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QUALITY OF IMMUNIZATION REPORTING OF THE SEHAT INDONESIAKU APPLICATION AND COMPLETE INFANT IMMUNIZATION COVERAGE

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ABSTRACT
Immunization requires a quality recording and reporting system so that coverage information reflects actual service conditions. The Sehat Indonesiaku (ASIK) application is used as a digital system to support immunization recording and reporting, but in Gunungsitoli City there are still differences between ASIK data and manual recording and variations in coverage between regions. To analyze the relationship between the quality of ASIK-based immunization reporting and complete infant immunization coverage in the work area of UPTD Puskesmas within the scope of Gunungsitoli City in 2026. Observational quantitative analytical research with a cross-sectional design was conducted on 101 villages/sub-districts in the working area of eight UPTD Puskesmas Gunungsitoli City with total sampling techniques. Data were obtained through document audits, observations, officer clarifications, and secondary data from ASIK, immunization registers, infant/toddler cohorts, program recapitulation, target data, and officer data.. The analysis used Pearson correlation and hierarchical multiple linear regression by controlling for the number of health workers, internet access, and workload ratio. 54.5% of regions had adequate reporting quality, while infant complete immunization coverage in aggregate was 35.5%. The total score of reporting quality was positively and significantly related to immunization coverage ($r=0.867$; $p<0.001$). Completeness, timeliness, accuracy, and consistency were also significantly related ($p<0.001$). The regression model showed $R^2=0.752$. Improving the quality of digital recording, reconciliation with source documents, and monitoring data quality are needed to support data-based immunization program decision-making.

Keywords: data accuracy; digital health; health information systems; immunization coverage; primary health services

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INTRODUCTION

Immunization is the most strategic public health intervention to prevent immunization-preventable diseases (PD3I), reduce pain, and reduce infant and child mortality. Globally, coverage of the third dose of diphtheria, tetanus, and pertussis (DTP3) vaccines in 2024 will only reach 85%, and 14.3 million children will still have zero doses (World Health Organization., 2023). This gap underscores the need for valid coverage data so that lagging regions and target groups can be accurately identified. Administrative coverage depends on the accuracy of the numerator (infants who are recorded as having received complete immunization) and the denominator (target infant). Services that have not been recorded or are late inputs make coverage appear lower than the actual condition. Conversely, duplication and mistargeting make it appear higher (World Health Organization., 2020a). Therefore, coverage must be read alongside the quality of reporting, i.e. completeness, timeliness, accuracy, and consistency of data (World Health Organization., 2020b). Immunization data must also be fit for purpose to be worthy of being the basis for program action (Scobie et al., 2020).

In Indonesia, immunization recording and reporting has been digitized through the Sehat Indonesiaku Application (ASIK) since 2023 with real-time individual data. However, digitization does not automatically solve data quality problems. The implementation of ASIK is still constrained by officer workload, internet access, system integration, and paper-digital dual reporting (Aisyah, Setiawan, Lokopessy, et al., 2025). The city of Gunungsitoli faces this problem in real terms. Complete infant immunization coverage fluctuates, from 49.97% (2023) to 60.92% (2024), then drops to 47.39% (2025) in manual recording. ASIK data shows a similar pattern, namely 41.56%, 53.61%, and 39.83%. The manual-ASIK gap appears consistently for three years (8.40; 7.31; and 7.56 percentage points). In 2025, the largest gap will be in the Alo'oa Health Center UPTD (11.56 points), while the lowest coverage will be in the Idanoi Tolamaera Health Center (39.42% manual; 30.66% ASIK). This pattern indicates problems with accuracy and consistency of reporting that are systemic, not momentary, and risk causing errors in determining sweeping areas, incomplete targets, and supervise needs (Gunungsitoli City Health Office, 2025).

Several recent studies have examined related topics. (Aisyah, Setiawan, Mayadewi, et al., 2025) showed that ASIK as the first electronic immunization registry in Indonesia is useful for coverage monitoring, but is constrained by human resources and digital infrastructure. (Zarekar et al., 2025), through systematic review and meta-analysis, found that information and communication technology interventions generally improve coverage, timeliness, completeness, and accuracy of recording. Sawitri et al. (2021) in Bali found that differences in data sources (recall and register) resulted in different coverage conclusions. (Daka et al., 2025) show that the quality of immunization data in health facilities is influenced by data availability, report accuracy, verification documentation, and timeliness. (Kawakyu et al., 2023) emphasized that the quality of data in the Routine Health Information System (RHIS) is a prerequisite for effective management decisions.

These studies generally discuss information systems, evaluation of the implementation of electronic registries, or validation of coverage in general. This research differs in three ways. First, the quality of ASIK-based reporting was tested quantitatively in relation to complete infant immunization coverage. Second, the manual–ASIK gap is used as an entrance to assess the dimensions of completeness, timeliness, accuracy, and consistency of data. Third, the analysis was carried out at the UPTD Puskesmas level with a village/sub-district-based ecological approach in one city area, in line with the principle of data verification at the service level (World Health Organization., 2023). Studies with this kind of focus and analysis units are still limited, especially in archipelago areas with connectivity constraints such as Gunungsitoli. The purpose of this study is to analyze the relationship between the quality of ASIK-based immunization reporting and complete infant immunization coverage in the work area of UPTD Puskesmas within the scope of Gunungsitoli City in 2026. Practically, the results are expected to be the basis for the Health Office and UPTD Puskesmas to strengthen the reconciliation of ASIK with source documents, prepare officer coaching based on priority areas, and improve the accuracy of immunization program decisions. Scientifically, this study adds empirical evidence on the role of digital data quality on the achievement of immunization programs at the primary service level.

METHOD

This study uses an observational quantitative analytical approach with a correlational cross-sectional design to analyze the relationship between the quality of immunization reporting based on the Sehat Indonesiaku Application (ASIK) and complete infant immunization coverage (Pérez-Guerrero et al., 2024). The analysis unit is 101 villages/sub-districts in the working area of eight UPTD Puskesmas Gunungsitoli City with total sampling techniques. Data were obtained through document audits, observations, officer clarifications, and secondary data from ASIK, immunization registers, infant/toddler cohorts, program recapitulation, target data, and officer data. The quality of reporting was measured based on completeness, timeliness, accuracy, and consistency using a 20-item checklist with a score of 0–1, while complete infant immunization coverage was calculated

from the number of babies who achieved complete immunization status in January–June 2026 compared to the 2026 annual infant target. Data was processed through editing, coding, scoring, entry, cleaning, and tabulating.

The analysis was carried out in univariate, bivariate, and multivariate manners. Bivariate analysis used Pearson or Spearman correlation according to the results of the assumption test, while multivariate analysis used hierarchical multiple linear regression with variables controlling the number of health workers, internet access, and workload. The results were tested at a significance level of α=0.05 and evaluated based on correlation coefficients, p-value, R Square, Adjusted R Square, standardized beta, and 95% confidence interval. The instrument has gone through a content validity test using Aiken's V and a reliability test with Cronbach's Alpha/KR-20. The research has received ethical approval from the Health Research Ethics Commission of Universitas Prima Indonesia with Number 014/KEPK/UNPRI/VI/2026, dated June 5, 2026, and is carried out by maintaining the confidentiality and privacy of data in accordance with the principles of health research ethics.

RESULT

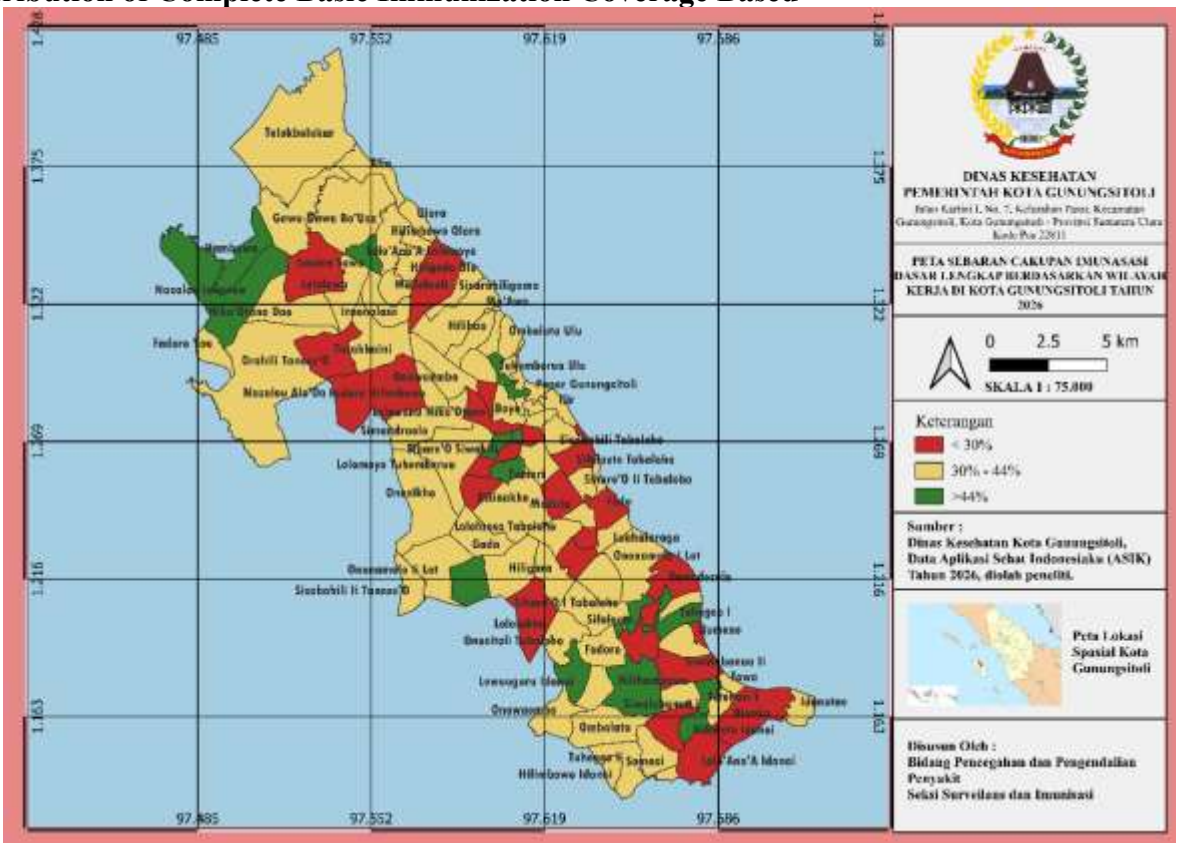
Informant characteristic

Table 1.
Frequency Distribution of Informant Characteristics

Informant Characteristics	f	%
Age		
18–35 years old	86	85,1
36–44 years old	13	12,9
45–59 years old	2	2,0
Education		
D3	93	92,1
D4/S1	8	7,9
Period of service as an immunization worker		
<1 year	10	9,9
1–5 years	66	65,3
6–10 years	12	11,9
>10 years	13	12,9
Have participated in immunization training		
No	92	91,1
Ya	9	8,9
Long use of ASIK		
<1 year	9	8,9
1–2 years	52	51,5
3–4 years	34	33,7
>4 years old	6	5,9
Have participated in ASIK training		
No	88	87,1
Ya	13	12,9

Based on the informant characteristics table, the majority of immunization workers are 18–35 years old (85.1%), educated in D3 (92.1%), and have a working period of 1–5 years (65.3%). Most of the informants have never participated in immunization training (91.1%). In the use of ASIK, the majority have used for 1–2 years (51.5%), while most have never participated in ASIK training (87.1%). In general, informants are dominated by workers of productive age with relatively intermediate work experience and use of ASIK, but most have not received formal training related to immunization or ASIK.

Distribution of Complete Basic Immunization Coverage Based



Source: Gunungsitoli City Health Office; ASIK for service counts January 1–June 30, 2026 with cut-off data July 13, 2026 and Pusdatin 2026 target data for mentioners, processed by researchers
Figure 1. Complete Basic Immunization Coverage Distribution Map Based on Working Areas in Gunungsitoli City in 2026

Gunungsitoli City's annual infant target in 2026 is 1,959 babies. Until the end of the analyzed service period, namely June 30, 2026, as many as 696 babies have achieved complete infant immunization status and are recorded in ASIK until the cut-off data of July 13, 2026. Using the 2026 annual infant target as a denominator, the aggregate Y value of Gunungsitoli City is 35.5%. The figure of 35.5% is a cumulative administrative achievement until the end of June 2026 against the 2026 annual target, not year-end coverage and not semester coverage with semester denominators. Bivariate and multivariate analysis uses Y values in each of 101 villages/sub-districts as an analysis unit.

At the health center level, the highest cumulative administrative achievement was found in the UPTD of the Gunungsitoli Idanoi District Health Center, which was 38.7% with 103 infants achieving IBL out of 266 annual targets. Furthermore, the highest achievement was followed by the UPTD of the South Gunungsitoli District Health Center at 37.3%, the UPTD of the North Gunungsitoli District Health Center at 37.0%, and the UPTD of the Gunungsitoli Alo'oa District Health Center at 36.5%. The lowest achievement was found at the UPTD of the Kauko Health Center of Gunungsitoli District at 31.4%, followed by the UPTD of the Idanoi Tolamaera Health Center at 32.2%.

At the village/sub-district level, the highest cumulative administrative achievement was found in Onozitoli Siforoasi Village at 54.8% with 17 infants achieving IBL out of 31 annual targets. Other high achievements were found in Sihareo II Tabaloho at 53.3%, Lelewonu Nikootano at 52.9%, and Hilihambawa and Loloana'a Idanoi at 52.4% each. The lowest achievement was found in Orahili Tanose'o and Tetehosi II, at 16.7%, respectively, followed by Humene at 18.2%, Sifalaete Tabaloho at 19.4%, and Lolofaoso Tabaloho at 20.0%.

ASIK-Based Immunization Reporting Quality

Table 2.
Distribution of Contextual Factors of Immunization Services in Villages/Urban Villages

Variabel	No	Indicator	Conform (f)	Compliant (%)	Not Suitable (f)	Inappropriate (%)
Reporting Completeness (X1)	1	Complete target identity	101	100,00	0	0,00
	2	Complete antigen types	101	100,00	0	0,00
	3	Full dosage	97	96,04	4	3,96
	4	Full service date	74	73,27	27	26,73
	5	Complete Location/Posyandu	37	36,63	64	63,37
	6	Full reporting recap	12	11,88	89	88,12
Reporting Timeliness (X2)	1	Input is carried out according to the service day or SOP	101	100,00	0	0,00
	2	Periodic reports are delivered on time	98	97,03	3	2,97
	3	No input delay	71	70,30	30	29,70
	4	Data updates are done regularly	12	11,88	89	88,12
Reporting Accuracy (X3)	1	ASIK data corresponds to the register	101	100,00	0	0,00
	2	Number of targets appropriate	100	99,01	1	0,99
	3	Antigen and dosage accordingly	91	90,10	10	9,90
	4	Service date according	51	50,50	50	49,50
	5	The recapitulation is done precisely	9	8,91	92	91,09
Reporting Consistency (x4)	1	Data compatibility between sources	101	100,00	0	0,00
	2	Data compatibility between periods	101	100,00	0	0,00
	3	No logical inconsistencies	89	88,12	12	11,88
	4	No duplication of data on reporting	49	48,51	52	51,49
	5	Compatibility of individual data and aggregate data	12	11,88	89	88,12

Based on the informant's characteristics table, the majority of immunization officers are 18–35 years old (85.1%), educated D3 (92.1%), and have a working period of 1–5 years (65.3%). Most of the informants have never participated in immunization training (91.1%). In the use of ASIK, the majority have used for 1–2 years (51.5%), while most have never participated in ASIK training (87.1%). In general, informants are dominated by productive-age officers with relatively moderate work experience and use of ASIK, but most have not received formal training related to immunization or ASIK.

Variable Control

Table 3.
Distribution of Contextual Factors of Immunization Services in Villages/Urban Villages

Variabel	f	%
Number of Health Workers (C1)		
1 orang	61	60,4
≥ 2 orang	40	39,6
Internet Access (C2)		
Unavailable/insufficient	10	9,9
Available/adequate	91	90,1
Workload (C3)		
≤ 30 babies per attendant	89	88,1
> 30–45 infants per attendant	9	8,9
> 45–60 babies per attendant	2	2,0
> 60 babies per staff member	1	1,0

Based on the table 3, most villages/sub-districts have 1 health worker who is responsible for immunization services, namely 61 villages/sub-districts (60.4%). Internet access in most villages/sub-districts is classified as available or adequate, namely 91 villages/sub-districts (90.1%). Meanwhile, the workload of immunization officers is mostly at a ratio of ≤30 babies per officer, which is 89 villages/sub-districts (88.1%). In general, the conditions of contextual factors indicate

that internet access and the workload of officers are relatively adequate, although most villages/sub-districts still have one health worker responsible for immunization services.

Bivariate Analysis

Table 4.
The Relationship between the Quality of Immunization Reporting Based on the Sehat Indonesiaku Application (ASIK) and Complete Infant Immunization Coverage

Independent variables	n	Correlation coefficient (r)	p-value	Direction and strength of the relationship	Verdict
Reporting completeness (X1)	101	0,815	<0.001	Positive, very powerful	H₀ rejected
Reporting timeliness (X2)	101	0,777	<0.001	Positive, strong	H₀ rejected
Reporting accuracy (X3)	101	0,818	<0.001	Positive, very powerful	H₀ rejected
Reporting consistency (X4)	101	0,815	<0.001	Positive, very powerful	H₀ rejected
Total reporting quality score (X)	101	0,867	<0.001	Positive, very powerful	H₀ rejected

Based on the table 4, all reporting quality dimensions had a positive and significant relationship with complete infant immunization coverage, with a total p value of <0.001. The strongest association was found in the total score of reporting quality (r=0.867), followed by accuracy (r=0.818), completeness and consistency (r=0.815 each), and timeliness (r=0.777). These results show that the better the quality of ASIK-based immunization reporting, the higher the tendency for complete infant immunization coverage. Thus, all H₀ was rejected and the quality of reporting, both as a whole and based on each dimension, was significantly related to complete infant immunization coverage.

Multivariate Analysis

Table 5.
Final Model Hierarchical Multiple Linear Regression Results of Complete Infant Immunization Coverage

Variabel	*B*	SE	Beta	*p-value*	t	95% CI *B*	Ket.
Number of health workers	0,331	1,036	0,019	0,750	0,320	−1,725–2,388	Insignificant
Internet access	0,682	1,540	0,024	0,659	0,443	−2,376–3,739	Insignificant
Workload ratio	0,012	0,041	0,016	0,779	0,281	−0,071–0,094	Insignificant
Completeness	0,120	0,055	0,247	0,032	2,173	0,010–0,231	Signifikan
Punctuality	0,094	0,047	0,191	0,048	2,001	0,001–0,188	Signifikan
Accuracy	0,124	0,061	0,240	0,044	2,043	0,003–0,245	Signifikan
Consistency	0,123	0,058	0,250	0,036	2,126	0,008–0,239	Signifikan
Konstanta	2,559	2,534	–	0,315	1,10	−2,472–7,590	Insignificant

Based on the results of the multivariate analysis, completeness (p=0.032), timeliness (p=0.048), accuracy (p=0.044), and consistency (p=0.036) were positively and significantly related to complete infant immunization coverage. Meanwhile, the number of health workers (p=0.750), internet access (p=0.659), and workload ratio (p=0.779) did not show a significant relationship, but were maintained as control variables. Based on standardized beta, consistency (β=0.250) had the strongest relative relationship, followed by completeness (β=0.247), accuracy (β=0.240), and timeliness (β=0.191).

DISCUSSION

The quality of ASIK reporting was dominated by the category of sufficient (54.5%), followed by poor (28.7%) and good (16.8%). ASIK has been used in all villages/sub-districts, but the quality of the data is not evenly distributed. The elements attached to service transactions are almost completely fulfilled, namely identity, antigen, dose, input on the day of service, and conformity with the register (96.04%–100%). The elements that demand action after service are very low, namely routine updates of 11.88%, accurate recaps of 8.91%, and the suitability of individual data with an aggregate of 11.88%. This pattern shows that the main obstacle is suspected to be not the

operation of the application, but the lack of a quality control routine after the service. This suspicion is hypothetical because the work flow of the officers is not directly observed.

These findings are in line with (Shama et al., 2021), which reported that the accuracy of delivery can be high while other quality dimensions are problematic. A similar thing can be seen here: 97.03% of reports are timely, but only 11.88% are regularly updated. WHO Indonesia (2026) also reported weaknesses in the uniqueness of records, date accuracy, and completeness in strengthening electronic registries. (Secor et al., 2022) emphasized that new registries are valuable if individual data can be used to find children who are left behind. This function depends on the completeness of dates (73.27%) and location (36.63%), which are weak in Gunungsitoli. In contrast to Aisyah, Setiawan, Lokopessy, et al. (2025) who place the internet as an obstacle, the internet here is available in 90.1% of the territory and is not significant in the model. This difference is likely because the binary size does not capture the stability of the network. The coverage of complete infant immunization of 35.5% (696 out of 1,959 targets) is the cumulative administrative achievement of January–June 2026 against the annual target. This figure is not equivalent to year-end coverage or coverage for 2023–2025. The range between villages (16.7%–54.8%) is much wider than between health centers (31.4%–38.7%), so that on average, health centers can cover pockets of underdeveloped areas.

All dimensions of reporting quality were positively correlated with coverage ($r = 0.777–0.818$; total score $r = 0.867$; $p < 0.001$). The control variable alone explained only 2.1% variation ($p = 0.558$). The addition of the fourth dimension increased the R^2 by 0.731 to 0.752 (Adjusted $R^2 = 0.734$; $F = 40.390$; $p < 0.001$). Two paths can explain this relationship. First, service visibility: services only enter the numerator if they are recorded as complete, up-to-date, accurate, and consistent, as estimated coverage changes after register validation (Sawitri et al., 2021). Second, the use of data for actions such as incomplete infant tracking and sweeping (Yusuph et al., 2024). Daka et al. (2025) also showed that the accuracy of verification reports and documentation determines the quality of immunization data. This study differs from the study because it examines the quantitative relationship of the four dimensions of quality with coverage at the village/sub-district level, after structural factors are controlled.

The four dimensions are standardized beta adjacent (0.191–0.250), so there is no dominant dimension. In the framework of Donabedian (1988), the structure only provides capacity, while the results depend on the reporting process. Therefore, improvement needs to cover all four dimensions at once. Practically, four weak points are after the service, so monthly reconciliation between the manual registers of Posyandu and ASIK needs to be prioritized in health centers with high gaps, namely Alo'oa, Idanoi Tolamaera, and Gunungsitoli (Ministry of Health of the Republic of Indonesia and PAEI, 2023). This study has several limitations. The cross-sectional design cannot ensure cause and effect. The reporting quality and coverage are both sourced from ASIK so that the correlation can be magnified mechanically, and unmeasured factors (geographic access, vaccine stock, community acceptance, supervision) can be the confounder. The quality score comes from dichotomous indicators, the Y variable uses the semester period against the annual goal, and the control variable is still simple. The accuracy and consistency of VIF is slightly above 5 and the presence of outlying candidates requires caution in interpreting partial coefficients. Ecological analysis also cannot be generalized to the individual level (ecological fallacy) or to other regions. Follow-up research should use longitudinal or quasi-experimental designs, qualitative studies, multilevel analysis, and independent validation through household surveys.

CONCLUSION

The conclusion of the study shows that the quality of ASIK-based immunization reporting, including completeness, timeliness, accuracy, and consistency, is positively and significantly related to complete infant immunization coverage, with consistency as the dimension that has the strongest

relative relationship. This study contributes to providing empirical evidence that improving the quality of reporting data can support the achievement of immunization coverage. The implication is that strengthening the quality of inputs, updates, verification, and consistency of ASIK data needs to be part of the management of immunization programs. This study is limited to 101 villages/sub-districts in Gunungsitoli City and uses data from 2026, so further research is recommended to involve a wider area and period and evaluate other factors that can affect immunization coverage.

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