



Service Quality Perception and Service Satisfaction of COVID-19 Vaccination in Indonesia: A Participant's Vaccination Perspective

Intan Zainafree¹✉, Chatila Maharani¹, Fitri Indrawati¹, Bambang Wahyono¹, Nadia Syukria¹, Maria M. Rosaria Patriajat², Mohammad Abdul Hakam³, Rahma Defi³, Hanif Pandu Suhito³

¹Faculty of Medicine, Universitas Negeri Semarang, Semarang, Indonesia

²Health Care Centre, Universitas Negeri Semarang, Semarang, Indonesia

³Semarang City Health Office, Semarang, Indonesia

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Abstract

The COVID-19 vaccine is a crucial effort to break the chain of transmission of COVID-19. To achieve optimal, effective, and efficient results in community program implementation, monitoring and evaluation are essential. The purpose of this study was to evaluate the implementation of COVID-19 vaccination in Semarang. So, it was known that service quality perception, service satisfaction, and willingness to recommend vaccination to others. This study is an analytic observational study with a cross-sectional design in 2022. The total number of respondents was 512 people. Data collection was carried out directly by visiting respondents who had received COVID-19 vaccinations at public health centers and vaccination centers. The data obtained is then processed and analyzed with the final model using Binary Logistic Regression. Respondents with basic education (4.67 ± 0.449) and those using the collective registration mechanism (4.51 ± 0.495) showed a positive correlation with perceived service quality. Of the 9 procedural suitability items, 4 received higher satisfaction scores: staff asking about regular medication use (4.41 ± 0.612), confirmed COVID-19 history (4.42 ± 0.598), close contact history (4.42 ± 0.609), and post-vaccination observation for side effects (4.43 ± 0.608), all with $p\text{-value} < 0.05$. Overall, respondents were satisfied with the service quality, with 26.5% willing to recommend vaccination to others. This indicates that the COVID-19 vaccination service is running effectively and appropriately.

Introduction

The first Coronavirus Disease (COVID-19) vaccination in Indonesia was administered on January 13, 2021, as part of the government's flagship program to suppress the spread of the virus and reduce the severity of the disease (Kementerian Kesehatan, 2021). This program has been scientifically proven to be one of the most effective strategies in controlling the pandemic (Aziz *et al.*, 2022; Sibanda and Haryanto, 2024). The initial vaccination strategy in Indonesia aligned with the recommendations of the World Health Organization (WHO), specifically prioritizing health workers operating in healthcare facilities.

This approach aimed to protect them physically, ensure the continuity of healthcare services, and provide a sense of security to the broader community (World Health Organization, 2020).

At the beginning of the implementation of the vaccination policy, the issue that circulated in society was the public's distrust of the safety and *halal* issues of vaccines from a medical and religious perspective. So, to overcome this, the government's strategy was to release the results of vaccine tests that have been carried out by the Food and Drug Supervisory Agency (BPOM) and to release a halal fatwa from the Indonesian Ulema Council (MUI) (Majelis

✉ Correspondence Address:

Department of Medicine, Faculty of Medicine, Universitas Negeri Semarang, Semarang, Indonesia
Email: intanzainafree@gmail.com

Ulama Indonesia, 2021). In addition, the Indonesian president became the first person to be injected with a vaccine to prove the safety of the vaccine content (Kementerian Kesehatan, 2021). This strategy has also been followed by regional heads to build public trust in vaccines. It is very important and highly dependent on the government's ability to communicate the benefits of vaccination and deliver vaccines safely and effectively (Mansoor, 2021; OECD, 2021).

Based on the initial trust-building strategy, the broader implementation of the national vaccination policy has played a vital role in strengthening public confidence in the effectiveness of COVID-19 vaccines. This has been strongly influenced by trust in health institutions and the government, which has been shown to significantly contribute to positive attitudes toward vaccination and increased public acceptance (Adhikari, Yeong Cheah and von Seidlein, 2022; Chung *et al.*, 2022). Public accessibility to vaccination services and perceived benefits of vaccination have also been identified as key determinants of public willingness to participate in the immunization program (Akther and Nur, 2022). To facilitate public access and encourage participation, the Indonesian government has provided easily accessible vaccination centers, including community health centers (Puskesmas), hospitals, and temporary mass vaccination sites (World Health Organization, 2023). This strategy has proven effective, as reflected in the city of Semarang, Central Java, which received presidential recognition for achieving high vaccination coverage, 124.36% for the first dose and 112.30% for the second dose relative to the provincial target (Wulan, Widianawati and wahyuni, 2024).

The high COVID-19 vaccination coverage achieved in Semarang was supported by innovative data management through a web-based platform known as Vaksinasi Terpadu COVID-19 Kota Semarang (VICTORI). (Prasetyorini, Larasati and Lituhayu, 2022) Developed by the Semarang City Health Office (DKK), this platform was accessible to healthcare workers, health facilities, and the public, enabling more coordinated and efficient vaccination efforts across the city. Despite this

success, no formal evaluation had yet been conducted to assess the quality of vaccination service delivery in Semarang, which limited efforts for continuous improvement. At the time this study was conducted in 2022, the COVID-19 pandemic was still ongoing, and the government had begun implementing the third (booster) dose of vaccination. In this context, ensuring high-quality vaccination services remains a crucial priority, not only from a technical standpoint but also from a psychological perspective. The uncertainty brought by the pandemic has triggered stress, loss of motivation, and a decline in physical health across all groups, including women and athletes (Sufyan *et al.*, 2022; Hermahayu *et al.*, 2022). Retrospective analyses from other countries have shown that effective vaccine rollout strategies, especially those supported by digital infrastructure and multisectoral coordination, can enhance public trust, promote equitable access, and strengthen the overall health system (Mathieu *et al.*, 2021; Salvatore *et al.*, 2022). Therefore, this study aimed to evaluate the implementation of COVID-19 vaccination services in Semarang during this critical period, focusing on healthcare service quality dimensions and public perceptions. The findings are expected to provide insights that support improvements in vaccination services and broader health system preparedness for future health crises.

Methods

This research is a cross-sectional study and was conducted in Semarang, Central Java, Indonesia. There are 37 community health centers, and we selected 8 community health centers representing geographic areas in the city and two vaccination centers coordinated by the Semarang Health Service. In this research, non-probability sampling techniques were used, especially convenience sampling techniques. Participants are people over 18 years who were vaccinated at the time this research was conducted (end of April to July 2022). while the study population is 18 years of age and over who have received the 2nd dose (until February 2022) in the study area, as many as 1,237,350 people (Dinas Kesehatan Kota Semarang, 2022). The minimum sample

size required after being calculated using Slovin's formula (margin of error, 5%) is 400 respondents. All subjects gave their informed consent for inclusion before they participated in this study. This study was conducted following the Declaration of Helsinki, and the protocol was approved by the Health Research Ethics Committee of Universitas Negeri Semarang (HERC number:199/KEPK/EC/2022).

The method used to recruit respondents is by identifying all people who meet the requirements and are willing to become respondents. After data collection, 513 questionnaires were collected. However, one was excluded because it was not filled out completely. So, the final total of questionnaires from respondents to be processed is 512. The number of questionnaires issued was small because there was a research team accompanying them during the questionnaire-filling period. A questionnaire consisted of five sections: respondent identity, condition of the current vaccination, compliance with vaccination procedures, quality perception, and satisfaction. The questions were developed by modification of the service quality questionnaire (SERVQUAL) by Parasuraman, healthcare service quality (HEALTHQUAL), and COVID-19 vaccination guidelines (for booster doses) (Berry, Parasuraman and Zeithaml, 1988; Lee, 2017). This modification was needed due to SERVQUAL is an instrument for service quality in general, and not specifically for health services. The HEALTHQUAL is an instrument for measuring healthcare quality in hospitals. Due to these reasons, the modification was necessary for special health service programs like the COVID-19 vaccination program. All sections are closed-ended questions. We developed the questionnaire based on a discussion with a health officer in the Semarang City Health Office. Before collecting the main data, we trialed the questionnaire in a COVID-19 vaccination center in the study area with 30 respondents. The trial respondents were not included in the analysis of the main data.

All independent variables (respondents' characteristics, current vaccination condition, and compliance with vaccination procedures) are in categorical data, nominal and ordinal. The score of service quality perception was

calculated by averaging all the aspects of the service quality perception score (continuous scale). After that, we did a normality test by Kolmogorov-Smirnov, and the result is not distributed normally. Next, we normalized the data using a data transformation test, but the data results were still not normal. So, we decided to use non-parametric tests. The Mann-Whitney analysis was carried out as a non-parametric test to find the significance of the difference between two averages, while the Kruskal-Wallis test was used as a non-parametric test to find the significance of more than 2 mean differences. Then, a non-parametric Mann-Whitney analysis was conducted to determine the correlation of procedure suitability with perceived quality and service satisfaction. Furthermore, bivariate analysis using Spearman was carried out to determine the correlation of overall satisfaction with perceptions of service quality. Finally, we analyze the existing variables with the final model using Ordinal Logistic Regression. All analyses were conducted using SPSS 22.0 (IBM Corporation, NY, USA)

Results and Discussion

The number of respondents who participated in this study was 512. Most respondents (63.5%) are male. There are 56.4% of respondents who have jobs with a low risk of being exposed to COVID-19, and 70.3% of respondents have received booster vaccines. The characteristics of the available respondents were then processed, and we correlated them with perceptions of quality and service satisfaction received by respondents. The results of the data processing are shown in Table 1.

The results of data processing shown in Table 1 show that respondents with basic education backgrounds perceive that the implementation of COVID-19 vaccination has been carried out with high service quality (4.67 ± 0.449) compared to the perceptions of respondents with other educational backgrounds. Based on the results of the processing, the collective COVID-19 vaccination registration mechanism is perceived to be of higher quality by respondents than registering independently. Each category showed that gender, age, address, occupation, education,

TABLE 1. Characteristics of Research Respondents Correlation with Quality and Satisfaction

Characteristics Respondent		Number (%) Mean \pm SD	Quality p-value	Mean \pm SD	Satisfaction p-value
Gender	Female	187 (36.5)	4,54 \pm 0,507	0.076*	4.41 \pm 0.592
	Male	325 (63.5)	4,44 \pm 0,571		4.35 \pm 0.644
Age Group	Adolescent	42 (8.2)	4,49 \pm 0,564	0.115**	4.48 \pm 0.505
	Young adult	236 (46.1)	4,41 \pm 0,586		4.39 \pm 0.646
	Adults	209 (40.8)	4,52 \pm 0,520		4.33 \pm 0.638
	Older	25 (4.9)	4,59 \pm 0,365		4.36 \pm 0.490
Domicile	Semarang City	432 (84.4)	4,47 \pm 0,564	0.900*	4.37 \pm 0.622
	Outside Semarang City	80 (15.6)	4,50 \pm 0,475		4.40 \pm 0.648
	High exposure risk of COVID-19	223 (43.6)	4,46 \pm 0,585	0.671*	4.38 \pm 0.609
	Low exposure risk of COVID-19	289 (56.4)	4,49 \pm 0,523		4.37 \pm 0.638
Education level	Basic Education	71 (13.9)	4,67 \pm 0,449	0.000**	4.34 \pm 0.696
	Secondary Education	274 (53.5)	4,47 \pm 0,549		4.35 \pm 0.635
	Higher Education	167 (32.6)	4,39 \pm 0,574		4.43 \pm 0.575
Vaccine doses	One dose	27 (5.3)	4,46 \pm 0,751	0.712**	4.33 \pm 0.832
	Two doses	125 (24.4)	4,44 \pm 0,575		4.19 \pm 0.668
	Booster dose	360 (70.3)	4,49 \pm 0,525		4.44 \pm 0.580
Vaccine type	Know the types of vaccines	498 (97.3)	4,47 \pm 0,554	0.659*	4.38 \pm 0.624
	Unknown type of vaccine	14 (2.7)	4,47 \pm 0,443		4.14 \pm 0.663
Vaccine location	Public Health Centre	329 (64.3)	4,48 \pm 0,536	0.211**	4.36 \pm 0.647
	Vaccination Centre	121 (23.6)	4,42 \pm 0,607		4.42 \pm 0.602
	Village/district	50 (9.8)	4,60 \pm 0,461		4.34 \pm 0.557
	School/campus	12 (2.3)	4,39 \pm 0,666		4.50 \pm 0.522

Vaccine	Cadre/Health worker	82 (16)	4,53 ± 0,480		4.39 ± 0.813	
	Village worker	140 (27.3)	4,50 ± 0,551		4.33 ± 0.568	
	School/Office/ Society/Organization	42 (8.2)	4,45 ± 0,747	0.361**	4.24 ± 0.617	0.122**
	Friends/relatives/family	125 (24.4)	4,42 ± 0,567		4.38 ± 0.577	
	Social media	123 (24)	4,47 ± 0,499		4.46 ± 0.590	
The rule of	Independent	61 (11.9)	4,23 ± 0,822		4.30 ± 0.587	
	Collective	451 (88.1)	4,51 ± 0,495	0.029*	4.38 ± 0.630	0.203*
How to register	Sign up directly	303 (59.2)	4,49 ± 0,478		4.39 ± 0.656	
	Through the website	127 (24.8)	4,46 ± 0,551		4.43 ± 0.542	
	Through the village cadre/devices	55 (10.7)	4,39 ± 0,692	0.378**	4.31 ± 0.605	0.085**
	School/office	27 (5.3)	4,47 ± 0,900		4.11 ± 0.641	

Note: *Mann-Whitney test; ** Kruskal-Wallis test; $\alpha = 0.05$.

Source: Primary Data, 2023

vaccine type, vaccine location, vaccine information, registration mechanism, and registration method had the same satisfaction ($\alpha > 0.05$). Respondents who received vaccine dose 2 (4.19 ± 0.668) and booster vaccine (4.44 ± 0.580) were more satisfied than respondents who received dose 1 vaccine ($\alpha < 0.05$). The COVID-19 vaccination service has been running for a long time, from the first dose vaccination policy until the implementation of the third dose policy for all societies now. This study assesses the implementation of the COVID-19 vaccination received by society, both in terms of service quality and level of satisfaction based on the perspective of the service they received. The results showed that the respondents' characteristics, such as gender, age, and occupation, were not related to perceptions of service quality and satisfaction. This was in contrast with several previous studies, which showed that gender was statistically significantly associated with satisfaction with health services received (Onyeonoro *et al.*, 2015; Rumi *et al.*, 2021; Chen *et al.*, 2016). Likewise, age and occupation correlated with the level of satisfaction with health services received (Chen *et al.*, 2016;

Jenkinson, 2002).

We found that the educational background of respondents was associated with their perception of service quality. The data showed that respondents with only a basic education (4.67 ± 0.449) reported a higher perception of service quality compared to those with higher educational attainment. This suggests that the level of education influences how individuals perceive and evaluate the quality of services they receive. Those with higher education tend to be more critical of their needs, leading to greater expectations and demands regarding the services provided. Consistent with our findings, previous studies have reported a correlation between patients' education levels and their perception of healthcare quality. Patients with lower education tend to accept healthcare services with fewer demands and often perceive the quality more positively (Munro and Duckett, 2016; Zhang *et al.*, 2020). Another study found that countries with a greater proportion of highly educated adults also tend to have higher vaccination rates (Raghupathi & Raghupathi, 2020; Lupu & Tiganasu, 2024). Similar findings have been reported in various international studies, where

individuals with higher levels of education were more likely to hold elevated expectations and apply more rigorous standards when assessing healthcare services, often resulting in lower satisfaction or perceived quality (Alanazi *et al.*, 2023; Yusefi *et al.*, 2022; Lewis *et al.*, 2004). This suggests that perceived service quality is shaped not only by the actual care delivered but also by patients' expectations and level of awareness regarding the healthcare system.

Based on the results of data analysis, it was found that the collective COVID-19 vaccination registration mechanism (4.51 ± 0.495) was perceived to be of higher quality than registering independently. In the context of the COVID-19 pandemic, vaccination is a war strategy in a country's national security emergency, so the collective mechanism is assessed and proven to be more effective than waiting for public awareness to vaccinate. This finding is reinforced by the results of a study on the legality of vaccination in the UK,

which shows that voluntary vaccination is an inappropriate policy; thus, it is necessary to improve policies to implement mandatory collective vaccination in the context of a severe and vaccine-preventable pandemic outbreak (Cave, 2017). The satisfaction level of respondents who received booster doses of 4.49 ± 0.525 was higher than respondents who received doses 1 or 2. This happened because respondents had previous experience of being injected with vaccines, so that experience influenced the assessment of service satisfaction received. In line with this study, positive attitudes were shown by respondents who received booster vaccines because they believed booster vaccines could strengthen protection and prevent the severity of COVID-19 (Wang *et al.*, 2022). However, research in Bangkok found the opposite fact that respondents' satisfaction with booster doses was low, which is caused by respondents already feeling enough with doses 1 and 2

TABLE 2. Scores of Item Conformance Procedures and Their Correlation with Quality and Satisfaction

No	The Suitability of Procedure		Number (%)	Quality		Satisfaction	
				Mean \pm SD	p-value*	Mean \pm SD	p-value*
1	Were you asked to complete your identity?	No	11 (2.1)	4,71 \pm 0,342	0.130	4.55 \pm 0.522	0.385
		Yes	501 (97.9)	4,47 \pm 0,306		4.37 \pm 0.627	
2	Did the staff measure your temperature before vaccination?	No	65 (12.7)	4,44 \pm 0,432	0,080	4.35 \pm 0.648	0.812
		Yes	447 (87.3)	4,48 \pm 0,566		4.38 \pm 0.623	
3	Did the staff measure your blood before vaccination?	No	9 (1.8)	4,72 \pm 0,458	0,075	4.56 \pm 0.527	0.400
		Yes	503 (98.2)	4,47 \pm 0,551		4.37 \pm 0.627	
4	Did the staff ask you about your allergy history?	No	51 (10.0)	4,53 \pm 0,411	0,901	4.31 \pm 0.510	0.248
		Yes	461 (90.0)	4,47 \pm 0,564		4.38 \pm 0.637	
5	Did the staff ask you about your previous medical history?	No	42 (8.2)	4,54 \pm 0,406	0,812	4.26 \pm 0.497	0.096
		Yes	470 (91.8)	4,47 \pm 0,561		4.38 \pm 0.635	
6	Did the staff ask you about your medication history regularly?	No	118 (23.0)	4,43 \pm 0,518	0,093	4.26 \pm 0.659	0.033
		Yes	394 (77.0)	4,49 \pm 0,560		4.41 \pm 0.612	
7	Did the staff ask you about your COVID-19 history?	No	105 (20.5)	4,46 \pm 0,553	0,945	4.20 \pm 0.699	0.003
		Yes	407 (79.5)	4,48 \pm 0,550		4.42 \pm 0.598	

No	The Suitability of Procedure	Number (%)	Quality		Satisfaction	
			Mean \pm SD	p-value*	Mean \pm SD	p-value*
8	Did the staff ask you about the close contact history with a COVID-19 suspect?	No 179 (35.0)	4,44 \pm 0,529	0,198	4.28 \pm 0.647	0.019
		Yes 333 (65.0)	4,49 \pm 0,562		4.42 \pm 0.609	
9	Were you asked to wait after being vaccinated to be observed (monitored) for side effects of the vaccine?	No 190 (37.1)	4,35 \pm 0,540	0,000	4.28 \pm 0.645	0.013
		Yes 322 (62.9)	4,55 \pm 0,543		4.43 \pm 0.608	

Note: *Mann-Whitney test with α 0.05

Source: Primary Data, 2023

Table 2 shows the perceived quality and satisfaction scores related to the scores for the procedure suitability items. Respondents who underwent an observation (monitoring) procedure for side effects after being vaccinated had a higher quality rating (4.55 ± 0.543) than respondents who did not undergo the procedure. From the 9 items on the suitability of the procedure, 4 items have more satisfaction than the other items, namely the procedures for staffs who ask for a history of taking drugs regularly (4.41 ± 0.612), procedures for staffs who ask for a confirmed history of COVID-19 (4.42 ± 0.598), procedures for staffs who asked for a history of close contact with patients with COVID-19 (4.42 ± 0.609), and the existence of an observation (monitoring) procedure for side effects after being vaccinated (4.43 ± 0.608) these four items had a p-value < 0.05 . Respondents received vaccinations through several procedures that had been adapted to WHO recommendations. These procedures were then assessed and linked to the respondent's perceived quality and satisfaction. We found that, firstly, the procedure of asking for a history of routine drug consumption had a high level of satisfaction compared to respondents who did not receive the procedure. Second, the procedure for asking for a confirmed history of COVID-19 and the procedure for asking for a history of close contact with a person with COVID-19. These three findings indicate that respondents are satisfied with the vaccination service after going through safety procedures regarding several questions asked by officers

related to their life history, especially their health. This finding is in line with previous research in which interpersonal interaction and empathy between patients and health workers are the strongest predictors of satisfaction with services received because of the formation of trust (Shan *et al.*, 2016; Rumi *et al.*, 2021). Other studies support this finding, emphasizing that health service quality is not solely dependent on technical execution, but also on how health personnel communicate and build trust with recipients. Therefore, a public health intervention must integrate broad-reaching education efforts with personalized, individual-level attention (Handayani *et al.*, 2023).

The procedure for observing (monitoring) side effects after being vaccinated (4.43 ± 0.608) received the highest satisfaction rating from the respondents and was the only procedure that was considered quality compared to other procedures. The observation procedure shows the responsible attitude of the vaccination operator to the respondent so that the respondent feels safe in getting the vaccine they receive. Research in India also found the same thing, that the satisfaction of respondents who underwent the procedure for observing vaccine side effects was higher than those who did not undergo the procedure (Ukey *et al.*, 2022). Individuals who underwent post-vaccination observation had a lower risk of post-acute COVID-19 syndrome (PASC), highlighting the importance of monitoring for long-term protection

TABLE 3. Score of Service Quality Perception Items and their Correlation with Overall Satisfaction.

	Service Quality Perception	Mean \pm SD	p-value	Spearman's Coef. Corr.
1	Information on location, schedule, requirements, and vaccination procedures is clear and precise	4.51 \pm 0.647	0.001	0.272
2	The quota/queue number for vaccination is easy for me to get	4.06 \pm 1.306	0.001	0.161
3	Information on the flow of vaccination services is clear and precise	4.48 \pm 0.737	0.001	0.343
4	The vaccination registration procedure is easy to do	4.56 \pm 0.732	0.001	0.336
5	The vaccination waiting room is comfortable and clean	4.42 \pm 0.775	0.001	0.349
6	The waiting room applies health protocols (has good air circulation and allows for social distancing)	4.42 \pm 0.831	0.001	0.352
7	The injection site is comfortable, clean, and protects the privacy/protects the genitals of vaccination participants	4.49 \pm 0.756	0.001	0.347
8	Implementation of timely vaccination	4.49 \pm 0.719	0.001	0.351
9	Queues for vaccine injections run regularly and quickly	4.51 \pm 0.708	0.001	0.367
10	Staff answered well, quickly, and precisely when I needed information / asked questions	4.55 \pm 0.660	0.001	0.346
11	Staff are capable and agile in their duties	4.60 \pm 0.588	0.001	0.369
12	Staff check my health condition (screening) properly so that I feel safe to be vaccinated	4.58 \pm 0.672	0.001	0.354
13	Staff perform the injection correctly	4.65 \pm 0.596	0.001	0.314
14	Staff ensure that my data is entered into Care Protect correctly	4.49 \pm 0.769	0.001	0.291
15	I have proof that I have been vaccinated	4.66 \pm 0.622	0.001	0.187
16	After the injection, I was asked to wait for the vaccine reaction (observation)	3.81 \pm 1.397	0.001	0.238
17	Vaccination staff are polite	4.61 \pm 0.619	0.001	0.374
18	Vaccination staff are friendly	4.62 \pm 0.632	0.001	0.379

Note: *Spearman test

Source: Primary Data, 2023

Table 3 shows the overall satisfaction score and its relationship to the scores for the perceived service quality items. Of the 18 items of service quality perception, all respondents were satisfied and very satisfied with the service quality (p-value < 0.05). Respondents were more satisfied with the item that the officer administered the injection correctly (4.65 \pm 0.596) and obtained evidence of having been vaccinated (4.66 \pm 0.622). We found that all respondents had a high level of satisfaction with the perceived quality of service received. From the 18 items of service quality perception, all respondents were satisfied and very satisfied with service quality (p-value < 0.05). The perception of service quality that gets the highest score is that the respondent receives proof of the vaccine after being injected. This

happens because the proof of a vaccine or, in this case, a vaccine certificate is needed to complete various requirements for society sustainability in Indonesia, which is what makes people feel satisfied after getting the certificate. Please note that the policies that apply in Indonesia regarding all activities to prevent and spread COVID-19 are monitored through the Care-Protect application, such as the implementation of the COVID-19 vaccination. People who have been vaccinated will get a proof of certificate that appears in the Care-Protect application less than 24 hours after being injected. This makes the respondents feel satisfied as well as the vaccine service is of good quality. In addition, the benefits of using this application can be enjoyed by accessing various government public services. The usefulness of

TABLE 4. Multivariate Ordinal Logistic Regression Model Effects of Suitability of Vaccination Procedures and Services on Perception and Satisfaction of Vaccination Service Quality

Variable	Estimate	Std.Error	Sig.	Odds Ratio	95% Confidence Interval
Quality					
Were you asked to wait after being vaccinated to be observed (monitored) for side effects of the vaccine? [0]	-0.634	0.200		0.531	-1.026 – 0.242
Satisfaction					
Did the staff ask you about your COVID-19 history? [0]	-0.582	0.302	0.054	0.559	-1.174 – 0.010
The quota/queue number for vaccination is easy for me to get [1]	0.887	0.388	0.022	2.428	0.126 – 1.648
The vaccination waiting room is comfortable and clean [2]	-4.986	1.635	0.002	0.007	-8.192 – -1.781
Staff are capable and agile in their duties [4]	-1.112	0.485	0.022	0.329	-2.063 – -0.161
I have proof that I have been vaccinated [4]	0.992	0.447	0.026	2.697	0.116 – 1.868
Vaccination staff are friendly [4]	-1.366	0.571	0.017	0.255	-2.486 – 0.246

Source: Primary Data, 2023

the application makes the society satisfied with the service received

All dependent variables were subjected to multivariate testing using ordinal logistic regression. The test results show that seven variables have a significance of <0.05 , which means they partially influence the perception of quality and satisfaction with COVID-19 vaccination services. Variables related to respondents' perceptions of quality and satisfaction with COVID-19 vaccination services are shown in Table 4. Based on the odds ratio in Table 4, respondents' perceptions of service quality tend to decrease by 0.53 times for respondents who are not asked to observe side effects after vaccination. In the service satisfaction category, respondents who received a proof certificate after being vaccinated increased their satisfaction trend by 2.69 times compared to those who did not receive proof of vaccination. Vaccine quotas that are difficult for respondents to obtain tend to reduce satisfaction by 2.42 times with vaccination services. In addition, waiting rooms that are uncomfortable and dirty tend to reduce satisfaction by 0.007 times compared to waiting rooms that are comfortable and clean. On the other hand, respondents who were not asked about their history of exposure to COVID-19

tended to decrease satisfaction by 0.05 times. Finally, when viewed from the perspective of vaccination service personnel, officers who are capable and agile increase the likelihood of respondent satisfaction by 0.32 times. Meanwhile, friendly officers also increased the tendency for respondent satisfaction by 0.25 times.

Finally, we found that the results of the multivariate ordinal logistic regression analysis showed that seven variables affect the tendency to increase respondents' perceived quality and satisfaction with COVID-19 vaccination. These variables were observed: side effects after vaccination, respondents who received a proof certificate after being vaccinated, vaccine quotas that are difficult for respondents, in addition, waiting rooms, respondents who were not asked about their history of exposure to COVID-19, vaccination staff who are capable, agile, and friendly. The physical comfort of the recipients of health services that are fulfilled is the main determinant of patient satisfaction (Jenkinson, 2002). Other research results show that aspects of administrative services, such as cleanliness of the waiting room, speed of service, and empathy from administrative officers, contribute greatly to patient satisfaction (Indarwati & Phuoc, 2018). In addition, emotional support,

such as empathy and positive attitudes from officers, also increased the level of satisfaction. Consistent with previous findings that public satisfaction with health center services is not only influenced by technical aspects, but also by clarity of procedures, fairness of service, and friendliness of officers (Sriatmi *et al.*, 2018), and makes service recipients willing to recommend to others (Jenkinson, 2002).

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