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Short Communication

Acceptance for a booster dose of COVID-19 vaccine in Indonesia: A follow-up study

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Abstract

The coronavirus disease 2019 (COVID-19) vaccination program in Indonesia has been implemented as a key strategy to mitigate the spread of the virus within communities. The success of this program depends on public acceptance of COVID-19 vaccines, including booster doses. The aim of this study was to assess the acceptance of the COVID-19 booster dose in Indonesia and to identify factors influencing individuals' acceptance. A cross-sectional study was conducted across 34 provinces in Indonesia in June 2023. Logistic regression analysis was used to identify the factors associated with booster dose uptake. The findings revealed that 88.8% (2,049/2,308) of respondents were willing to receive a booster dose if provided free of charge by the Indonesian government. However, acceptance decreased to 61.7% when respondents were informed of a 20% likelihood of side effects, even with a reported 95% vaccine efficacy. Adjusted logistic regression analysis identified ten significant factors associated with booster dose acceptance: sex, age, religion, history of previous COVID-19 infection, type of primary vaccine received, belief in vaccine-related conspiracy theories, trust in traditional medicine conspiracies, confidence in natural immunity, perceived vaccine efficacy, and perceived vaccine effectiveness. These findings suggest that acceptance of COVID-19 booster doses in Indonesia is influenced by intrinsic and extrinsic factors, including limited knowledge of booster dose benefits and concerns about potential side effects. To enhance public acceptance, targeted health campaigns and educational initiatives should be intensified, emphasizing the safety, efficacy, and importance of booster vaccinations in controlling the COVID-19 pandemic.

Keywords: COVID-19, vaccine, acceptance, booster dose, Indonesia

Introduction

Coronavirus disease 2019 (COVID-19) pandemic, caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), remains a significant global public health threat. The emergence of new SARS-CoV-2 variants underscores the need to strengthen vaccination efforts, particularly to

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protect vulnerable populations [1-3]. The protective effect of vaccination typically increases following vaccination, but it gradually declines over time [4]. For instance, five or more months after completing the primary vaccination series, protection against infection decreases from 83% in the first month to 22% [4]. Breakthrough infections are highly possible after the first and second doses, underscoring the need for additional booster doses to maintain immunity and sustain long-term protection.

The World Health Organization (WHO) has identified vaccine hesitancy as one of the top ten global health concerns [5]. A previous study in Indonesia have shown that vaccine acceptance is influenced by perceived vaccine effectiveness [6]. Another study found that 63.5% of vaccination uptake in Indonesia was influenced by demographic factors such as age, marital status, religion, and monthly income [7]. The success of the COVID-19 booster dose strategy depends on public willingness to receive it [8,9]. Individuals' perceptions and attitudes toward booster doses significantly impact community-wide vaccine acceptance [8,9]. A critical or skeptical attitude toward vaccination may contribute to vaccine reluctance, further complicating efforts to increase coverage [10-15]. Given that booster dose coverage remains low in Indonesia, it is essential to understand the underlying factors influencing vaccine acceptance to develop effective strategies for increasing uptake. To enhance uptake, it is essential to develop scientifically grounded approaches and policy interventions. Additionally, understanding the determinants of vaccine hesitancy is crucial for formulating effective, evidence-based strategies to increase acceptance. Our previous study indicated that in 2022, Indonesians had a stronger preference for free COVID-19 booster doses compared to paid options [6]. The aim of this study was to assess the changes in public acceptance of the COVID-19 booster doses from 2022 to 2023, providing insights into shifting vaccination trends and informing future immunization policies.

Methods

Study design and setting

An online cross-sectional study was conducted in Indonesia, and the survey links were distributed throughout Indonesia to measure the public acceptance of COVID-19 booster vaccinations. The target criteria for participants were Indonesian citizens older than 18 years old with internet access. Several communication platforms were used to send invitations to participate in the study, with a link to a 15-minute survey utilizing the SurveyMonkey platform. All survey participants were required to provide their informed consent before participating.

Study variables and study instrument

The structured online questionnaire was designed based on a previous study on vaccine acceptance [7]. The information collected included demographic data (age, sex, marital status, educational attainment, religion, occupation, and monthly income), knowledge and awareness of COVID-19 booster doses, perceptions of the safety and effectiveness of the COVID-19 vaccine, perceived severity of SARS-CoV-2 infection, perceived benefits and potential barriers to receiving the COVID-19 booster dose, and acceptance of booster dose.

Acceptance of a COVID-19 booster dose served as the dependent variable in this study. To assess willingness, respondents were asked whether they would accept a free COVID-19 booster dose provided by the government without prior information on its efficacy or safety. Additionally, participants were presented with scenarios involving different vaccine efficacy levels (95%, 75%, and 50%) and varying probabilities of side effects, such as mild or localized pain (5% or 20%), to evaluate the influence of vaccine profiles on acceptance.

The survey consisted of multiple question sets. The first section gathered demographic information, the second section assessed respondents' knowledge and awareness of COVID-19 booster doses, including their understanding of vaccine sources. The third section focused on participants' perceptions of booster doses through four key questions: (1) concerns about side effects or allergic reactions; (2) perceived necessity of booster doses; (3) perceived effectiveness in preventing COVID-19; and (4) perceived safety of booster doses. Responses were recorded on a Likert scale, where "strongly agree" and "strongly disagree" were assigned a score of one, while "neither agree nor disagree," "disagree," and "strongly disagree" were assigned a score of zero.

Additionally, respondents were asked about their reasons for receiving a booster dose. The final section of the survey examined factors influencing participants' decisions to accept or reject the COVID-19 booster dose. To gain further insights into vaccine acceptance and hesitancy, respondents were allowed to select multiple reasons or contributing factors that influenced their decision-making process.

Data collection procedure

Data was collected from June 1 to June 25, 2023. A total of 21 enumerators were recruited to facilitate data collection across major islands in Indonesia. The survey was disseminated through various social media platforms, including Line, WhatsApp, Telegram, Messenger, Facebook, Instagram, and Twitter. Respondents voluntarily provided informed consent before participating in the study. The first page of the questionnaire included an option for participants to click "Agree" to indicate their willingness to proceed with the survey. The response was automatically recorded, even if the survey was complete. To ensure anonymity and confidentiality, no personally identifiable information was collected. Additionally, participants were not offered any compensation for their participation.

Data analysis

Categorical data were summarized using frequencies and percentages for each variable, while descriptive statistics for variables were presented as means and standard deviations (mean±SD). A logistic regression model was employed to evaluate the factors associated with vaccine acceptance; a method commonly used in a previous study [11]. In this study, a two-step logistic regression approach was utilized to identify the factors influencing the acceptance of the COVID-19 booster dose. First, the crude odds ratio (OR) and 95% confidence interval (CI) were calculated for each independent variable. All factors that were statistically significant ($p<0.05$) were subsequently included in the unadjusted logistic regression analysis. The final output provided the adjusted odds ratio (aOR) for each significant factor. All analyses were conducted using Statistical Package for the Social Sciences (SPSS) version 20 (IBM, New York, USA).

Results

Sociodemographic and characteristics of respondents

A total of 3,254 respondents participated in this study, of which 946 were excluded due to incomplete responses. Ultimately, 2,308 respondents remained, of which 75.3% (1,737/2,308) were female, 48.3% were between the ages of 21 and 30, and 79.2% were single (**Table 1**). More than half of the respondents (57.5%; 1,327/2,308) had completed higher education, while 6.4% held postgraduate or doctoral degrees. Approximately 26.5% of respondents were wage workers, and 85.7% identified as Muslim. Additionally, 1,853 (80.3%) respondents reported a monthly income of three million Indonesian Rupiah (equivalent to 200.9 USD) (**Table 1**).

Table 1. Demographic characteristics of the participants (n=2,308)

Characteristic	Number	Percentage
Sex		
Male	571	24.7
Female	1737	75.3
Age (year)		
≤20	794	34.4
21–30	1,114	48.3
31–40	220	9.5
41–50	112	4.9
51–>60	68	2.9
Marital status		
Single	1,829	79.2
Married	456	19.8
Divorce or widow	23	1.0
Education		
Elementary to Senior High School	981	42.5
Diploma	1,179	51.1
Undergraduate/graduated	148	6.4

Characteristic	Number	Percentage
Religion		
Islam	1,978	85.7
Christian (Protestant or Catholic)	280	12.1
Others (Hindu/Buddha/Atheist/Agnostic/Confucian)	50	2.2
Occupation		
Self-employed or homemaker	93	4.0
Employed for wages	612	26.5
Student/retired/unable to work/others	16,03	69.5
Monthly household income (Indonesian Rupiah)		
<3 million	1,853	80.3
3–5 million	206	8.9
5–10 million	196	8.5
>10 million	53	2.3

COVID-19 booster dose acceptance rates

Approximately 88.8% of respondents indicated their acceptance to receive a booster dose if it was fully provided by the Indonesian government without any disclosure regarding its effectiveness or safety (**Table 2**). If the booster dose was 75% effective with a 5% probability of side effects, approximately 80% of respondents were willing to be vaccinated. However, when vaccine efficacy increased to 95%, but the likelihood of side effects rose to 20%, the acceptance rate declined to 61.7%. Furthermore, when the vaccine was reported to be 75% effective in preventing SARS-CoV-2 infection but carried a 20% risk of side effects, only 43.6% of participants expressed willingness to receive the booster dose (**Table 2**).

Table 2. Acceptance rate for a booster dose of COVID-19 vaccine in Indonesia with various efficacies and safeties (n=2,308)

Acceptance based on COVID-19 vaccine profile	Acceptance	
	Number	Percentage
COVID-19 vaccine is provided freely by the government (without stating the efficacy or the safety)		
Yes	2,049	88.8
No	259	11.2
COVID-19 vaccine is 50% effective with a 5% chance of side effects such as fever		
Yes	1,610	69.8
No	698	30.2
COVID-19 vaccine is 95% effective, with a 20% chance of side effects such as fever		
Yes	1,425	61.7
No	883	38.3
COVID-19 vaccine is 75% effective, with a 5% chance of side effects such as fever		
Yes	1,849	80.1
No	459	19.9
COVID-19 vaccine is 75% effective, with a 20% chance of side effects such as fever		
Yes	1,007	43.6
No	1,301	56.4

Factors associated with COVID-19 booster dose acceptance

The initial logistic regression analysis revealed that demographic variables, including sex, age, and religion, were significantly associated with booster dose vaccine acceptance (**Table 3**). In addition to these demographic factors, individuals who had previously been infected with COVID-19 were 1.4 times more likely to receive the booster dose compared to those who had not been infected. Respondents who did not believe in vaccine-related conspiracy theories were 3 to 7 times more likely to accept vaccination than those who did. Conversely, individuals who believed in traditional medicine could cure COVID-19 had small chance to accept the booster dose. Participants who believed that receiving a booster dose was essential for public protection and trusted that the pharmaceutical companies had developed a safe and effective vaccine were 6.5 to 10.5 times more likely to accept vaccination compared to those who did not share these beliefs. Moreover, respondents were 4.5 times more likely to receive the vaccine if it was provided free of charge by the government (**Table 3**).

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Table 3. Univariate and multivariate linear regression model showing the factor associated with acceptance for a booster dose of COVID-19 vaccine in Indonesia (n=2,308)

Item	Number	%	Acceptance (yes)	Univariate		Multivariate	
			n (%)	OR 95%CI	*p*-value	OR 95%CI	*p*-value
Sex							
Male (Reference group (R))	571	24.7	486 (85.1)	1		1	
Female	1,737	75.3	1,563 (90.0)	1.57 (1.18–2.07)	0.001	1.02 (0.73–1.44)	0.872
Age							
≤20	794	34.4	691 (87.0)	1.03 (0.64–1.66)	0.897	0.65 (0.35–1.20)	0.170
21–30	1,114	48.3	1,017 (91.3)	1.61 (1.00–2.60)	0.050	0.92 (0.50–1.67)	0.786
31–40	220	9.5	185 (84.1)	0.81 (0.46–1.42)	0.470	0.51 (0.25–1.03)	0.064
41 or older (R)	180	7.8	156 (86.7)	1		1	
Marital status							
Single (R)	1,829	79.2	1,631 (89.2)	1			
Married or divorce or widow	479	20.8	418 (87.3)	0.83 (0.61–1.13)	0.239		
Educational attainment							
Elementary to Senior High School (R)	981	42.5	861 (87.8)	1			
Diploma	1,179	51.1	1,061 (90.0)	1.25 (0.95–1.64)	0.101		
Undergraduate/graduated	148	6.4	127 (85.8)	0.84 (0.51–1.38)	0.503		
Religion							
Islam (R)	1,978	85.7	1,744 (88.2)	1		1	
Christian (Protestant/Catholic/others (Hindu/Buddha/Atheist/Agnostic/Confucian)	330	14.3	305 (92.4)	1.63 (1.06–2.51)	0.025	1.67 (1.02–2.74)	0.040
Occupation							
Self-employed (R)	93	4.0	80 (86.0)	1			
Employed for wages	612	26.5	536 (87.6)	1.14 (0.60–2.15)	0.673		
Student/retired/unable to work/others	1,603	69.5	1,433 (89.4)	1.37 (0.74–2.51)	0.310		
Monthly household income (Indonesian Rupiah)							
<3 million (R)	1,853	80.3	1,647 (88.9)	1			
3–5 million	206	8.9	178 (86.4)	0.79 (0.52–1.21)	0.289		
>5 million	249	10.8	224 (90.0)	1.12 (0.72–1.73)	0.610		
Having family member seriously ill or died caused by COVID-19?							
Yes	500	21.7	446 (89.2)	1.05 (0.76–1.45)	0.736		
No (R)	1,808	78.3	1,603 (88.7)	1			
Having influenza vaccinated for the last 5 years?							
Yes	366	15.9	331 (90.4)	1.23 (0.84–1.79)	0.274		
No (R)	1,942	84.1	1,718 (88.5)	1			
Have you ever been contracted with COVID-19?							
Yes	861	37.3	783 (90.9)	1.43 (1.08–1.89)	0.011	1.14 (0.82–1.60)	0.418
No (R)	1,447	62.7	1,266 (87.5)	1		1	
Type of COVID-19 vaccine received for the 1st dose							
Sinovac (R)	1,777	77.0	1,594 (89.7)	1		1	
AstraZeneca/Moderna/Pfizer/Sinopharm/other	531	23.0	455 (85.7)	0.68 (0.51–0.91)	0.010	1.02 (0.68–1.53)	0.902
Type of COVID-19 vaccine received for the 2nd dose							
Sinovac (R)	1,426	61.8	1,302 (91.3)	1		1	
AstraZeneca/Moderna/Pfizer/Sinopharm/other	882	38.2	747 (84.7)	0.52 (0.40–0.68)	<0.001	0.69 (0.48–0.98)	0.040

Item	Number	%	Acceptance (yes)	Univariate		Multivariate	
			n (%)	OR 95%CI	*p*-value	OR 95%CI	*p*-value
Vaccine safety data is sometimes misrepresented							
Agree or strongly agree (R)	594	25.7	505 (85.0)	1		1	
Neither agree nor disagree	928	40.2	800 (86.2)	1.10 (0.82–1.47)	0.517	0.93 (0.64–1.36)	0.729
Disagree or strongly disagree	786	34.1	744 (94.7)	3.12 (2.12–4.58)	<0.001	1.05 (0.63–1.74)	0.851
Vaccinating children is dangerous and this fact is often covered up							
Agree or strongly agree (R)	278	12.0	210 (75.5)	1		1	
Neither agree or disagree	599	26.0	500 (83.5)	1.63 (1.15–2.31)	0.006	1.30 (0.80–2.12)	0.283
Disagree or strongly disagree	1,431	62.0	1,339 (93.6)	4.71 (3.33–6.65)	<0.001	1.29 (0.76–2.17)	0.332
The pharmaceutical companies cover up vaccine safety							
Agree or strongly agree (R)	333	14.4	250 (75.1)	1		1	
Neither agree or disagree	754	32.7	655 (86.9)	2.19 (1.58–3.04)	<0.001	1.13 (0.71–1.82)	0.592
Disagree or strongly disagree	1,221	52.9	1,144 (93.7)	4.93 (3.51–6.92)	<0.001	0.89 (0.51–1.55)	0.687
The public is deceived about vaccine advances							
Agree or strongly agree (R)	261	11.3	184 (70.5)	1		1	
Neither agree nor disagree	589	25.5	487 (82.7)	1.99 (1.42–2.81)	<0.001	0.73 (0.43–1.26)	0.267
Disagree or strongly disagree	1,458	63.2	1,378 (94.5)	7.20 (5.08–10.21)	<0.001	0.87 (0.45–1.66)	0.680
The vaccine efficacy data is often misleading							
Agree or strongly agree (R)	360	15.6	262 (72.8)	1		1	
Neither agree nor disagree	744	32.2	642 (86.3)	2.35 (1.72–3.21)	<0.001	2.15 (1.31–3.53)	0.002
Disagree or strongly disagree	1,204	52.2	1,145 (95.1)	7.25 (5.11–10.29)	<0.001	2.33 (1.24–4.37)	0.008
The public is deceived about vaccine safety							
Agree or strongly agree (R)	266	11.5	192 (72.2)	1		1	
Neither agree nor disagree	643	27.9	530 (82.4)	1.80 (1.29–2.53)	0.001	0.74 (0.43–1.28)	0.293
Disagree or strongly disagree	1,399	60.6	1,327 (94.9)	7.10 (4.96–10.16)	<0.001	0.85 (0.43–1.66)	0.641
The governments try to cover up between vaccines and autism							
Agree or strongly agree (R)	229	9.9	161 (70.3)	1		1	
Neither agree nor disagree	882	38.2	759 (86.1)	2.60 (1.85–3.66)	<0.001	1.09 (0.65–1.81)	0.732
Disagree or strongly disagree	1,197	51.9	1,129 (94.3)	7.01 (4.82–10.19)	<0.001	1.37 (0.75–2.52)	0.302
I believe that wearing traditional medicine could prevent the impact of COVID-19							
Agree or strongly agree (R)	1,471	63.7	1,275 (86.7)	1		1	
Disagree or strongly disagree	837	36.3	774 (92.5)	1.88 (1.40–2.54)	<0.001	1.60 (1.00–2.57)	0.050
I believe that the traditional medicine is able to increase the immunity							
Agree or strongly agree (R)	2,010	87.1	1,781 (88.6)	1			
Disagree or strongly disagree	298	12.9	268 (89.9)	1.14 (0.76–1.71)	0.499		
I believe the efficacy of traditional medicine to prevent the impact of COVID-19 from family or friends							
Agree or strongly agree	1,480	64.1	1,293 (87.4)	0.65 (0.49–0.87)	0.004	1.01 (0.63–1.63)	0.951
Disagree or strongly disagree (R)	828	35.9	756 (91.3)	1		1	
I also read books or news about traditional medicine that could prevent the impact of COVID-19							
Agree or strongly agree	1,382	59.9	1,206 (87.3)	0.67 (0.51–0.88)	0.005	1.27 (0.82–1.98)	0.278
Disagree or strongly disagree (R)	926	40.1	843 (91.0)	1		1	
The booster dose is important to protect the public from COVID-19							
Yes	1,861	80.6	1,765 (94.8)	10.55 (7.96–13.98)	<0.001	3.98 (2.73–5.80)	<0.001

Item	Number	%	Acceptance (yes)	Univariate		Multivariate	
			n (%)	OR 95%CI	*p*-value	OR 95%CI	*p*-value
No or do not know (R)	447	19.4	284 (63.5)	1		1	
Pharmaceutical companies have developed a safe and effective booster dose COVID-19 vaccine							
Yes	1,698	73.6	1,606 (94.6)	6.58 (4.99–8.66)	<0.001	1.75 (1.19–2.57)	0.004
No or do not know (R)	610	26.4	443 (72.6)	1		1	
I believe that the government should provide free booster dose to everyone							
Yes	2,000	86.7	1,832 (91.6)	4.57 (3.41–6.12)	<0.001	1.99 (1.39–2.86)	<0.001
No or do not know (R)	308	13.3	217 (70.5)	1		1	
I believe that natural immunity is sufficient and I do not need to be vaccinated							
Agree or strongly agree or neither agree nor disagree	973	42.2	788 (81.0)	0.25 (0.18–0.33)	<0.001	0.85 (0.58–1.27)	0.444
Disagree or strongly disagree (R)	1,335	57.8	1,261 (94.5)	1		1	
COVID-19 infection is harmless, so I do not have to be vaccinated							
Agree or strongly agree or neither agree nor disagree	539	23.4	398 (73.8)	0.20 (0.15–0.26)	<0.001	0.51 (0.34–0.75)	0.001
Disagree or strongly disagree (R)	1,769	76.6	1,651 (93.3)	1		1	
My decision to be vaccinated with a booster dose was greatly influenced by the workplace during the pandemic							
Agree or strongly agree (R)	1,082	46.9	969 (89.6)	1			
Neither agree nor disagree or disagree or strongly disagree	1,226	53.1	1,080 (88.1)	0.86 (0.66–1.11)	0.266		
My decision to be vaccinated with a booster dose is strongly influenced by the person or family who live with me at home							
Agree or strongly agree (R)	1,199	51.9	1,098 (91.6)	1		1	
Neither agree nor disagree or disagree or strongly disagree	1,109	48.1	951 (85.8)	0.55 (0.42–0.72)	<0.001	0.79 (0.57–1.08)	0.145
I am not sure vaccination is effective against COVID-19							
Agree or strongly agree	345	14.9	254 (73.6)	0.15 (0.11–0.21)	<0.001	0.72 (0.44–1.18)	0.202
Neither agree nor disagree	583	25.3	487 (83.5)	0.27 (0.20–0.38)	<0.001	1.04 (0.67–1.61)	0.853
Disagree or strongly disagree (R)	1,380	59.8	1,308 (94.8)	1		1	
I am worried about any adverse effects or allergic reactions when vaccinated with booster dose of COVID-19 vaccine							
Agree or strongly agree	1,105	47.9	975 (88.2)	0.90 (0.69–1.16)	0.429		
Neither agree nor disagree or disagree or strongly disagree (R)	1,203	52.1	1,074 (89.3)	1			
I believe booster dose COVID-19 vaccine is very important							
Agree or strongly agree	1,461	63.3	1,304 (89.3)	1.13 (0.87–1.48)	0.342		
Neither agree nor disagree or disagree or strongly disagree (R)	847	36.7	745 (88.0)	1			
I believe that primary and booster doses as requirement for travel are necessary and useful							
Agree or strongly agree	1,410	61.1	1,250 (88.7)	0.96 (0.74–1.26)	0.811		
Neither agree nor disagree or disagree or strongly disagree (R)	898	38.9	799 (89.0)	1			
Booster doses are useful for protecting people from COVID-19							
Agree or strongly agree	1,647	71.4	1,469 (89.2)	1.15 (0.87–1.52)	0.320		
Neither agree nor disagree or disagree or strongly disagree (R)	661	28.6	580 (87.7)	1			
Booster dose of COVID-19 vaccine is safe							
Agree or strongly agree	1,514	65.6	1,348 (89.0)	1.07 (0.82–1.41)	0.588		
Neither agree nor disagree or disagree or strongly disagree (R)	794	34.4	701 (88.3)	1			

Individuals who perceived COVID-19 is harmless and believed that their natural immunity was sufficient were 0.2 times more likely to decline the vaccine than those who disagreed with this notion. Additionally, vaccine acceptance was strongly influenced by the options of family and friends, as well as concerns regarding the vaccine's efficacy against COVID-19 (**Table 3**).

Participants who received AstraZeneca, Moderna, Pfizer, Sinopharm, or other vaccines for their first and second doses had lower odds of accepting a booster dose compared to those who received Sinovac (aOR: 0.68; 95% CI: 0.51–0.91 and aOR: 0.52; 95%CI: 0.40–0.68, respectively) (**Table 3**). Acceptance of the booster dose was also influenced by concerns about potential side effects, perceptions of vaccination importance, the belief that vaccination is necessary for travel, and the perceived value of vaccines in protecting against COVID-19 (**Table 3**).

The final logistic regression model incorporated all significant variables from the unadjusted analysis. Several factors remained significantly associated with the acceptance of a COVID-19 booster dose in the adjusted model. These factors included sex, age, religion, history of COVID-19 infection, type of primary vaccine received, belief in the vaccine-related and traditional medicine conspiracies, confidence in natural immunity, perceived vaccine efficacy, and trust in the effectiveness of vaccination against COVID-19 (**Table 3**).

Participants who identified as Protestant, Catholic, and other religions (including Hindu, Buddhist, Atheist, Confucian, and Agnostic) had 1.6 times higher odds of accepting the booster dose compared to Muslim (**Table 3**). Respondents who received a non-Sinovac vaccine for their second dose, such as AstraZeneca, Moderna, Pfizer, and Sinopharm had lower acceptance rates compared to those who received Sinovac (aOR: 0.69; 95%CI: 0.48–0.98). Participants who believed that a booster dose was essential to protecting the public against COVID-19 were nearly four times more likely to accept the vaccine than those who disagreed (aOR: 3.98; 95%CI: 2.73–5.80; $p<0.001$) (**Table 3**). Additionally, respondents who agreed with vaccine-related conspiracy theories, such as the claim that vaccine efficacy data is often misleading or that traditional medicine alone can prevent the impact of COVID-19 infection, were almost twice as likely to accept the booster dose (aOR: 2.33; 95%CI: 1.27–4.37; $p=0.008$ and aOR: 1.60; 95%CI: 1.00–2.57; $p<0.050$, respectively).

Respondents who believed that pharmaceutical companies had developed a safe and effective vaccine had a higher acceptance rate than those who did not believe (aOR: 1.75; 95%CI: 1.19–2.57) (**Table 3**). Additionally, individuals who agreed that the government should provide free booster vaccines to all had nearly twice the odds of accepting booster doses compared to those who disagreed (aOR: 1.99; 95%CI: 1.39–2.86). Conversely, respondents who believed vaccination was unnecessary because COVID-19 infection is harmless had a significantly lower acceptance rate than those who either disagreed or were uncertain about this belief (aOR: 0.51; 95%CI: 0.34–0.75) (**Table 3**).

Motivations, influencing factors, and sources associated with booster dose acceptance

The study also examined both positive and negative factors influencing respondents' decisions to receive a booster dose of COVID-19 vaccine. The primary motivators for vaccination included self-protection (62.3%), protecting family members (48.8%), and safeguarding co-workers (31.8%). Notably, only 10.6% of respondents reported feeling coerced by the government to get vaccinated (**Figure 1**).

The increasing number of confirmed COVID-19 cases was the most significant factor influencing respondents' decision to receive a booster dose (42.5%), followed by confidence in vaccine effectiveness (40.4%), recommendations from doctors or the Ministry of Health (39.4%), and personal health status (28.6%) (**Figure 2**). Additional factors included concerns about COVID-19-related fatalities (21.4%), the type of vaccine received (11.9%), and potential side effects (9%) (**Figure 2**).

Respondents expressed preference regarding the source country of COVID-19 vaccines. The most preferred sources were the United States (18%), followed by China (9.1%), the United Kingdom (8.1%), and Russia (2.4%). However, a majority of respondents (62.3%) either did not know or did not specify their preferred vaccine source (**Figure 3**).

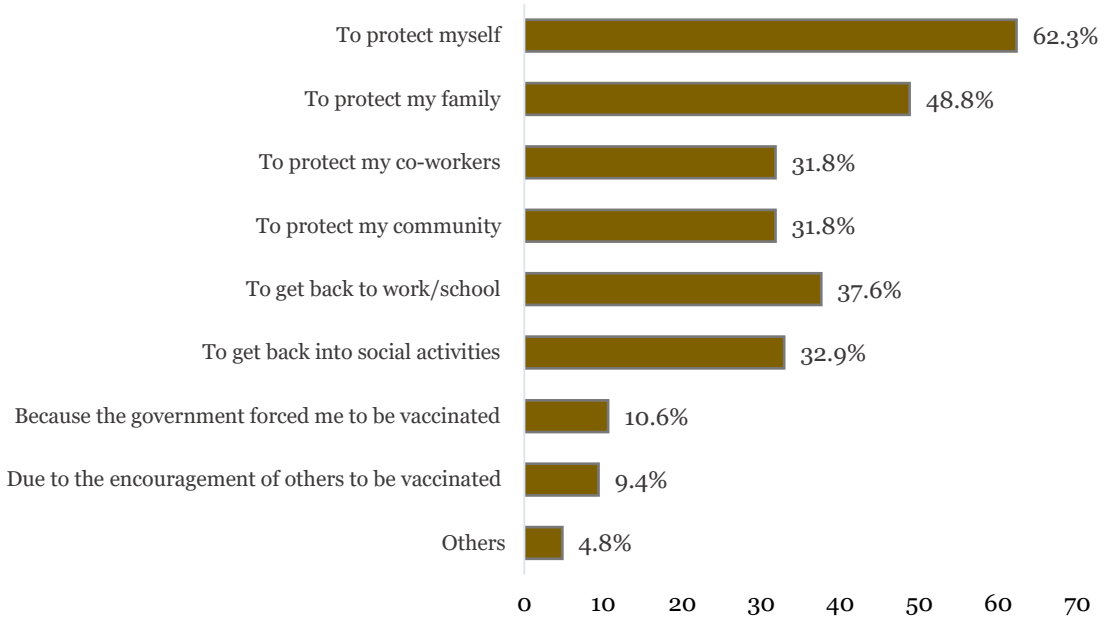

Figure 1. Motivation to receive a COVID-19 booster dose reported by the respondents (n=2,308).

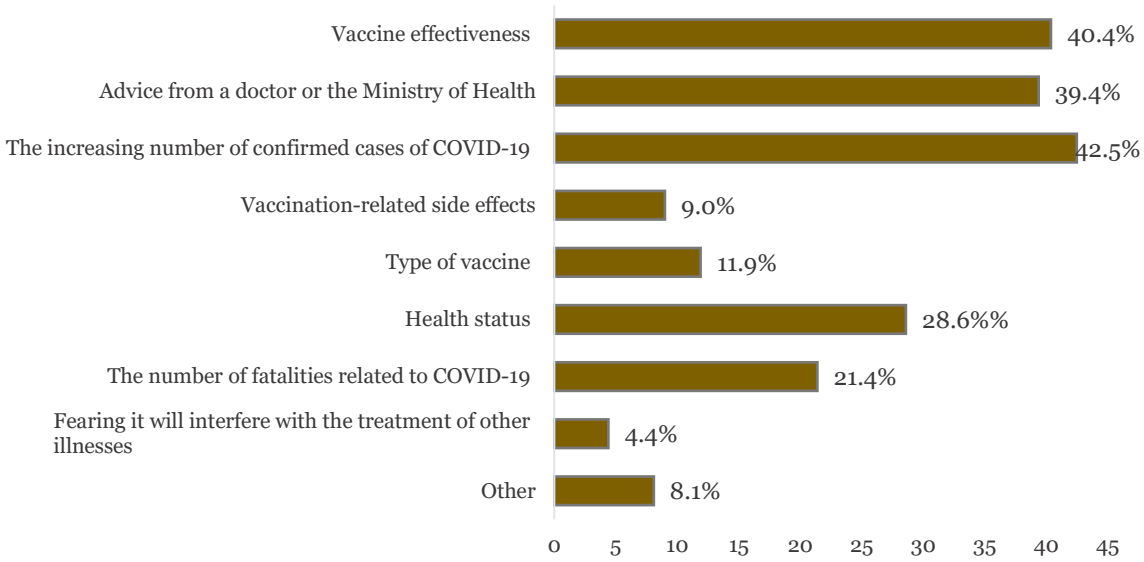

Figure 2. Main determinant influencing respondents' decisions to receive a COVID-19 booster dose (n=2,308).

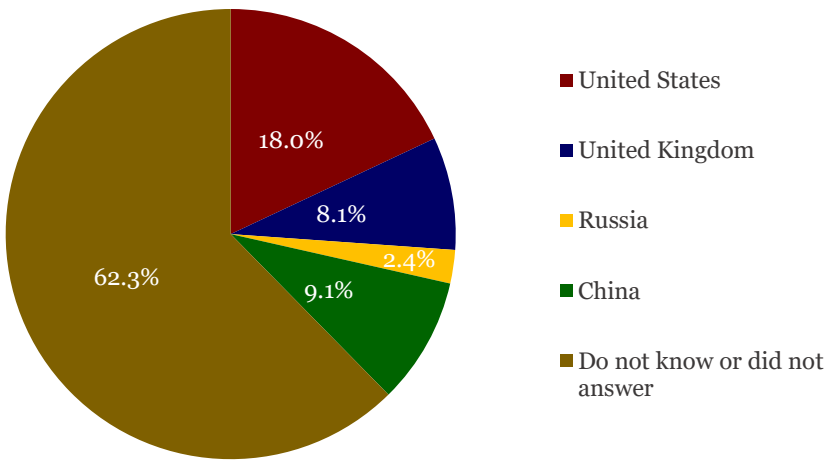

Figure 3. Preferred source of a booster dose of the COVID-19 vaccine according to respondents (n=2,308).

Discussion

This study sought to explore the factors contributing to acceptance of a COVID-19 vaccine booster dose. The findings indicated that 88.8% of respondents would be willing to receive the booster dose if provided free of charge by the Indonesian government. This acceptance rate is lower than that reported in a previous study, which found that 93% of respondents were willing to accept a booster dose [7]. However, the rate in this study was higher than the acceptance rate reported in other countries, such as Thailand (62.2) [16], China (84.80%) [17], Japan (78.3%) [18], and India (52.1%) [19]. The willingness to accept booster dose was significantly influenced by profiles of the vaccine. When respondents were informed of a 20% likelihood of side effects, even with a reported 95% efficacy, the acceptance rate dropped to 61.7%. This decrease suggests that concerns regarding potential negative effects may deter individuals from receiving the booster dose. The incidence of side effects such as headaches, fatigue [20,21], fever, muscle pain, and joint pain [22-25] has been reported as contributing to vaccine hesitancy.

Our finding suggests that providing information about the effectiveness of vaccines could significantly increase acceptance of booster doses. As public knowledge regarding the efficacy of vaccines improves, the willingness to receive booster doses is likely to rise. This observation aligns with previous research, highlighting the importance of enhancing public awareness of the benefits of vaccinations to increase vaccination rates [6]. Additionally, other studies have shown that individuals who believe in the vaccine's effectiveness are 7.95 times more likely to accept the booster dose compared to those who do not hold this belief [26]. Therefore, it is crucial to develop clear and effective strategies for communicating the vaccine's efficacy to the general public.

Our study revealed differences in booster dose acceptance based on vaccination history. The majority of participants had received the Sinovac vaccine for their first dose (77%), followed by AstraZeneca (9%), Moderna (6.2%), Pfizer (4.1%), and Sinopharm and others vaccines (3.7%). We found that respondents who received AstraZeneca, Moderna, Pfizer, Sinopharm, or other vaccines were generally less willing to receive a booster dose compared to those who received the Sinovac vaccine. The difference may reflect concerns about the perceived efficacy or risks of the previous dose. Some studies have indicated that the effectiveness of COVID-19 vaccine decreased over time, as antibody levels decline several months after the second dose [27,28]. As a result, a booster dose is recommended to maintain immunity. Furthermore, a study conducted in Bangladesh found that individuals who received the Sinovac vaccines experienced fewer side effects (28%) compared to those vaccinated with Moderna or Pfizer, who reported side effects such as fever, pain, and headache in approximately 80% of cases [29]. This suggests that the side effects experienced from previous vaccinations may influence perceptions of vaccine safety and, consequently, the willingness to receive booster doses.

Our study identified several factors that associated with the acceptance of a booster dose, including the belief that traditional medicine could prevent the impact of COVID-19 infection and a lack of trust in vaccine efficacy data (**Table 4**). Previous studies have indicated that vaccine hesitancy is a complex and multifaceted issue [30]. In addition, public hesitation regarding vaccine data accuracy is often rooted in individual perceptions of vaccination. This is consistent with beliefs about the effectiveness of the COVID-19 vaccine. If the public believes that a vaccine is effective at preventing the disease, they may perceive a booster dose as unnecessary [7]. Despite the high effectiveness and approval of these vaccines, public concern about vaccine safety has contributed to vaccine hesitancy [31].

Various motivations for receiving a booster dose of the COVID-19 vaccine have been identified in the literature. A study conducted in Spain indicated that individuals acceptance were mainly concerned about the potential to transmit COVID-19 to their family (49.52%), travel-related risks (30.56%), and the risk of self-infection (39.45%) [32]. These findings are similar to our results, which show the main reasons to receive a booster dose of the COVID-19 vaccine were to protect themselves and their family as well as to resume school, work, travel and other social activities. One strategy for vaccine promotion that aligns with the "protector schema" is to highlight that vaccination plays a role in protecting others [33].

The effectiveness of the vaccines and concerns about their safety are significant factors influencing respondents' decisions to receive a booster dose of the COVID-19 vaccine. A previous study has found that individuals are more likely to accept vaccines when they believe they are

effective, safe, and associated with minimal side effects [34]. In this study, only 10.6% of participants accepted the booster vaccine based on public recommendations. Additionally, most participants favored the United States and the United Kingdom as the sources of the booster vaccine, although over half of the participants (62.3%) did not provide an answer regarding their preferred country for the vaccine's origin. This represents an increase from a previous study, where 59.3% of participants did not respond to this question [7]. The low acceptance of the booster vaccine based on public recommendations highlights the need for more targeted and effective public health campaigns that emphasize vaccine efficacy, safety, and minimal side effects to improve uptake. Furthermore, the increasing proportion of participants who did not specify a preferred vaccine origin indicates ongoing uncertainty or indifference, suggesting that public health strategies should focus on building confidence in vaccines regardless of their country of manufacture.

There are some limitations in this study. Participation was limited to individuals with internet access or devices, potentially introducing selection bias. The study utilized a cross-sectional design, limiting the ability to accurately capture long-term exposure to the examined factors. The subjects had not yet incurred the vaccine cost at the time of the survey, regardless of their responses. A follow-up study could provide insights into trends in vaccine acceptance over time in Indonesia.

Conclusion

Our study identified several factors associated with acceptance of the third dose of the COVID-19 vaccine. These factors included sex, age, religion, information about previous COVID-19 infections, the type of vaccine received for the first and second doses, beliefs in vaccine conspiracies, beliefs in traditional medicine conspiracies, perceptions of the necessity of natural immunity, the perceived efficacy of the COVID-19 vaccine, and confidence in the effectiveness of the vaccination against COVID-19. This finding highlights the complex interplay of demographic, psychological, and informational factors that influence acceptance COVID-19 vaccine booster dose. The influence of previous COVID-19 infections, vaccine type, and conspiracy beliefs underscores the need for public health efforts to counter misinformation and reinforce trust in vaccination. Furthermore, perceptions of natural immunity and confidence in vaccine efficacy play a crucial role, emphasizing the importance of clear, evidence-based messaging to enhance vaccine uptake and protect public health.

Ethics approval

The protocol was reviewed and approved by the ethical committee of the Faculty of Medicine at Universitas Syiah Kuala (Approval number: 057/EA/FK/2023).

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Competing interests

The authors declare no conflict of interest. The funders had no role in the study's design, data collection, analysis, or interpretation, manuscript writing, or decision to publish the results.

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Underlying data

Derived data supporting the findings of this study are available from the corresponding author on request.

Declaration of artificial intelligence use

We hereby confirm that no artificial intelligence (AI) tools or methodologies were utilized at any stage of this study, including during data collection, analysis, visualization, or manuscript preparation. All work presented in this study was conducted manually by the authors without the assistance of AI-based tools or systems.

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References

1. World Health Organization. Interim statement on the use of additional booster doses of emergency use listed mRNA vaccines against COVID-19. Available from: https://www.who.int/news/item/17-05-2022-interim-statement-on-the-use-of-additional-booster-doses-of-emergency-use-listed-mrna-vaccines-against-covid-19. Accessed: 19 September 2023.
2. Williams SV, Vusirikala A, Ladhani SN, *et al*. An outbreak caused by the SARS-CoV-2 Delta (B. 1.617. 2) variant in a care home after partial vaccination with a single dose of the COVID-19 vaccine Vaxzevria, London, England, April 2021. Eurosurveillance 2021;26(27):2100626.
3. Cruickshank S. COVID-19 vaccine boosters: Is a third dose really needed? Available from: https://www.gavi.org/vaccineswork/covid-19-vaccine-boosters-third-dose-really-needed?gclid=CjwKCAjwg5uZBhATEiwAhhRLHuoOPTT5qB2k-B5OmIG1ejyjaHGDJZ2dcXS5Z42AFeyIcA5QBhqsXBoCu7kQAvD_BwE. Accessed: 19 September 2023.
4. Ssentongo P, Ssentongo AE, Voleti N, *et al*. SARS-CoV-2 vaccine effectiveness against infection, symptomatic and severe COVID-19: A systematic review and meta-analysis. BMC Infect Dis 2022;22(1):439.
5. Kabir R, Mahmud I, Chowdhury MTH, *et al*. COVID-19 vaccination intent and willingness to pay in Bangladesh: A cross-sectional study. Vaccines 2021;9(5):416.
6. Harapan H, Wagner AL, Yufika A, *et al*. Acceptance of a COVID-19 vaccine in Southeast Asia: A cross-sectional study in Indonesia. Front Public Health 2020;8:381.
7. Harapan H, Fathima R, Kusuma HI, *et al*. Drivers of and barriers to COVID-19 vaccine booster dose acceptance in Indonesia. Vaccines 2022;10(12):1981.
8. Patwary MM, Alam MA, Bardhan M, *et al*. COVID-19 vaccine acceptance among low-and lower-middle-income countries: A rapid systematic review and meta-analysis. Vaccines 2022;10(3):427.
9. Zhao Y-M, Liu L, Sun J, *et al*. Public willingness and determinants of COVID-19 vaccination at the initial stage of mass vaccination in China. Vaccines 2021;9(10):1172.
10. Flanagan KL, Fink AL, Plebanski M, *et al*. Sex and gender differences in the outcomes of vaccination over the life course. Annu Rev Cell Dev Biol 2017;33:577-599.
11. Hassan W, Kazmi SK, Tahir MJ, *et al*. Global acceptance and hesitancy of COVID-19 vaccination: A narrative review. Narra J 2021;1(3):e57.
12. He J, He L. Knowledge of HPV and acceptability of HPV vaccine among women in western China: A cross-sectional survey. BMC Womens Health 2018;18(1):130.
13. Larson HJ, Cooper LZ, Eskola J, *et al*. Addressing the vaccine confidence gap. Lancet 2011;378(9790):526-535.
14. Rosiello DF, Anwar S, Yufika A, *et al*. Acceptance of COVID-19 vaccination at different hypothetical efficacy and safety levels in ten countries in Asia, Africa, and South America. Narra J 2021;1(3):e55.
15. Wagner AL, Rajamoorthy Y, Taib NM. Impact of economic disruptions and disease experiences on COVID-19 vaccination uptake in Asia: A study in Malaysia. Narra J 2021;1(2):e42.
16. Kunno J, Supawattanabodee B, Sumanasrethakul C, *et al*. The relationship between attitudes and satisfaction concerning the COVID-19 vaccine and vaccine boosters in urban Bangkok, Thailand: A cross-sectional study. Int J Environ Res Public Health 2022;19(9):5086.
17. Lai X, Zhu H, Wang J, *et al*. Public perceptions and acceptance of COVID-19 booster vaccination in China: A cross-sectional study. Vaccines 2021;9(12):1461.

18. Tokiya M, Hara M, Matsumoto A, *et al*. Acceptance of booster COVID-19 vaccine and its association with components of vaccination readiness in the general population: A cross-sectional survey for starting booster dose in Japan. Vaccines 2022;10(7):1102.
19. Achrekar GC, Batra K, Urankar Y, *et al*. Assessing COVID-19 booster hesitancy and its correlates: An early evidence from India. Vaccines 2022;10(7):1048.
20. Menni C, Klaser K, May A, *et al*. Vaccine side-effects and SARS-CoV-2 infection after vaccination in users of the COVID symptom study app in the UK: A prospective observational study. Lancet Infect Dis 2021;21(7):939-949.
21. Ganesan S, Al Ketbi LMB, Al Kaabi N, *et al*. Vaccine side effects following COVID-19 vaccination among the residents of the UAE—an observational study. Front Public Health 2022;10:876336.
22. Xia S, Duan K, Zhang Y, *et al*. Effect of an inactivated vaccine against SARS-CoV-2 on safety and immunogenicity outcomes: Interim analysis of 2 randomized clinical trials. JAMA 2020;324(10):951-960.
23. Mulligan MJ, Lyke KE, Kitchin N, *et al*. Phase I/II study of COVID-19 RNA vaccine BNT162b1 in adults. Nature 2020;586(7830):589-593.
24. Frater J, Ewer KJ, Ogbe A, *et al*. Safety and immunogenicity of the ChAdOx1 nCoV-19 (AZD1222) vaccine against SARS-CoV-2 in HIV infection: A single-arm substudy of a phase 2/3 clinical trial. Lancet HIV 2021;8(8):e474-e485.
25. Logunov DY, Dolzhikova IV, Zubkova OV, *et al*. Safety and immunogenicity of an rAd26 and rAd5 vector-based heterologous prime-boost COVID-19 vaccine in two formulations: Two open, non-randomised phase 1/2 studies from Russia. Lancet 2020;396(10255):887-897.
26. Sun Y, Dai H, Wang P, *et al*. Will people accept a third booster dose of the COVID-19 vaccine? A cross-sectional study in China. Front Public Health 2022;10:914950.
27. Tartof SY, Slezak JM, Fischer H, *et al*. Effectiveness of mRNA BNT162b2 COVID-19 vaccine up to 6 months in a large integrated health system in the USA: A retrospective cohort study. Lancet 2021;398(10309):1407-1416.
28. Glück V, Grobecker S, Köstler J, *et al*. Immunity after COVID-19 and vaccination: Follow-up study over 1 year among medical personnel. Infection 2022;50(2):439-446.
29. Mohsin M, Mahmud S, Mian AU, *et al*. Side effects of COVID-19 vaccines and perceptions about COVID-19 and its vaccines in Bangladesh: A cross-sectional study. Vaccine X 2022;12:100207.
30. MacDonald NE. Vaccine hesitancy: Definition, scope and determinants. Vaccine 2015;33(34):4161-4164.
31. Harapan H, Wagner AL, Yufika A, *et al*. Willingness-to-pay for a COVID-19 vaccine and its associated determinants in Indonesia. Hum Vaccin Immunother 2020;16(12):3074-3080.
32. Sauch Valmaña G, Fuster-Casanovas A, Ramírez-Morros A, *et al*. Motivation for vaccination against COVID-19 in persons aged between 18 and 60 years at a population-Based vaccination site in Manresa (Spain). Vaccines 2022;10(4):597.
33. Oganesyan N. Positive COVID-19 messaging on TV can persuade resistant viewers, the protector coalition says. Available from: https://variety.com/2021/tv/news/positive-tv-messaging-coronavirus-the-protector-coalition-1234885193-1234885193/. Accessed: 15 September 2023.
34. Menni C, May A, Polidori L, *et al*. COVID-19 vaccine waning and effectiveness and side-effects of boosters: A prospective community study from the ZOE COVID Study. Lancet Infect Dis 2022;22(7):1002-1010.