-value	Acceptance n (%)	Adjusted OR (95% CI)	p-value
Acceptance rate	326 (86.5)			170 (45.1)			159 (42.2)			65 (17.2)		
Sex												
Female (R)	221 (89.8)	1		109 (44.3)			111 (45.1)	1		39 (15.9)		
Male	105 (80.1)	2.01 (1.05-3.86)	0.036	61 (46.6)			48 (36.6)	1.39 (0.87-2.21)	0.164	26 (19.8)		
Educational attainment												
Basic (R)	3 (37.5)	1		3 (37.5)			3 (37.5)			3 (37.5)	1	
Intermediate	169 (95.5)	0.23 (0.05-1.18)	0.078	84 (47.5)			79 (44.6)			37 (20.9)	3.46 (0.75-16.09)	0.113
Advanced	162 (84.4)	1.69 (0.82-3.45)	0.153	82 (42.7)			77 (40.1)			25 (13.0)	1.67 (0.91-3.08)	0.101
Type of job												
Civil servant (R)	43 (89.6)	1		21 (43.8)	1		20 (41.7)	1		6 (12.5)		
Employee	49 (76.6)	2.42 (0.51-11.56)	0.267	30 (46.9)	1.78 (0.62-5.11)	0.285	25 (39.1)	1.57 (0.44-5.57)	0.488	12 (18.8)		
Student	211 (90.6)	1.36 (0.39-4.78)	0.629	109 (46.8)	2.01 (0.73-5.56)	0.175	105 (45.1)	1.60 (0.50-5.09)	0.424	43 (18.5)		
Retiree	7 (77.8)	2.60 (0.75-9.02)	0.132	2 (22.2)	2.01 (0.80-5.07)	0.139	2 (22.2)	1.24 (0.40-3.86)	0.711	1 (11.1)		
Unemployed	16 (69.6)	1.10 (0.15-8.40)	0.920	7 (30.4)	0.65 (0.11-3.97)	0.644	7 (30.4)	0.89 (0.11-7.13)	0.914	3 (13.0)		
Income												
No regular income (R)	212 (89.5)	1		107 (45.1)			107 (45.1)	1		44 (18.6)	1	
<PMW	42 (75.0)	0.69 (0.18-2.70)	0.592	26 (46.4)			17 (30.4)	0.85 (0.28-2.53)	0.765	11 (19.6)	1.28 (0.57-2.86)	0.548
≥PMW	72 (85.7)	0.58 (0.21-1.65)	0.308	36 (42.9)			35 (41.7)	0.47 (0.12-1.12)	0.088	10 (11.9)	1.47 (0.56-3.89)	0.435

CI: confidence interval; OR: odds ratio; PMW: provincial minimum wage; R: reference

Only 156/377 (41.3%) of respondents were willing to purchase a COVID-19 vaccine (**Table 3**). Among these, the majority (111/154, 71.1%) were willing to pay within the range of IDR 50,000 to IDR 150,000 (**Table 3**). None of the assessed determinants (age, sex, educational attainment, occupation, and monthly income) had a significant association with the willingness to purchase a COVID-19 vaccine (**Table 4**).

Table 3. Willingness to purchase and price range preference for a hypothetical COVID-19 vaccine with 95% effectiveness and 5% chance of adverse effects (IDR 15,000 = US\$1.00)

	Frequency (n)	Percentage (%)
Willingness to purchase		
Yes	156	41.3
No	221	58.7
Price range preference (IDR)		
50,000–150,000	111	71.1
151,000–300,000	33	21.2
301,000–600,000	10	6.4
>600,000	2	1.3

Table 4. Logistics regression analysis showing the factors associated with willingness to purchase a hypothetical COVID-19 vaccine with 95% effectiveness and 5% chance of adverse effects

Variable	n (%)	Willing n (%)	Unadjusted		Adjusted	
			OR (95% CI)	p-value	OR (95% CI)	p-value
Sex						
Female (<i>R</i>)	246 (65.3)	109 (44.3)	1		1	
Male	131 (34.1)	47 (35.9)	1.42 (0.92-2.20)	0.114	1.43 (0.90-2.28)	0.132
Educational attainment						
Basic (<i>R</i>)	8 (2.1)	2 (25)	1			
Intermediate	177 (46.9)	69 (39.0)	0.42 (0.08-2.13)	0.295		
Advanced	192 (51.0)	85 (44.3)	0.80 (0.53-1.22)	0.304		
Type of job						
Civil servant (<i>R</i>)	48 (12.7)	24 (50)	1		1	
Employee	64 (17.0)	21 (32.8)	2.83 (0.95-8.42)	0.061	1.80 (0.51-6.37)	0.361
Student	233 (61.8)	101 (43.3)	1.38 (0.48-4.02)	0.551	1.24 (0.39-3.94)	0.718
Retiree	9 (2.4)	4 (44.4)	2.17 (0.83-5.70)	0.116	2.65 (0.91-7.66)	0.073
Unemployed	23 (6.1)	5 (21.7)	2.27 (0.45-11.35)	0.319	1.55 (0.28-8.75)	0.619
Income						
No regular income (<i>R</i>)	237 (62.9)	99 (41.8)	1		1	
<PMW	56 (14.8)	18 (32.1)	0.83 (0.50-1.37)	0.459	0.46 (0.16-1.36)	0.160
≥PMW	84 (22.3)	39 (46.4)	0.55 (0.27-1.11)	0.093	0.55 (0.24-1.26)	0.154

CI: confidence interval; OR: odds ratio; PMW: provincial minimum wage; R: reference

Discussion

Our results show that the acceptance rate of a hypothetical COVID-19 vaccine in the Acehese community would be high for a vaccine with high effectiveness and limited chance of adverse effects. This is in line with the findings of previous studies, indicating that the higher the effectiveness of a vaccine, the higher its acceptance rate within a community [8,14]. Vaccines with fewer adverse effects also had a higher acceptance rate than vaccines with higher chance of adverse effects. In fact, the adverse effects of vaccines have been considered the main reason for vaccine hesitancy among the general population [15].

However, almost 60% of our respondents were unwilling to purchase a COVID-19 vaccine, and those who were willing to purchase would only spend a relatively low amount. This is in line with a survey that found a majority of people will choose a low vaccine price [9]. The lower the cost of a COVID-19 vaccine, the more willing respondents were to be vaccinated [16,17].

In our survey, men were twice more likely to accept a COVID-19 vaccine with 95% effectiveness and 5% adverse effects, compared to females. Previous studies also showed that sex is a factor that significantly affects the acceptance of COVID-19 vaccines [18,19-22]. For instance, a study among healthcare workers in France found that males were almost twice more likely to

accept vaccination compared to females [22]. Another study also found that sex was the only factor significantly associated with the willingness to get vaccinated among the general population in Malaysia [20].

Interestingly, the acceptance rate decreased to only 45.1% for a hypothetical vaccine that had high effectiveness (95%) but with a higher risk of adverse effects (20%). A previous study revealed that public distrust of vaccine safety is one of the main factors for vaccine hesitancy with the acceptance falling with greater potential of adverse effects [23]. Another study reported that three quarters of the total respondents stated that fear of adverse effects was the most prominent reason in rejecting a COVID-19 vaccine [24]. Obviously, vaccines with fewer adverse effects are preferred by the public [25].

Our study found that age, sex, educational history, occupation, and income had no significant influence on the willingness to purchase a hypothetical COVID-19 vaccine among the Acehnese (**Table 4**). This is in line with the finding of a previous study also conducted in Indonesia [14], while another study found that only age and sex had no effect on the willingness to pay for vaccines [20]. However, there was a study reported that age, sex, education, occupation, and income were related to the willingness to pay for vaccines [26]. Various factors, such as difference in the number of samples, distribution of respondents and different ways of classifying the assessed factors might have contributed to these differences.

Conclusions

Acceptance of a hypothetical COVID-19 vaccine in the Acehnese community depends on the effectiveness and the chance of adverse effects. Vaccines with the highest effectiveness and the lowest chance of adverse effects were acceptable to 86.5% of the respondents. However, only 41.3% of the respondents were willing to purchase a COVID-19 vaccine, with the preferred price ranging from IDR 50,000–150,000 (US\$ 3.3–10.0). Sex has a significant effect on acceptance, but not on the willingness to purchase a COVID-19 vaccine among the Acehnese population.

Ethics approval

The protocol of this study was approved by the Institutional Review Board of the School of Medicine, Universitas Syiah Kuala, Banda Aceh, Indonesia (129/EA/FK-RSUDZA/2021).

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Conflict of interest

All the authors declare that there are no conflicts of interest.

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Underlying data

All data underlying the results are available as part of the article and no additional source data are required.

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