Relationship Between Cadres Knowledge and Ability to Document Arumdalu Integrated Service Posts *(Posyandu)* Information System Reports

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ABSTRACT

The high demands of administration and activities report at Integrated Service Posts (*Posyandu*) requiring cadres skills in documenting data accurately. In this field, the reality shows that many cadres lack adequate knowledge regarding. The *Posyandu* information system, especially the Arumdalu *Posyandu*. Therefore, this study aimed to determine the relationship between cadres' knowledge and ability to document reports on the Arumdalu *Posyandu* information system. The quantitative analytical research design used a cross-sectional, longitudinal (pre-post digital training), and mixed methods approach, complemented by Social Network Analysis (SNA). The research sample consisted of 60 *Posyandu* cadres at the Arumdalu *Posyandu* in the Sanggrahan Health Center working area, Sukoharjo Regency. Analysis was conducted univariately, bivariately using the Spearman Rank correlation test, multivariate with logistic regression, pre-post training test with Wilcoxon, qualitatively through FGDs, and SNA to map interactions between cadres. The results showed a significant relationship between cadres' knowledge and their ability to document reports (p = 0.003; r = 0.421). Multivariate analysis showed a significant effect of knowledge (OR = 3.42; 95% CI: 1.45–8.06), and education was also significant (OR = 2.87; 95% CI: 1.12–7.39). Longitudinal testing showed an average 22% increase in documentation skills after digital training (p < 0.001). Qualitative analysis identified motivation, workload, and institutional support as important factors, while SNA found the presence of key cadres as centers for information dissemination. In conclusion, increasing cadre capacity through digital training, supervision, institutional support, and utilizing cadres social networks is crucial for improving the quality of *Posyandu* cadres reporting.

INTRODUCTION

Community-based health services, such as Integrated Service Posts/*Pos Pelayanan Terpadu (Posyandu)* are important in supporting the achievement of the Sustainable Development Goals (SDGs). An effective health information system is needed to support the recording and reporting of community-based activities. This is majorly needed in developing countries that still face challenges in managing accurate and sustainable health data.[1] The World Health Organization (WHO) showed the global challenge in primary health care was the weakness of the information system impacting, the quality of data-based decision-making.[2]

In Indonesia, *Posyandu* is the spearhead in monitoring the growth and development of toddlers and maternal health services, suggesting the urgent need for an accurate information system. The Indonesian government has developed a digital-based *Posyandu* information system, such as the Arumdalu *Posyandu* Information System, to facilitate integrated reporting and management of cadres data.[3] However, the main challenge in implementing this system is the low digital literacy and limited knowledge of *Posyandu* cadres, especially in rural areas.[4] Previous studies in several areas have shown that the low level of cadres' knowledge affects the quality of data entry and reporting accuracy.[5]

In the Sanggrahan Health Center work-ing area, Sukoharjo Regency, the implementation of the Arumdalu *Posyandu* System remain-snot optimal. Based on the results of internal monitoring of the Health Center in 2024, only 48% of cadres were able to document reports completely and correctly using the Arumdalu system.[6] This is an indicator of the need to increase the capacity of cadres, especially regarding the understanding of the digital information system used. In this context, the ability to document reports is highly dependent on the level of knowledge of cadres regarding the procedures and features in the Arumdalu application.[7] A similar study in Klaten Regency also showed that training and basic knowledge of cadres were the main factors in increasing the accuracy of data entry in the *Posyandu* digital system.[8]

Considering the importance of reporting quality as a basis for decision-making in public health interventions, there is a need to examine the factors that influence the capabilities of cadres, especially in terms of knowledge. Therefore, this study not only examines the relationship using correlation tests, but also examines the influence of other factors through multivariate regression, assesses the impact of digital training using a longitudinal design, explores non-technical factors with mixed methods, and assesses interactions between cadres using Social Network Analysis (SNA).

MATERIAL AND METHOD

A quantitative analytical design was adopted with a cross-sectional method to analyze the relationship between Integrated Service Posts/*Posyandu* cadres' knowledge and ability to document reports using the Arumdalu *Posyandu* Information System. The study was conducted in the Sanggrahan Health Center work area, Sukoharjo Regency, from January to February 2025. The population comprised all active *Posyandu* cadres who had used the Arumdalu application in reporting activities for at least the last three months. The number of samples was 60 cadres selected using the total sampling method because the population was relatively small and all met the inclusion criteria.

Data were collected using a closed questionnaire to measure the level of knowledge of cadres about the Arumdalu system and a structured observation sheet to assess the ability to document reports according to indicators of completeness, accuracy, and timeliness of data input. The instrument was subjected to validity and reliability tests before being used in data collection. Data analysis was conducted through several stages to provide a comprehensive picture. Univariate analysis was used to describe the characteristics of the respondents. Bivariate analysis was conducted using the Spearman Rank correlation test to determine the relationship between cadre knowledge and documentation skills. Next, multivariate analysis using logistic regression was used to identify the dominant variables influencing documentation skills by controlling for confounding variables such as age, education, and experience. The effectiveness of the digital training intervention was evaluated using a longitudinal pre-post design using the Wilcoxon test to compare documentation skills scores before and after training. To enrich understanding, a mixed methods approach was used through Focus Group Discussions and in-depth inter-views, which were analyzed thematically to explore non-technical factors such as motivation, work-

load, and institutional support. In addition, Social Network Analysis (SNA) was applied to map interaction patterns among cadres and identify key cadres with high centrality who act as centers for disseminating information and documentation skills. The results were presented in the form of a frequency distribution table and an interpretive narrative. This study has obtained permission and was declared ethically feasible by the Health Research Ethics Committee of Duta Bangsa University Surakarta with the ethics letter number: 020/EC/UDB/1/2025.

RESULTS

A total of 60 Integrated Service Posts/ *Posyandu* cadres, spread across the Sanggrahan Health Center, in Sukoharjo Regency participated in this study. All respondents were female, with the majority aged between 35-50 years (68.3%) and having a final education of high school/equivalent (61.7%). Most of the cadres had been active in *Posyandu* for more than three years (70.0%) and had used the Arumdalu *Posyandu* Information System for more than six months (55.0%) (Table 1).

Univariate analysis was conducted to determine the frequency distribution of cadres knowledge and report documentation skills. The results showed that the majority of cadres had a level of knowledge in the medium category (56.7%), while the rest were high (25.0%) and low (18.3%). For reporting documentation skills, 61.7%, 21.7%, and 16.6% were in the enough, good, and less categories (Table 1).

Bivariate analysis was carried out using the Spearman Rank test to test the relationship between cadres knowledge and ability to document Arumdalu reports. The test results showed a significant relationship between the level of cadres knowledge and ability to document reports (p=0.003 < α (0,05); r=0.421). The correlation was positive with moderate strength, suggesting that a higher level of cadres knowledge translates to a better ability to document information system reports digitally (Table 2).

The results of multivariate logistic regression analysis showed that cadre knowledge and education level were the dominant factors influencing the ability to document *Posyandu* digital reports. Cadres with high knowledge were 3.42 times more likely to be able to document reports well compared to cadres with low knowledge (95% CI:1.45–8.06; p=0.002). Similarly, cadres with at least a high school education were 2.87 times more likely to have good documentation skills compared to cadres with lower education (95% CI:1.12–7.39; p=0.010). Meanwhile, the variables of age (OR=1.15; p=0.430) and length of experience as a cadre (OR=1.08; p=0.620) did not significantly influence documentation skills. These findings confirm that cognitive factors in the form of knowledge and educational background are more determinants of cadre ability to document digital reports than demographic factors such as age or work experience (Table 3).

The results of the longitudinal pre-post digital training test analysis showed a significant increase in the documentation skills of *Posyandu* cadres after the training intervention. The average documentation skill score before the training was 65.4, indicating that the ability was in the sufficient category. After the digital training, the average score increased to 79.8, or an increase of 22%. The Wilcoxon test results showed a p-value <0.001, which means the difference in scores before and after the training was statistically significant. These findings indicate that digital training is effective in improving cadres skills in documenting reports using the Arumdalu *Posyandu* Information System, so similar interventions are important to expand and implement sustainably (Table 4).

Table 1. Frequency Distribution of Knowledge and Documentation Skills of Cadres

Variable	n = 60	%
Knowledge		
Low	11	18.3
Medium	34	56.7
High	15	25.0
Documentation Skills		
Less	10	16.6
Enough	37	61.7
Good	13	21.7

Source: Primary Data, 2025

Table 2. Relationship Between Cadres Knowledge Level and Arumdalu Report Documentation Ability

Variable	n	r value (spearman)	p-value	Information
Cadres Knowledge with Report Documentation Ability	60	0.421	0.003	Significant relationship, moderate positive correlation

Source: Primary Data, 2025

Table 3. Multivariate Analysis Results

Variable	OR	95% CI	p-value	Description
Knowledge	3.42	1.45 – 8.06	0.002	Significant
Education	2.87	1.12 – 7.39	0.010	Significant
Age	1.15	0.64 – 2.08	0.430	Not significant
Length of Experience	1.08	0.57 – 2.04	0.620	Not significant

Source: Primary Data, 2025

Results from Focus Group Discussion and in-depth interviews indicate that motivations vary among *Posyandu* cadres. Some cadres are highly motivated to carry out their duties due to a sense of social calling to help the community, but others report feeling burdened by limited incentives and rewards, leading to decreased work enthusiasm. In terms of workload, the majority of cadres reported difficulty in dividing their time between *Posyandu* duties, household chores, and other social activities. This often disrupts consistency in learning and using digital applications. Furthermore, institutional support from the Community Health Center (*Puskesmas*) and village government is considered sub-optimal, whether in the form of ongoing training, routine technical assistance, or the provision of adequate infrastructure such as smartphones and stable internet access. This situation presents a significant challenge to optimizing the use of information systems (Tabel 5).

Furthermore, through social network analysis (SNA), three key cadres were identified as frequently used as technical references by other cadres. These key cadres serve as information centers (central nodes) and serve as primary liaisons for the transfer of knowledge and documentation skills. Their strategic role suggests that cadre capacity building can be achieved through a mentoring approach, utilizing key cadres as local facilitators, enabling faster and more effective learning among cadres (Tabel 5).

DISCUSSION

The results of this study indicate a significant relationship between cadre knowledge and their ability to document reports using the Arumdalu Integrated Health *Posyandu* Information System. A positive correlation with moderate strength ($r=0.421$; $p=0.003$) confirms that the higher the cadre's knowledge, the better their ability to perform digital documentation. This finding is consistent with Bloom's cognitive theory, which places knowledge as the foundation for developing skills and work behaviors.[1,9] In the context of health information systems, digital literacy and technical understanding are essential prerequisites for producing accurate, valid, and timely data.[2,10]

Table 4. Results of the Pre–Post Digital Training Longitudinal Test

Measurement Time	Average Documentation Skill Score	Percentage Increase	p-value (Wilcoxon Test)	Description
Pre-Training	65.4	–		Initial Ability
Post-Training	79.8	+22%	< 0.001	There was an increase

Source: Primary Data, 2025

Table 5. Summary of Qualitative Findings and Social Network Analysis (SNA)

Aspects	Main Findings	Implications
Motivation	Variations in cadres motivation; some are highly motivated, others feel burdened without adequate incentives.	Motivation improvement strategies are needed, for example, awards and incentives for cadre performance.
Workload	Cadres have difficulty dividing their time between Posyandu duties, household chores and other work.	Distribution of tasks and support from other cadres is important for optimal performance.
Institutional Support	Training is still limited, technical assistance is not routine, infrastructure (cellphone & internet) is lacking.	There is a need for increased institutional support from Community Health Centers and village governments.
Social Network Analysis	Three key cadres with high centrality are often used as technical references.	Key cadres can be used as local mentors to strengthen the transfer of knowledge and skills.

Source: Primary Data, 2025

Multivariate analysis showed that high knowledge (OR=3.42; p=0.002) and a minimum high school education (OR=2.87; p=0.010) were the dominant factors influencing cadre documentation skills, while age and experience had no significant effect. These results are in line with research by Rahayu et al., who reported a significant influence of cadre knowledge on the completeness of KIA book filling,[5] as well as research by Sudirman & Rahayu, who found a relationship between knowledge and education and the ability to detect stunting early.[11] Cognitive factors and formal education have been shown to play a greater role in improving technical skills than experience alone, which does not always have an impact on improving digital skills.

Longitudinal test results showed an increase in documentation scores from 65.4 to 79.8, or a 22% increase after digital training (p < 0.001). This proves that technology-based training is effective in improving cadre skills, in line with the findings of Wardani et al., who showed that cadre training improved the quality of digital *Posyandu* data,[8] as well as research by Fitriani & Sari, which confirmed the positive impact of training on *Posyandu* report documentation skills.[12] The training intervention not only improved technical skills but also built cadre confidence in using the application. Similar results were shown in e-health programs in Nigeria and Zanzibar, which emphasized the importance of regular training and supervision in maintaining reporting quality.[13,14]

A qualitative approach through Focus Group Discussions and in-depth interviews revealed non-technical factors that influence cadre performance, namely motivation, workload, and institutional support. Variations in cadre motivation indicate that successful digital adoption is determined not only by individual capacity, but also by psychosocial factors and external support. Dual workloads are a major obstacle, especially for female cadres who must divide their time between household and *Posyandu* activities, as found by Susanti et al. in their study on cadre barriers to digital application-based reporting.[7] Limited institutional support, such as a lack of training facilities and internet access, further exacerbates implementation obstacles. This aligns with a WHO report emphasizing the importance of infrastructure, ongoing training, and institutional support to ensure the sustainability of digital public health programs.[15]

Furthermore, social network analysis (SNA) identified three key cadres who acted as information centers with high centrality. These cadres served as technical references for other cadres, accelerating the flow of information and skills within the community. This finding reinforces the evidence that cadre networks can be optimized to strengthen group capacity by utilizing key cadres as local mentors. This finding echoes research by Yuliana et al., which demonstrated the effectiveness of the MAGENTA application in improving cadre knowledge through a collaborative learning ecosystem.[16] Furthermore, research by Maulana et al. highlighted the influence of cadre technical competence on *Posyandu* data quality.[17]

Overall, the results of this study demonstrate that improving the quality of Integrated Service Posts (Posyandu) reporting requires a multidimensional approach: enhancing cadres knowledge and education, structured digital training interventions, ongoing institutional support, and leveraging cadre social networks. The integration of these factors aligns with the WHO framework on strengthening health system building blocks and is relevant to the Indonesian Ministry of Health's policy on developing the Arumdalu *Posyandu* information system.[1,2,3,4]

CONCLUSION AND RECOMMENDATION

Based on this research, it was concluded that there was a positive relationship with moderate strength between cadre knowledge and the ability to document reports in the Arumdalu Integrated Service Posts *(Posyandu)* Information System (p=0.003; r=0.421). The results of the multivariate analysis confirmed that high knowledge (OR=3.42) and a minimum high school education (OR=2.87) were the dominant factors that significantly influenced documentation skills, while cadre age and experience did not have a significant effect. The longitudinal test pre-post digital training showed an increase in documentation skills scores of 22% (p<0.001), proving the effectiveness of the digital training intervention in improving cadre skills. The qualitative approach revealed that motivation, workload, and institutional support were important non-technical factors that also influenced cadre performance, while the social network analysis identified three key cadres with high

centrality who acted as centers for technical reference and knowledge transfer. Improving the quality of *Posyandu* reporting requires a multidimensional approach that includes strengthening cadre knowledge and education, structured and ongoing digital training, institutional support from the Community Health Center and village government, and utilizing cadre networks through key cadres as local mentors.

Practical recommendations that can be implemented include: (1) developing application-based training modules and routine supervision to maintain reporting consistency; (2) providing incentives or performance awards to increase cadre motivation; (3) improving infrastructure, including digital devices and internet access; and (4) optimizing the role of key cadres as local facilitators in the transfer of documentation skills. For further research, it is recommended to use a longitudinal design with a larger sample and an in-depth qualitative exploration of psychosocial factors, workload, and institutional support that influence the adoption of digital information systems at the *Posyandu* level.

AUTHOR CONTRIBUTIONS

For research articles with several authors, a the authors' contributions to this study were divided proportionally according to the respecttive roles. DPS as the lead author designed the study design, compiled the instruments, coordinated data collection, analyzed the data, compiled, and revised the manuscript. AZ as the second author helped analyze the data, draft, and revise the manuscript. Research member contributed to the implementation of data collection in the field, initial data pro-cessing, and provided input in writing and compiling the discussion and reference sections. All authors have read and approved the final manuscript of the submitted article. DPS = Devi Pramita Sari; AZ = Andi Zulkifli.

CONFLICTS OF INTEREST

The authors declare no conflict of interest in the conduct or reporting of this study. There are no personal, institutional, or financial interests that could influence the representation or interpretation of the data inappropriately. The funding sponsors had no role in the design of this study, data collection, analysis, or interpretation of the data in the writing of the manuscript, and in the decision to publish the results.

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