

Peak of Covid-19 Case Increase: Factors Related to Acceptance of the Covid-19 Booster Among Adolescents

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ABSTRACT

Background: The acceleration of booster vaccination targets a minimum of 50 percent people aged 18 years and above while still prioritizing high-risk groups, such as the elderly. This is crucial to extend the protection of the Covid-19 vaccine and ensure that there is no surge in cases in the future.

Purpose: This study aimed to analyze the determinant factors of Covid-19 booster acceptance among adolescents aged 18-24 years.

Methods: The present study adopted an analytic observation method with a cross-sectional approach. It took place in East Java and involved 1415 adolescents selected through a simple random sampling. The dependent variable was Covid-19 booster acceptance among these adolescents. The independent variables were age, education, gender, and family income. The data were obtained through a questionnaire. They processed using bivariate analysis to investigate the relationship between the dependent and independent variables. To determine the acceptance of adolescents towards Covid-19 booster, it used multivariate logistic regression.

Results: Age (OR= 1.71, CI 95% = 1.25 to 2.3, p= 0.001), education (OR= 1.56, CI 95% = 1.18 to 2.08, p= 0.002), gender (OR= 1.51, CI 95% = 0.14 to 1.99, p= 0.004), and family income (OR= 1.36, CI 95% = 0.10 to 1.85, p= 0.052) hold a statistically significant relationship with Covid-19 booster acceptance among adolescents.

Conclusion: Age, education, gender, and family income are factors affecting Covid-19 booster acceptance among adolescents. Government and other relevant stakeholders are expected to take comprehensive measures to increase Covid-19 booster vaccination among adolescents aged 18-24 years.

Keywords: adolescents, covid-19 increase, vaccine booster

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BACKGROUND

The Covid-19 vaccination is one of the strategies to control the Covid-19 transmission and reduce the number of affected people (Matrajt et al., 2021, Stefanelli & Rezza, 2022). It is intended to achieve herd immunity, safeguard public health, and ensure the social and economic functions run well during the outbreak. Booster is a Covid-19 vaccine administered to an individual who has completed the primary vaccination series to maintain immunity levels and extend the protection period. It is given with two systems. The first is homologous, the administration of booster vaccines using the same type of vaccine with the first and second doses of primary vaccines. The second is heterologous systems, which involves administering the same or similar disease antigens using 2 different types of vaccines, an initial dose to create an immune system and subsequent doses of different types to develop an immune response (Garg et al., 2022, Gerhards et al., 2023).

A study noted that antibody levels decreased six months after receiving a complete primary dose of Covid-19 vaccination. Therefore, an extended vaccine is necessary to enhance individual protection against the virus. In early 2023, the Ministry of Health issued a second booster for the general public aged 18 and above. The booster vaccine is free for all Indonesians. The second Covid-19 booster vaccine is administered six months apart from the first booster dose vaccination (García-Botella et al., 2022, Menni et al., 2022). It is given to accelerate vaccination to increase antibody titer and prolong protection. During the transition from pandemic to endemic, the government is more aggressive in disseminating health protocols, vaccinations, new variants, and immunity of the community.

The booster vaccination is administered at health centers, government-owned hospitals, and local governments as well as vaccination service posts under provincial or district health offices. Booster vaccination can be given simultaneously with primary vaccination, with different vaccinators. A study suggested that the second booster increases the antibody response, which helps boost the protective effect of the vaccine series to last longer (Salah et al., 2023, Enciu et al., 2023).

In addition, recent research published in the New England Journal of Medicine and The Lancet Infectious Diseases supports the effectiveness of the second booster dose. The study revealed that participants' antibodies reached higher levels after receiving the fourth dose of the mRNA vaccine compared to the levels observed after the third dose (Hasibuan et al., 2023, Wang et al., 2022, Fang et al., 2022). This improvement highlights the potential of the second booster in enhancing immune response and protection against the virus. Meanwhile, in the last study, researchers noted a more significant increase in antibodies among participants aged 70 years or above. This age group particularly at risk of developing severe diseases. However, another study observed that, for certain participants, the benefit of the fourth injection is limited because the immune boost provided by the third injection remained (Yamamoto, 2022, Khong et al., 2022). This phenomenon suggested that a second amplifier, in this case the fourth dose, may offer minimal or even no additional protection to certain individuals or population if the immune response is already at its peak after the third dose (Grewal et al., 2022).

Some studies show that a second booster can reduce the risk of severe illness and death from Covid-19, especially among populations at risk (Wong et al., 2023, Bert et al., 2022). Such study revealed that the second booster provided 34% better protection against infection compared to the first booster. Additionally, the second booster was found to offer 64% better protection against hospitalization, 67% against severe illness, and impressive 72% against death from Covid-19 than the first booster. This finding underscores the importance

of administering the second booster dose to vulnerable populations to enhance their level of protection against the virus (Mattiuzzi & Lippi, 2023, Chan et al., 2023).

The implementation of the Covid-19 booster vaccine in Indonesia has created several attitudes of people. Some of them accept it easily, and some do not at all. It occurs because a lot of hoaxes spread on social media about the implementation of booster in Indonesia, thus making the public panic and causing different perceptions. Public acceptance of the Covid-19 booster vaccine is fundamental to prevent its widespread (Abdelmoneim et al., 2022, Huang et al., 2023). There are several precipitating factors that bring about public acceptance of the Covid-19 booster vaccine, but the main factors have not been investigated up to date. This study aims to analyze the determinants of Covid-19 booster acceptance among adolescents of 18-24 years old.

METHODS

This research used an analytic observational method with a cross-sectional research design and was conducted in East Java, from January to August 2023. The study population consisted of adolescents aged 18 to 24 years residing in East Java, Indonesia. From this population, samples were obtained using a simple random sampling technique. The inclusion criteria included adolescents aged 18 to 24 years who voluntarily participated in the online questionnaire, resulting in a final sample size of 1,415 participants. The study included several independent variables, which were age, education, gender, and family income, while the dependent variable was Covid-19 booster acceptance among the participating adolescents.

Data collection for this research was performed using a questionnaire encompassing age, education, gender, family income, and acceptance of the Covid-19 booster. The questionnaire was developed based on a comprehensive literature review to ensure its relevance and accuracy. To assess the reliability of the questionnaire, a Cronbach's Alpha test was conducted using the Statistical Package for the Social Sciences (SPSS).

In this study, bivariate analysis was employed using the Chi-square test to investigate the relationship between the dependent and independent variables. The test allowed the researchers to compare the distribution of a categorical variable in a sample or a group with its distribution in another. If the distribution is not significantly different, there is no relationship or association between the variables and the groups. In other words, the categorical variables and the groups are considered independent in terms of their distribution patterns. Multivariate logistic regression was adopted to determine the acceptance of the adolescents towards Covid-19 booster. Incomplete responses were those with one or more missing answers, and they were excluded from the analysis.

This study was approved by the Health Research Ethics Committee of Faculty of Medicine Universitas Islam Al-Azhar, with ethical clearance number 264/EC-04/FK-06/UNIZAR/XII/2022, dated December 16, 2022.

RESULTS

Table 1 presents the social and demographic details of the participants involved in this study. The age group 21 to 24 years was the most prevalent in this study (63.7%). Women made up the majority of the research participants (64.6%), and their most common education level was Senior high school (42.1%). Most of them lived in town (69.3%). High responses were from respondents with high parent vaccine status (96.6%). The study has a high participation of respondents with no family members in their household ever had Covid-19 (60.1%).

Table 1. Sociodemographic characteristics (n=1415)

Characteristics	n (%)
Age	
18-20	514 (36.3)
21-24	901 (63.7)
Sex	
Male	501 (35.4)
Female	914 (64.6)
Education level	
Junior High School	432 (30.5)
Senior High School	596 (42.1)
Diploma 3	387 (27.4)
Area of residence	
Town	980 (69.3)
Village or rural area	435 (30.7)
History of Covid-19	
No	1269 (89.7)
Yes	146 (10.3)
Parent vaccine status	
No	48 (3.4)
Yes	1367 (96.6)
Family members in their household ever had Covid-19	
No	851 (60.1)
Yes	489 (34.6)
I don't know	75 (5.3)

The process of bivariate analysis involved examining the relationship between one independent variable and one dependent variable using the chi-square test. Table 2 demonstrates the association between age, education, gender, and family income. According to Table 2, a higher percentage of adolescents aged 21-24 years expressed acceptance of the Covid-19 booster compared to those aged 18-20, and the difference was statistically significant ($p = <0.001$). Adolescents with education below senior high school indicated lower acceptance of the Covid-19 booster vaccine than those senior high school or higher, and it was statistically significant ($p = <0.001$). Female adolescents indicated acceptance of the Covid-19 booster vaccine than the males. Adolescents with higher family income than the regional minimum wage indicated acceptance of the Covid-19 booster than those with lower family income.

Table 2. Chi-square test results

Variable independent	Covid-19 booster				x ²	p
	Acceptance		Hesitancy			
	n	%	n	%		
Age						
18-20	450	87.5	64	12.5	16.95	<0.001
21-24	710	78.8	191	21.2		
Education						
< Senior High School	329	76.2	103	23.8	14.26	<0.001
> Senior High School	831	84.5	152	15.5		

Gender						
Male	390	77.8	111	22.2	8.97	0.003
Female	770	84.2	144	15.8		
Family income						
< regional minimum wage	257	77.2	76	22.8	6.80	0.009
> regional minimum wage	903	83.5	179	16.5		

Multivariate analysis is a method of data processing with variables in large quantities to simultaneously find the influence of these variables on an object.

Table 3. Multivariate logistic regression results

Independent Variable	OR	SE	CI 95%		p
			Lower	Upper	
Age	1.71	0.16	1.25	2.34	0.001
Education	1.56	0.15	1.18	2.08	0.002
Gender	1.51	0.14	1.14	1.99	0.004
Family income	1.36	0.16	0.10	1.85	0.052
Number of samples =	1.415				
Nagelkerke R2 =	4.5%				

Based on Table 3, the possibility of adolescents aged 21-24 to receive the Covid-19 vaccine is 1.71 times as high as those under 21 years. The possibility of those with education of senior high school or higher to receive the Covid-19 vaccine is 1.56 times compared to those with lower education. Female adolescents possibly receive the Covid-19 vaccine 1.51 times as high as the male ones. The possibility of adolescents with families who have higher income than the minimum regional wage to receive the Covid-19 vaccine is 1.36 times as high as those with lower income.

Table 4 shows the results why people hesitancy to the COVID-19 booster. The main reasons for hesitancy the COVID-19 booster was as follows side effects associated with previous COVID-19 vaccines, fear of future complications, and lack of confidence in the effectiveness of the booster dose.

Table 4. COVID-19 booster hesitancy reasons

	Reasons							
	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)	6 n (%)	7 n (%)	8 n (%)
Age								
18-20	13 (5.1)	18 (7.1)	15 (5.8)	15 (5.8)	13 (5.1)	17 (6.7)	16 (6.3)	14 (5.5)
21-24	12 (4.7)	16 (6.3)	20 (7.8)	19 (7.5)	18 (7.1)	18 (7.1)	15 (5.8)	16 (6.3)
Education								
< Senior High School	12 (4.7)	16 (6.3)	13 (5.1)	13 (5.1)	11 (4.3)	15 (5.8)	14 (5.5)	12 (4.7)
> Senior High School	16 (6.3)	18 (7.1)	18 (7.1)	20 (7.8)	17 (6.7)	20 (7.8)	21 (8.2)	19 (7.5)
Gender								
Male	14	15	10	16	17	16	18	19

		(5.5)	(5.8)	(3.9)	(6.3)	(6.7)	(6.3)	(7.1)	(7.5)
Female		17	14	13	17	18	20	15	16
		(6.7)	(5.5)	(5.1)	(6.7)	(7.1)	(7.8)	(5.8)	(6.3)
Family income									
< regional minimum wage		18	17	13	23	14	20	16	15
		(7.1)	(6.7)	(5.1)	(9)	(5.5)	(7.8)	(6.3)	(5.8)
> regional minimum wage		14	17	14	13	15	16	16	14
		(5.5)	(6.7)	(5.5)	(5.1)	(5.8)	(6.3)	(6.3)	(5.5)

1: safety uncertainties

2: booster dose is unnecessary

3: side effects associated with previous COVID-19 vaccines

4: history of COVID-19 infection

5: family/friend history of COVID-19 infection

6: lack of confidence in the effectiveness of the booster dose

7: fear of future complications

8: low vaccine booster literacy

DISCUSSION

People over the age of 18 will be administered a booster vaccination primary in districts and cities where the first dose and second dose vaccination rates have reached 70% and 60% respectively. Depending on the kind of vaccine, a booster vaccination campaign is an extended measure of the first full dose vaccination given once or twice (Theparod et al., 2023). Based on the results of Sero survey, it is designed to strengthen the population's medical defense and recover immunity (Mahapatra, 2022). The word "booster vaccination" is distinct from the phrase "additional vaccination" or "additional dose", which may be required if, following initial vaccination, the recipient's immunity has not developed adequately. Immune diseases are commonly present in such individuals (Matzaraki et al., 2017).

In terms of health, there are at least three significant health benefits to booster vaccination regimens. First, following a 6-month vaccine, there is a trend for less antibodies to produce, especially when new Covid-19 types appear (Collatuzzo et al., 2023, Pérez-Alós et al., 2022). Referring to several studies conducted by experts, In the past six months, all age groups have shown an 8% decline in the efficacy of 4 vaccinations that have reached Emergency Use Listing (EUL) from the World Health Organization (WHO). The efficacy of the vaccination has decreased by 10% and by 32% to avoid the symptoms over the same time period in people of 50 and older. The second is for long-term health of those who were affected by the Covid-19 pandemic. The third is that it satisfies every Indonesian's constitutional right to receive vaccinations for the safety of their families and communities (Beccia et al., 2022).

In terms of the economy, as long as stringent health regulations are followed, community activities will be more accommodating since the suppression of instances can stop the creation of a new wave. In order to prioritize health professionals owing to the invasion of the most recent strain, the government has enforced booster vaccination (Filip et al., 2022). The current expansion has considered aspects of vaccine safety, efficacy, and quality. The government is collaborating with the Covid-19 vaccine evaluation committee, diverse organizations, and Indonesia Technical Advisory Group of Immunization (ITAGI) to identify adults aged 18 and older as the subsequent target for the booster shot (Satari et al., 2023, Megatsari et al., 2022).

This extra immunization can be completed using a similar vaccine type (homologous) or a different vaccine from the one that was previously administered (heterologous).

According to the National Agency of Drug and Food Control's research findings, Emergency Use Authorization (EUA) was supplied to five different vaccine kinds for booster shots, namely those that were administered in a homologous model, such CoronaVac, Pfizer, and AstraZeneca. Moderna and Zifivax are the vaccinations that may be administered by homologous and heterologous injection (Hafiz et al., 2022, Chirico et al., 2020).

The acceptance of Covid-19 booster vaccines is influenced by several factors. Older people have more tendency to accept booster vaccines compared to the younger groups. The young age groups are still vulnerable. Given that they run the risk of spreading Covid-19, it also has to be in an awareness of social media. Younger age is a strong predictor of receiving the Covid-19 vaccine. Thus, in order for the public to comprehend and accept the Covid-19 vaccine, comprehensive education on the disease should be provided to all target ages through a number of measures to widely spread pertinent information (Miller et al., 2022, Qin et al., 2022).

Besides, level of education also brings about acceptance of the Covid-19 vaccine. An individual who has a high level of education tends to be more receptive to information, including the information about the Covid-19 vaccine (Zychlinsky Scharff et al., 2022, Jabessa & Bekele, 2022). On the other hand, individuals with low levels of education do not easily accept information. Further, men have a higher possibility to accept vaccination against Covid-19 compared to women do. It might happen because gender is an internal factor that affects behavioral change. Changes in behavior can be influenced by hormonal factors as well as physical factors. Therefore, women often act with feelings while men tend to use rational considerations (Kitsios et al., 2022, Reisch et al., 2021).

The study suggested that respondents with low incomes are less interested in the Covid-19 vaccine while other studies indicated varying results between the Covid-19 vaccine acceptance and income. People with high incomes are more receptive to the implementation of Covid-19 vaccination. Respondents with low economic income prioritizes income as a source of livelihood so that access to health services is a consideration for them to accept the Covid-19 vaccine.

CONCLUSION

Age, education, gender, and family income were identified as significant factors influencing the acceptance of the COVID-19 booster vaccine among individuals aged 18 years and older. Age was found to affect the level of knowledge regarding the COVID-19 booster vaccination. Moreover, a higher level of education increased both awareness and acceptance of the booster vaccine. In addition, sufficient family income enabled individuals to access and fulfill their needs for the COVID-19 booster doses provided through the national vaccination program.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest related to the research, authorship, or publication of this article.

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