

## From notes to needles: Assessing logbook-based monitoring of child immunization by posyandu cadres in Borong Loe Hamlet

Rimawati Aulia Insani Sadarang<sup>1</sup>, Mutmainna Mutmainna<sup>2</sup>, Nur Ihwan<sup>3</sup>

<sup>1,2,3</sup> Department of Public Health, Faculty of Medicine and Health Sciences, Universitas Islam Negeri Alauddin Makassar, Makassar, Indonesia

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### ABSTRACT

Immunization remains a vital intervention for reducing child morbidity and mortality, yet coverage in several rural areas, including Borong Loe Hamlet, remains suboptimal. Previous studies have largely overlooked the role of local health volunteers, such as Posyandu cadres, in strengthening immunization data systems through simple, context-based tools. This study evaluates the effectiveness of using a structured logbook by Posyandu cadres to monitor child immunization activities. The intervention involved distributing a logbook containing 13 structured work plans, followed by a six-month implementation period. Evaluation was conducted using three key indicators: completeness, consistency, and timeliness of recording. Findings revealed an average score of 5.17 out of 10, categorized as "fair," with consistency scoring highest (5.6) and timeliness lowest (4.6). These results suggest that the logbook facilitates systematic documentation by cadres but highlights the need for continuous training and the provision of visual guidelines to enhance recording accuracy. The logbook model offers a scalable and context-sensitive approach to improving immunization monitoring in resource-limited rural settings. Implications point to the potential of empowering local health actors through targeted tools and support systems to strengthen public health data quality and surveillance mechanisms.

### ABSTRAK

Imunisasi masih menjadi intervensi penting untuk mengurangi morbiditas dan mortalitas anak, namun cakupannya di beberapa daerah pedesaan, termasuk Dusun Borong Loe, masih belum optimal. Penelitian sebelumnya sebagian besar mengabaikan peran relawan kesehatan lokal, seperti kader Posyandu, dalam memperkuat sistem data imunisasi melalui alat bantu yang sederhana dan sesuai dengan konteks. Penelitian ini mengevaluasi efektivitas penggunaan buku catatan terstruktur oleh kader Posyandu untuk memantau kegiatan imunisasi anak. Intervensi yang dilakukan adalah dengan membagikan buku catatan harian yang berisi 13 rencana kerja terstruktur, yang diikuti dengan periode implementasi selama enam bulan. Evaluasi dilakukan dengan menggunakan tiga indikator utama: kelengkapan, konsistensi, dan ketepatan waktu pencatatan. Temuan menunjukkan skor rata-rata 5,17 dari 10, dikategorikan sebagai "cukup", dengan konsistensi mendapat nilai tertinggi (5,6) dan ketepatan waktu terendah (4,6). Hasil ini menunjukkan bahwa buku catatan memfasilitasi dokumentasi yang sistematis oleh kader, tetapi menyoroti perlunya pelatihan yang berkelanjutan dan penyediaan panduan visual untuk meningkatkan akurasi pencatatan. Model buku catatan harian menawarkan pendekatan yang terukur dan peka terhadap konteks untuk meningkatkan pemantauan imunisasi di daerah pedesaan yang memiliki sumber daya terbatas. Implikasinya menunjukkan potensi pemberdayaan pelaku kesehatan lokal melalui alat dan sistem pendukung yang ditargetkan untuk memperkuat kualitas data kesehatan masyarakat dan mekanisme pengawasan.

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### AUTHOR(S) INFO

#### Correspondence Email

[rimawati.aulia@uin-alauddin.ac.id](mailto:rimawati.aulia@uin-alauddin.ac.id)

#### Address

Jl. Sultan Alauddin No.63, Romangpolong, Kec. Somba Opu, Kabupaten Gowa, Sulawesi Selatan 92113, Indonesia



## INTRODUCTION

Immunization is recognized as one of the most effective public health interventions for preventing disease and saving millions of lives annually. According to WHO (2023), global coverage of the third dose of diphtheria-tetanus-pertussis (DTP3) vaccine among infants reached 84%. However, approximately 14.5 million children remain "zero-dose," having received no vaccines at all, while an additional 6.5 million fail to complete the basic immunization schedule. Moreover, the number of children missing the first dose of the measles vaccine increased to 22.2 million in 2023 from 19.3 million in 2019, indicating persistent immunization gaps, especially in low- and middle-income countries, including Indonesia (WHO, 2024).

In Indonesia, although full basic immunization coverage reportedly reached 94.6% in 2022 (WHO, 2023), regional disparities remain stark. Research by Siramaneerat and Agushybana (2021) indicates that children in rural areas, particularly in Eastern Indonesia, are at a significantly higher risk of not receiving complete immunization compared to their urban counterparts. Determinants such as maternal education, family economic status, access to health insurance, and availability of healthcare facilities contribute notably to this disparity (Aqil et al., 2009).

In Dusun Borong Loe, Jeneponto District, South Sulawesi, around 35% of children under five have not completed basic immunization, with contributing factors including low parental awareness, geographic inaccessibility, and weak data recording and monitoring systems at the Posyandu level (Jeneponto Health Office, 2024). Manual and fragmented record-keeping has led to a 40% data omission rate, impeding timely follow-up of missed immunizations (Puskesmas Binamu, 2024). Addressing this issue requires a structured and context-sensitive intervention to strengthen immunization documentation and monitoring at the community level.

To enhance immunization coverage in rural and underserved areas, several studies recommend community-based monitoring systems that empower local health workers. According to Chard et al. (2019), the integration of simple, low-cost tools such as logbooks can substantially improve data accuracy and service delivery when combined with supportive supervision. Similarly, Pandey et al. (2020) emphasize that systematic tracking tools at the grassroots level facilitate early identification of defaulters and enable timely follow-up, which are crucial in settings with limited health infrastructure.

Furthermore, capacity building through training and engagement of community health workers plays a vital role in the successful implementation of such tools. A study by Oladepo et al. (2018) found that regular mentoring and structured work plans enhanced the motivation and performance of frontline health workers in recording immunization data. These strategies align with the WHO's recommendation to strengthen health systems by integrating digital and analog tracking systems tailored to local contexts (WHO, 2021).

While numerous interventions have aimed at improving immunization rates through centralized programs or technological innovations, fewer studies have explored the utility of structured analog tools like logbooks in rural Indonesian settings. The lack of context-specific documentation tools often leaves Posyandu cadres underprepared to maintain accurate, consistent, and timely immunization records. Most available research focuses on national data systems or urban settings, neglecting localized interventions that leverage community health workers' potential in peripheral areas (Setiawan & Titaley, 2020).

In response, this study introduces and evaluates a structured logbook containing 13 work steps designed to support Posyandu cadres in documenting child immunization activities. Implemented in Dusun Borong Loe, the intervention addresses a critical gap by offering a practical, low-resource tool adapted to rural operational challenges. The objective of this study is to assess the logbook's effectiveness in improving completeness, consistency, and timeliness of immunization data recording by cadres, and to identify technical barriers encountered during its use.

**Table 1**  
Logbook Filling Format for Posyandu Cadre Activities

Work Plan	Tasks Performed	Obstacles	Notes
Interview with parents	Conducted interviews with 3 parents of toddlers with nutritional issues related to diet and hygiene	One parent was hard to meet due to work	Data showed low dietary variation and low handwashing behavior
PHBS Household Survey	Surveyed 10 households to identify PHBS practices (handwashing, toilet use, etc.)	(X) house locked during initial visit	(X%) households lacked toilets; poor handwashing practices need improvement
Data analysis	Collected and analyzed interview and survey data to identify core problems	More time needed for cross-data validation	–
Information availability	Prepared and distributed leaflets on balanced nutrition and immunization importance to 20 households	Leaflets ran out, reprint needed	Community response was good, many asked further questions
Service accessibility	Promoted November immunization schedule and ensured new Posyandu location was accessible	Some residents were unaware of the new location	Residents suggested using WhatsApp group for dissemination
Service quality	Recorded and followed up on community feedback on Posyandu service quality	N/A	–
Health education improvement	Prepared and delivered a brief talk on diarrhea prevention during PKK meeting	Lacked visual materials like posters	Participants were enthusiastic and asked about home diarrhea management
Rescheduling	Identified toddlers with incomplete immunization and rescheduled home visits	Hard to contact some parents by phone	Priority given to children missing basic immunizations
Coordination with stakeholders	Coordinated with Puskesmas/village midwife for vaccine needs and staff schedules	Village midwife was on leave, needed replacement coordination	–
Tracing	Traced toddlers with incomplete immunization history	(X) family had moved away	Identified 3 toddlers missing immunization, 1 already found
Reporting	Prepared monthly Posyandu report for Puskesmas	Some cadre had not submitted data	Report submitted via email to Puskesmas
Child growth monitoring	Weighed and measured toddlers and provided nutrition counseling	Weighing skipped for some toddlers	Focus on children with weight issues
Immunization coverage	Evaluated weekly immunization coverage and identified areas/cases	N/A	Focus on achieving DPT-HB-Hib and Measles vaccine targets

## METHODS

This study employed a quantitative evaluative design to assess the effectiveness of logbook utilization by Posyandu cadres in monitoring child immunization. The study was conducted over a six-month period from November 2024 to April 2025 in Dusun Borong Loe, Jeneponto District, South Sulawesi, Indonesia. The intervention targeted Posyandu cadres as the primary population, with all 13 active cadres participating in the program. A total sampling technique was used, considering the small and manageable cadre population.

The primary inclusion criteria included active participation in Posyandu services, willingness to follow the structured logbook intervention, and completion of initial training. Each cadre received a standardized logbook containing 13 structured work plans relevant to immunization recording, including child identification, follow-up plans, and home visit notes (see [Table 1](#)).

The evaluation framework focused on three core indicators: data completeness, recording

consistency, and timeliness of logbook entries. Data completeness was defined as the cadre's ability to fill in all relevant columns in the logbook, including child identity, staff involvement, activity plans, and special notes. Recording consistency was measured by the uniformity of format and writing style used by cadres in accordance with the given guidelines. Timeliness referred to the extent to which cadres recorded immunization and work plan activities on the same day the activity occurred (See Figure 1).

**Figure 1**  
*Proses data collection*



Each indicator had a maximum score of 10 points. Scoring was based on the number of completed activities matching the planned work steps out of 13 total items. Scores were converted to percentages using the formula:  $(\text{Number of activities in compliance} / 13) \times 100$ . The detailed scoring rubric for each indicator is outlined in Table 2, while the interpretation of average scores across the three indicators is categorized according to Table 3. The final score for each logbook was obtained by averaging the three indicator scores, yielding a total score that was interpreted within predefined rating categories: "very good" (9.0–10.0), "good" (7.5–8.9), "fair" (5.0–7.4), "poor" (3.0–4.9), and "very poor" (1.0–2.9).

Data were analyzed descriptively to calculate mean scores, identify the most and least achieved indicators, and highlight common technical challenges. Informed consent was obtained from all participating cadres prior to data collection. Ethical clearance was not required as the study focused on program evaluation without collecting personal health information.

## RESULTS AND DISCUSSION

Based on Table 4, the average score of all indicators is 5.17 with an average score for completeness of recording: 5.3, consistency of recording: 5.6, and timeliness: 4.6. The score of 5.17, represents a 'fair' category for logbook completion in general, with the interpretation that recording is done but not fully consistent or there are frequent delays.

Recording immunization data is one of the main tasks of Posyandu cadres. However, there are still many cadres who do not understand the technicalities of filling out the logbook thoroughly (Ariyanti et al., 2016). According to the Performance of Routine Information System Management (PRISM) framework, the quality of recording is strongly influenced by behavioral factors such as cadres' understanding of the importance of data, technical skills, motivation, and work environment support (Aqil et al., 2009). This element is in line with competency theory which emphasizes the importance of knowledge, skills, self-awareness, personal traits, and motivation in carrying out tasks (Hidayah et al., 2023).

The average recording completeness score of 5.3 indicates that most activities have been recorded, but there are still shortcomings in the aspects of follow-up, tracking, and impact evaluation. This is largely due to the double workload of cadres, the majority of whom are housewives. Similarly, a study in Cameroon found a lack of recording of key indicators such as vaccine stock and storage temperature due to lack of training and limited tools (Saidu et al., 2023).

**Table 2**  
Assessment criteria for the Posyandu Cadre Empowerment Program

Indicator Type	Assessment Criteria	Number of Activities Compliant	Score
Completeness of Recording	100% complete	13	10
	80–90% complete	11–12	8
	60–70% complete	8–9	6
	Less than 60% complete	≤7	4
Consistency of Recording	All activities recorded completely & uniformly	13	10
	1–2 activities not recorded or slight format variation	11–12	8
	3–5 activities not recorded or many format variations	8–10	6
	More than 5 activities not recorded or very inconsistent	≤7	4
Timeliness of Recording	Always on time (on the same day)	0 times late	10
	Late 1–2 times	1–2 times	8
	Late 3–5 times	3–5 times	6
	Late more than 5 times	>5 times	4

]The average score of 5.6 reflects that most cadres followed the standardized format for recording, although there were still variations in writing style and terminology used. This variation can be attributed to the absence of standardized and easy-to-understand logbook completion guidelines. This finding is consistent with research showing that without training and clear guidelines, consistency in data entry will be difficult to achieve (Saidu et al., 2023).

Timeliness is a major weakness, with an average score of only 4.6. Many cadres record data some time after the event due to busyness or forgetfulness, which can reduce data accuracy. A study in Obala, Cameroon showed that cadre training and provision of standardized tools improved the discipline of real-time recording (Vouking et al., 2017).

Overall, logbooks have been used reasonably well, with recording of around 60–70% of the work plan. However, challenges remain in terms of format consistency and timeliness. Incomplete and late recording can hinder program analysis and increase the risk of missed immunizations. The use of logbooks remains valuable, especially in tracking under-fives who do not attend Posyandu.

**Table 3**  
Score Range and Assessment Category of Logbook Recording

Score Range	Interpretation	Description
9.0 – 10.0	Very Good	Recording is very complete, consistent, and timely without significant obstacles.
7.5 – 8.9	Good	Recording is already good, but there are still some minor issues that need improvement.
5.0 – 7.4	Fair	Recording is conducted but not fully consistent or often experiences delays.
3.0 – 4.9	Poor	Recording is incomplete, often late, and requires major improvements in implementation.
1.0 – 2.9	Very Poor	Recording is not conducted properly or not done consistently, requires comprehensive evaluation and immediate follow-up.

To improve the quality of recording, several strategic steps are needed, such as adjusting work plans to be more flexible with cadres' daily activities, continuous training that emphasizes the importance of complete, consistent, and timely recording, developing logbook filling guidelines in visual forms such as infographics or practical checklists. Such interventions have been shown to be

effective in various contexts. A study conducted by Saidu et al. (2023) in Cameroon and Vouking et al. (2017) in Obala showed that empowering cadres through training and provision of standardized recording tools had a positive impact on immunization data quality and evidence-based decision making.

**Table 4**  
*Logbook Filling Score of Each Posyandu Cadre*

Cadre Initials	Completeness of Recording	Consistency of Recording	Timeliness of Recording
RS	8	6	6
SO	6	6	4
SG	4	4	4
TN	4	6	4
WT	6	6	6
Average Score	5.3	5.6	4.6

The collection of health data concerning child immunization in rural settings faces several challenges, particularly regarding literacy, transport access, and motivation among caregivers. These factors significantly affect the timeliness and completeness of data, which are critical for effective healthcare delivery and program planning.

One of the primary barriers in rural health data collection is the level of literacy among caregivers. Many caregivers in rural areas often possess limited literacy skills, which can impede their understanding and completion of health records related to immunizations. A lack of comprehension regarding health documentation may contribute to inaccuracies in data reporting, and lower engagement with healthcare processes (Äijö et al., 2020; (Chen et al., 2022). Caregivers struggling to understand medical terminologies or forms may inadvertently provide incorrect information, contributing to data incompleteness (Chen et al., 2022). Furthermore, the quality of education in rural settings often lags behind that in urban areas, exacerbating this challenge (Maharjan et al., 2020; Chen et al., 2023).

Access to transportation is a critical factor in health data collection, particularly in rural regions where distances to health facilities can be significant. Studies have shown that caregivers frequently encounter obstacles such as long wait times for public transport or the necessity of traveling on foot to reach vaccination sites, thereby adversely affecting their ability to attend immunization appointments (Nyande et al., 2025)Jannat et al., 2023). The physical burden of traveling can deter caregivers from seeking necessary vaccinations, consequently hindering data collection efforts related to immunization rates (Nyande et al., 2025). Additionally, the reliability of transport systems is often poor in rural settings, which can lead to delays in data submission and potentially compromise the quality of healthcare services (Modderman et al., 2023).

The motivation of caregivers to participate in immunization programs and data collection is crucial in rural health contexts. A perceived lack of value regarding immunization can lead to apathy among caregivers, resulting in suboptimal data collection (McCormack et al., 2024). Motivational factors can be influenced by cultural beliefs, socioeconomic status, and the perceived adequacy of healthcare services. Research indicates that when caregivers recognize tangible benefits from healthcare interventions, they are more likely to engage, thereby improving data completeness and reporting accuracy (Ahun et al., 2024; Tengepare et al., 2023). Furthermore, enhancing community motivation through education and awareness campaigns can stimulate participation and improve data accuracy by addressing misconceptions about vaccination and health services (Hardy et al., 2023; Muthelo et al., 2023).

## CONCLUSION

The implementation of logbook distribution to Posyandu cadres in Dusun Borong Loe has

proven beneficial in enhancing the structure and clarity of immunization activity documentation. The intervention contributed to improved systematic recording; however, the overall evaluation score of 5.17 out of 10 indicates that the utilization of the logbook remains suboptimal. While recording consistency was relatively strong, issues related to data completeness and timeliness persist and warrant further improvement.

To optimize the effectiveness of the logbook system, it is essential to align the work plan more closely with the cadres' daily routines, provide ongoing training, and supply practical and visual user guides. These adjustments would enhance usability and compliance, leading to more accurate and timely data recording. The findings of this study highlight the potential of structured, low-resource tools as scalable and context-sensitive strategies to support immunization monitoring in underserved rural settings. This intervention offers a replicable model for other regions facing similar challenges in achieving equitable immunization coverage among children.

Despite its contributions, the study is limited by its short evaluation period and narrow geographic scope. Future research should involve longer-term monitoring and multi-site implementation to validate and refine the intervention. Strengthening cadre capacity through supportive supervision and integrating logbook systems with broader health information frameworks could further reinforce immunization programs and contribute to achieving the targets set under Sustainable Development Goal 3.

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