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Refusal of COVID-19 booster vaccination among people living in remote tourism area, Samosir, Indonesia

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ABSTRACT

Background and purpose: Samosir Island is a tourist area located in the middle of Toba Lake, Sumatra. It was reported that the coverage of COVID-19 booster vaccination had not reached the national target. This study aims to determine factors associated with the refusal of the COVID-19 booster vaccination.

Methods: A community-based survey was conducted in the Sitiotio Sub-district of Samosir, from January to March 2023. Four out of eight villages were selected to represent the farthest and closer area. A multistage systematic random sampling was applied to select 156 out of 2073 households (HH). We interviewed 376 respondents to explore sociodemographic, experience of side effects of previous COVID-19 vaccination, comorbidities, family support, information, knowledge and perceptions. Booster vaccination status was determined through p-Care and immunization card. Descriptive, simple and multiple logistic regression were conducted.

Results: About 32.4% of respondents refused the COVID-19 booster for fear of vaccine side effects (95.5%), had been vaccinated against COVID-19 (91.8%), and believed that the COVID-19 virus was gone (66.4%). The refusal of boosters was higher for those with low education, experienced side effects, have comorbidities, no family support and insufficient information, had poor knowledge and perception about COVID-19 vaccinations. Lack of trust of COVID-19 vaccine (AOR=2.31, 95%CI: 1.05-5.07), high perceived barriers (AOR=4.75, 95%CI: 1.96-11.49) and low self-efficacy (AOR=4.94, 95%CI: 1.44-16.98), less family support (AOR=6.34, 95%CI: 1.89-21.26) and poor knowledge (AOR=7.74, 95%CI: 1.74-34.02) significantly associated with COVID-19 booster vaccination refusal.

Conclusion: Poor knowledge and perception of the COVID-19 vaccine and lack of family support increase refusal of the COVID-19 booster. Continuous evidence-based health promotion and family involvement can be carried out to increase public trust.

Keywords: COVID-19, booster vaccine, refusal, Health Belief Model, Samosir-Indonesia.

INTRODUCTION

The COVID-19 pandemic is the biggest global health disaster in this century and had affected the world's health and economy. Globally, there had been 766 million people infected including 6.94 million deaths since the initial discovery of cases until April 2023. Indonesia reported 6.7 million COVID-19 cases and 159 thousand deaths from March 2020 until April 2023.[1,2]

Vaccination against COVID-19 has been proven to reduce morbidity and mortality, as well as to form herd immunity in society.[3] Previous study reported a decrease in neutralizing anti-body titers after six months following the first and second doses of the COVID-19 vaccine, thus booster vaccination needed to improve the effectiveness of primary dose of COVID-19 vaccine.[3–7] Even though the effectiveness of booster vaccines had been proven, the coverage of COVID-19 booster vaccinationsin Indonesia was below the target.

As of May 2023, it was reported that the achievement of booster vaccinations in Indonesia was 37.9%, with lowest achievement rates in the provinces of Papua and West Sulawesi (<15%) and highest in the provinces of Jakarta (72.5%) and Bali (70.9%).[8] Higher vaccination rates were observed in a big city such as Jakarta or priority areas such as Bali, compared to other regions in Indonesia. For example, in North Sumatra Province, the coverage of booster vaccination of 42.7%, is far below the national target.[8] Although the Samosir District, one district in North Sumatera, had been reported by the health office with a booster vaccination achievement of 69.9%, which is slightly close to the national target, the Sitiotio Sub-district, a remote tourism area under the Samosir District, reported a slightly lower booster vaccination coverage of 68.2%. Somehow, if the reported coverage is true, this means one third of people are not vaccinated with COVID-19 booster dose, which still needs attention. Previous vaccination study showed that vaccinaction coverage reported by the program is always higher than the results of population survey,[9] thus there remains a possibility that refusal rate is higher in a community than the reported data.

Previous studies on acceptance and rejection of the COVID-19 booster vaccine in Indonesia had been carried out in the capital city of Jakarta and the tourist area of Bali. These studies used an online questionnaire, thus morelikely to represent respondents with the higher education and socio-economic.[10,11] The study found that perceptions or beliefs about vaccine efficacy, side effects, understanding of vaccines, trust in the health system, and knowledge about the benefits of booster vaccines for reducing transmission and increasing the effectiveness of previous vaccines were related factors. Another online study found that health and socioeconomic beliefs influenced acceptance of booster vaccinations.[12]

Outside Indonesia, studies using the Health Belief Model (HBM) concept found sociodemographic factors (age, gender, income, employment status, marital status and ethnicity), self-efficacy, perceived susceptibility, severity, benefits, history of side effects, health status, information, types and safety of vaccines related to increasing doubts about the COVID-19 booster.[6,13,14] Based on the above situation, this study aims to examine the COVID-19 booster refusal rate and factors associated with the refusal.

METHOD

Design and Setting

This was a community based crossectional survey which was conducted in Sitiotio, Samosir District, North Sumatra, which is a remote area surrounded by mountains. It consists of 8 villages with an area of 50.8 km², a population of 8,161 people, 2,073 households, an average of 4.44 people per household with a population density of 162 people per km2 in 2022. This area is mostly accessed by boat with a distance to the center of government ±52.8 km². There is one main public health center, namely the Sitiotio Public Health Center and eight satellite public health centers to provide health services in the area. The majority of the population work as farmers and are Batak Ethnic people.[15,16]

COVID-19 Vaccination Policy in Indonesia: COVID-19 vaccination (dose one and two) in Indonesia started on January 13, 2021 and has been carried out in stages to a target of 181.5 million people where the majority of vaccines used were Sinovac and AstraZeneca[4,17,18] as a primary dose vaccination. The administration of booster doses with the AstraZeneca, Pfizer-BioNTech and Moderna vaccines[4] started in January 2022, targeting people aged 18 years and over. The vaccination recording and reporting system is carried out through online applications, namely P-care vaccination, SMILE and Pedulilindungi. A person who receives a vaccination is given a vaccination card and can access the information within the Pedulilindungi application.[19]

Population and Sample

Target population of the study was residents aged ≥18 years who live in Sitiotio sub-district. The sample selection was carried out with multi-stages random sampling. The first stage was selecting 4 villages which represented difficult and easy to reach areas. Next step, household listings in the 4 selected villages were made as a sampling frame and sample size were allocated proportionally to population size in each district. A systematic random household selection was carried out in each village. In each selected household, interviews were conducted with all household members aged ≥18 years with inclusion criteria having received one and two doses of vaccine with proof of a vaccination card and/or Pedulilindungi application. Sample size was calculated using a two samples for hypothesis test formula[20], with 95% confidence level, 90% power, proportion of high perceived severity of COVID-19 infection among the vaccinated person 86.1%[21] and P1-P2 is determined arbitrary as 12%; resulted a total sample of n1=n2=342 persons.

Data Collection and Instruments: Data collection was carried out from January to March 2023 assisted by 4 trained interviewers (village health officers). The total number of samples succesfully interviewed were 376 people from 156 households. The research questionnaire was adopted and modified from previous research instruments on COVID-19 vaccination in Jakarta, Bali and China, and used the HBM theory.[6,11,12] The questionnaire contained a total of 60 questions, which required an interview time of ±30 minutes per person. Knowledge consisted of 12 questions with a score of 0 for incorrect answer and 1 for correct answer. Scores of correct answers were summed and categorized based on Bloom's cut off point (low, medium, and high).[22]

The perception questionnaire was divided into 5 sections: perceptions of susceptibility, severity, benefits,

barriers and self-efficacy with a scale of 1-4 (strongly disagree-strongly agree), then each score was added up. The median value is used as a cut off point to determine poor and good perceptions. Vaccination status was categorized as refuse and receive the COVID-19 booster vaccination based on written documents such as immunization card, P-care, and SMILE recording system. Sociodemographic characteristics (age, gender, education and occupation), history of comorbidities, history of side effects, family support and information (cues to action), perception and knowledge defined as independent variables, while vaccination status as the dependent variable.

Analysis Data

Descriptive analysis was performed to obtain the distribution of socio-demographic characteristics of respondents. The analysis continued with simple logistic regression to select independent variables with a p-value≤0.25. Multiple logistic regression analysis were carried out using the backward method to see which variables were significantly related to the refusal of COVID-19 booster. Two-sided p-value≤0.05, 95%CI, and AOR as a consideration of significance and assessing the chance of risk of the independent variable to the dependent variable.

This research received ethical clearance from the Ethics Commission of the Faculty of Medicine, Udayana University, number: 53/UN14.2.2.VII/12/LT/2023 dated 18 January 2022 and permission to collect data from the Samosir District Health Office, Number: 440.447/029/PUSK/I/2023 dated 05 January 2022.

RESULT

Table 1 shows slightly more than half (51.1%) respondents were male with median age of 46 years old. Almost half (48.9%) of them were at the age group of 18-45 years, graduated from high school (41.5) and the majority (82.7%) worked as farmers.

Table 1. Distribution of sociodemographic characteristics

Characteristics (N=376)	frequency	%
Sex		
Male	192	51.1
Female	184	48.9
Age (years)		
Median; Min–Max	46.0; 18-82	
18–45	184	48.9
46–59	92	24.5
≥60	100	26.6
Education		
No Education	60	16.0
Elementary–middle school	124	33.0
Senior high school	156	41.5
College	36	9.5
Employment		
Farmer	311	82.7
Entrepreneur	20	5.3
Student	7	1.9
Office employees	38	10.1

A third (32.4%; 95%CI: 27.7%-37.4%) of the respondents refused the COVID-19 booster for several reasons including fear of side effects, having been vaccinated before and believing that the COVID-19 virus has gone. In contrast, the two-thirds of respondents received the COVID-19 booster for the reasons such as it is a government policy, travel requirements and health reasons.

More than one third of the respondents (38.7%) admitted experiencing post-vaccination side effects, where the majority felt weakness (90.3%). Information had been mostly obtained from health workers and the government (Table 2).

Table 2. COVID-19 vaccination status and sources of information

Characteristics	N=376	%
Booster vaccination status		
Refusing booster	122	32.4 (27.7-37.4)
Receiving booster	254	67.6 (62.6-72.3)
Reasons for refusing booster vaccination* (n=122)		
Fear of side effects	117	95.9
Have been vaccinated	112	91.8
The COVID-19 virus is gone	81	66.4
Reasons for receiving booster vaccination* (n=254)		
Government policy	245	96.5
Travel conditions	201	79.1
Health	184	72.4
Visiting public places	164	64.6
Symptoms of previous vaccination side effects*	145	38.7
Weak	131	90.3
Fever	60	41.4
Pain	53	36.6
Nauseous	10	6.9
Red	10	6.9
Resources information*		
Health workers	322	85.6
Government	252	67.0
Family	177	47.1
Electronic	133	35.4
Internet	106	28.2
Print media	19	5.1

*Respondents are allowed to answer more than one.

Table 3 shows vaccination status based on sociodemographic characteristics. The tendency of refusing the COVID-19 booster was higher in the male group, the age group ≥60 years, and those who did not go to school.

Table 3. COVID-19 vaccination status based on sociodemographic characteristics

Variable	Booster Vaccine Status				COR	95%CI	p
	Refuse (n=122)	%	Receive (n=254)	%			
Sex							
Male	71	57.0	121	53.0	1.53	0.99-2.37	0.05
Female	51	47.7	133	52.3	Ref		
Age (years)							
≥60	42	42.0	58	58.0	2.05	1.11-3.78	0.02
46–59	24	36.1	68	63.9	1.65	0.99-2.75	0.05
18–45	56	30.4	128	69.6	Ref		
Education							
No Education	27	45.0	33	55.0	2.46	0.99-6.09	0.05
Basic–middle school	45	36.3	79	63.7	2.29	1.22-4.27	0.01
Senior high school	41	36.3	115	63.7	1.43	0.76-2.68	0.25
College	9	25.0	27	75.0	Ref		
Employment							
Farmer	108	34.7	203	65.3	4.52	1.56-13.07	0.01
Entrepreneur	7	35.0	13	65.0	0.71	0.15-3.22	0.65
Student	3	42.9	4	57.1	0.99	0.38-2.55	0.98
Office employees	4	10.5	34	89.5	Ref		

*COR=crude odd ratio, Ref=reference group

Table 4 shows that respondents who had lack of knowledge (47.1%), had a history of comorbidities (76.5%), a history of previous vaccine side effects (54.5%), did not receive family support (73.8%) and did not trust information about COVID-19 (61.4%), have a higher chance of rejecting the COVID-19 booster. In addition, respondents who had poor perceived susceptibility (62.4%), poor perceived severity (70.9%), poor perceived benefits (75%), poor perceived barriers (65.2%) and low self-efficacy (71.7%) have a higher chance of rejecting the booster.

Table 5 shows the final results of multivariable logistic regression modeling. Factors that were significantly related to refusal of the COVID-19 booster were cues to action: did not trust information about the COVID-19 vaccine and did not receive family support, perception factors: poor perceived barriers and poor self-efficacy, and low level of knowledge.

Table 4. COVID-19 vaccination status based on knowledge, cues to action and perception

Variables	Booster vaccine status				COR	95% CI	p
	Refuse (n=122)	%	Accept (n=254)	%			
Knowledge							
Low	49	47.1	55	52.9	3.35	1.99-5.61	<0.001
Medium	32	41.6	45	58.4	1.25	0.69-2.27	0.45
High	41	21.0	154	79.0	Ref		
Comorbid history							
Yes	26	76.5	8	23.5	8.23	3.64-19.03	<0.001
No	96	28.1	246	71.9	Ref		
History of side effects							
Yes	79	54.5	66	45.5	5.23	3.28-8.33	<0.001
No	43	18.6	188	81.4	Ref		
Lack of family support							
Yes	79	73.8	28	26.2	14.82	8.63-25.46	<0.001
No	43	16.0	226	84.0	Ref		
Did not trust COVID-19 vaccine information							
Yes	81	61.4	51	38.6	7.86	4.84-12.77	<0.001
No	41	16.8	203	83.2	Ref		
Perceived susceptibility							
Poor	106	62.4	64	37.6	19.66	10.82-35.73	<0.001
Good	16	7.8	190	92.2	Ref		
Perceived severity							
Poor	107	70.9	44	29.1	34.04	18.12-63.95	<0.001
Good	15	6.7	210	93.3	Ref		
Perceived benefits							
Poor	108	75.0	36	25.0	46.71	24.16-90.29	<0.001
Good	14	6.0	218	94.0	Ref		
Perceived barriers							
Poor	107	65.2	57	34.8	24.65	13.32-45.62	<0.001
Good	15	7.1	197	92.9	Ref		
Self-efficacy							
Poor	114	71.7	45	28.3	66.18	30.16-95.23	<0.001
Good	8	3.7	209	96.3	Ref		

*COR=crude odd ratio, Ref=reference group

Table 5. Multiple logistic regression of factors associated with COVID-19 booster vaccination refusal

Variables	Categories	Initial Model			Final Model		
		AOR	95%CI	p	AOR	95%CI	p
Sociodemographic							
Sex	Male	1.25	0.57-2.75	0.57			
	Female	Ref					
Age (Years)	≥60	1.22	0.41-3.46	0.71			
	46-59	0.58	0.18-1.92	0.38			
	18-45	Ref					
Education	No education	1.31	0.44-3.87	0.62			
	Basic–middle	0.85	0.23-3.03	0.80			
	Senior high	0.05	0.01-0.49	0.01			
	College	Ref					
Employment	Farmer	0.12	0.01-1.21	0.72			
	Entrepreneur	0.10	0.01-1.23	0.10			
	Student	0.32	0.01-1.23	0.07			
	Office employees	Ref					
Cues to Action							
Comorbidities	Yes	1.74	0.55-5.54	0.34			
	No	Ref					
History of side effects	Yes	0.67	0.26-1.76	0.41			
	No	Ref		Ref			
Did not trust COVID-19 vaccine information	Yes	2.84	1.09-7.40	0.03	2.31	1.05-5.07	0.037
	No	Ref					
Lack of family support	Yes	3.59	0.78-16.57	0.10	6.34	1.89-21.26	0.003
	No	Ref					
Knowledge	Low	6.11	1.25-29.86	0.02	7.74	1.76-34.02	0.007
	Medium	1.66	0.66-4.18	0.28	1.45	0.65-3.24	0.360
	High	Ref					
Perceived							
Perceived susceptibility	Poor	1.12	0.35-3.62	0.84			
	Good	Ref					
Perceived severity	Poor	1.51	0.46-4.96	0.50			
	Good	Ref					
Perceived benefits	Poor	3.47	1.00-12.05	0.05			
	Good	Ref					
Perceived barriers	Poor	4.23	1.48-12.09	0.01	4.75	1.96-11.49	0.001
	Good	Ref					
Self-efficacy	Poor	3.67	0.78-17.14	0.09	4.94	1.44-16.98	0.011
	Good	Ref					

*AOR=adjusted odd ratio, ref=reference group

DISCUSSION

This study found a relatively high rejection of the COVID-19 booster vaccination in Sitiotio sub-district which was related to lack of knowledge, distrust of information about COVID-19 and booster vaccine, high perceived barriers, poor self-efficacy and lack of family support.

The reason of respondents did not receive the COVID-19 booster was because they were worried about the side effects, had already received doses one and two that were perceived as sufficient to protect them against infection of the COVID-19, and believed that COVID-19 had disappeared. Previous studies reported similar reasons of booster refusal, included concerns about the vaccine safety and the belief on protection against SARS-COV-2 infection from previous two doses of the COVID-19 vaccine[24] and the reactions occurred after receiving the vaccine injection.[25] On the other hand, the reasons for receiving the COVID-19 booster vaccine is more related to government policy, travel requirements, health reasons and visiting public places which were not different from studies in Jakarta and Bali.[12] These reasons were different from the study of receiving the COVID-19 vaccine at the beginning of the pandemic, where people received vaccine because they were afraid of contracting COVID-19 and there were cases of new infection and high mortality.[12]

Perception on barriers to vaccination can come from themselves or others. Lack of information and distrust of information about COVID-19 and the COVID-19 vaccine have been noted as source of barriers.[25,26] Our finding was in line with other studies,[27,28] those with high perceived barriers more likely to reject the COVID-19 booster. Disbelief in the effectiveness of booster doses due to incorrect or lack of information is also a factor hindering acceptance of the COVID-19 booster.[10,14,29] Our findings support the importance of continuously disseminating evidence-based information about the COVID-19 vaccine to increase public trust.[26] Moreover, support by health providers and specific health education should target those who do not believe in COVID-19 and booster vaccines.[30]

Low knowledge about COVID-19 and booster vaccines is the main reason of rejecting the booster vaccination. Booster dose rejection was higher in individuals with low levels of literacy about COVID-19 and the COVID-19 vaccine.[14,31] The ability to gather and understand information and using their knowledge are necessary for the decision to receive the vaccination. Those with low e-health access and literacy are more hesitant to receive booster doses and ultimately reject the booster. They expected to receive additional information regarding boosters from official organizations like the government and health officials.[24,28,30,32]

At the study location, information at the start of the pandemic and the start of the COVID-19 vaccination was very intensively carried out in the community through face-to-face meetings, mass media, social media and involving all health and non-health policy stakeholders. Based on the immunization program report of Samosir Health Office, the coverage of the first dose of vaccination reached 100% and the second dose ≥92%. However, information at the time of booster vaccination was not given as intensive. This affected self-efficacy or self-motivation and people's trust in booster vaccines was low. In addition, there are villages with limited internet access, thereby limiting access to information to increase their knowledge. Moreover, around 47.1% of the population only had low education and never received basic education.[33]

Confirmed cases of COVID-19 were still occurring up to the booster vaccination phase. Most of the confirmed cases occurred among those who had received the full dose of vaccination and booster doses. This condition increased the wrong perception of the benefits and strengths of boosters, in addition to the lack of

continuous health promotion in the booster vaccination phase. They could have assumed that the risk of being infected with COVID-19 is less likely than the side effects caused after the injection of the booster. They were unsure whether the booster would protect them from infection and they witnessed severe side effects among vaccinated individuals. This can lead to refusal of the booster.[14,34,35]

Cues to action factors such as lack of family support are also associated with the risk of refusal of the booster. One of the inhibiting factors for health services in the family is the lack of knowledge, limited sources of information, and culture.[36] One third of the respondents did not receive family support to receive boosters and tended to refuse them. Another study[10,37] found that the decision to get a booster was heavily influenced by family support. Those without family support were almost twice as likely to refuse a booster vaccination. This finding is consistent with other studies,[14] those who does not provide support or does not receive support from family is more likely to refuse boosters. Consistently good normative influence can reduce doubts about receiving a COVID-19 booster. Strong recommendations from the government, health workers, support from trusted people in the community and families will influence the acceptance of the COVID-19 booster.

Our study indicates that people tended to accept vaccines because of government recommendations and refused vaccines because of concerns about the side effects of the COVID-19 vaccine. The local government and health office need to provide encouragement by rearranging service strategies or promulgating regulations regarding the mandatory COVID-19 booster vaccination. Rules regarding the obligation of boosters need to be implemented and a quick response from the community is needed, especially when other pandemic conditions occur in the future. Visiting public places, public service places and cultural events in the community should be prohibited if people have not had a booster. Health promotion activities through home visits and the dissemination of health information using leaflets can be carried out to reach rural communities and increase public knowledge due to the lack of accessible online information. Vaccination officers can carry out home visits for those who have not been vaccinated by involving stakeholders in the local community to increase the achievement of booster targets.

Our study has some limitations. The study was conducted in a remote village and most of the respondents had low education, including the elderly, some respondents may not understand the question properly. However, we tried to minimize this by reading questions directly and using the local language when necessary. We did not explore factors such as distance from home to vaccination services, income, marital status and other characteristics, which shoud be explored in the future studies.

CONCLUSION

A third of the respondents refused the COVID-19 booster vaccination. The reason for refusing the booster were fear of vaccine side effects, completion of previous doses of COVID-19 vaccination and belief that the virus was gone. Perceived barriers, low self-efficacy, distrust of information about COVID-19 and booster vaccines, as well as lack of family support and low level of knowledge have increased rejection of COVID-19 boosters.

Health promotion with a family approach, stakeholder involvement in the community, and dissemination of evidence-based promotional media need to be carried out continuously. The policy regarding the obligation to receive boosters needs to be widely disseminated to increase the achievement of COVID-19 boosters.

Vaccination service by home visits to those who have not been vaccinated or those with special needs can be considered.

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AUTHOR CONTRIBUTION

JIS designed research papers, collected and analysed data, compiled reports on study papers. AASS developed study concepts and designs, assisted and provided feedback on study results and manuscript writing. DPD provided input and feedback on study design, provided feedback on the preparation and writing of manuscripts.

CONFLICT OF INTEREST

There is no conflict of interest in this study.

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