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Analysis of the Implementation of the e-Primary Health Center Application in Improving Primary Health Center Performance in Merangin District

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Keyword: e-Primary Health Center; Primary Health Center; Health Information System; Health Service Performance; Digital Health;

Abstract
Introduction: *Digital health information systems are a key strategy for improving the quality and efficiency of primary health care services.* ***Objective:*** *This study aimed to analyze the implementation of the e-Puskesmas application in improving Primary Health Center performance in Merangin District.* ***Methods:*** *A qualitative study with an exploratory design was conducted through in-depth interviews, observations, and document reviews involving informants from the district health office and selected primary health centers. Data were analyzed using an interactive model consisting of data reduction, data display, and conclusion drawing, supported by triangulation techniques.* ***Results and Discussion:*** *The implementation of e-Puskesmas was supported by human resources, infrastructure, financial allocation, and policy support from the district health office. The application contributed to improving efficiency in data recording, timeliness of reporting, and management of health service information. However, several challenges remained, including inconsistent communication, limited resources, workload due to dual systems, unstable internet connectivity, and variations in digital literacy among health workers.* ***Conclusions:*** *The e-Puskesmas application has contributed to improving primary health center performance; however, optimization requires strengthening human resources, infrastructure, and data governance, as well as enhancing technical support to ensure sustainable implementation*

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Introduction

Indonesia, as a large country, has national goals stated in the Preamble of the 1945 Constitution, one of which is to promote public welfare. In the context of health development, the state has the responsibility to improve the health status of the population through the provision of quality and equitable health services. Health is a fundamental need of society and holds a position equal to other basic needs such as food and education; therefore, every individual has the right to access quality and equitable health services (Fitriani, 2023). Quality health services are oriented toward the needs, expectations, and values of the community as service users, thereby ensuring patient satisfaction and the fulfillment of patient rights during the service process (Rochayati Nggode, 2024),(Hayati, Putra, Rumana, & Fannya, 2022).

Health services represent an important subsystem within the national health system because they play a direct role in meeting the health needs of the population (Alaeddini, Tavolinejad, & Esmailzadeh, 2022). In recent years, the health system in Indonesia has undergone various changes in response to population growth, technological development, and the increasing complexity of health problems. Therefore, the Government of Indonesia, through the Ministry of Health of the Republic of Indonesia, has encouraged health system transformation as a strategic effort to improve service quality, expand public access to health facilities, and reduce disparities in health services across regions (Hartono, 2021). One of the key pillars of this transformation is health technology transformation, which includes strengthening health data systems, developing health applications, and building a health technology ecosystem supported by adaptive regulations and governance (Atika, 2023).

The development of information and communication technology provides significant opportunities to improve the efficiency and quality of health services. The utilization of information technology in public services is also in line with the e-government development policy aimed at improving the effectiveness of government administration and the quality of services provided to the public (Puspitawaty, 2020). In the context of health services, the use of information technology has become increasingly important to support the management of health data, accelerate service processes, and improve the accuracy and availability of information for decision-making. Beyond administrative efficiency, the availability of accurate and timely electronic health data plays a critical role in supporting the continuity of care, enabling health workers to access complete patient histories across service visits and thereby reducing the risk of fragmented or duplicated services. Furthermore, well-structured electronic data constitutes the foundation for program evaluation, allowing health facility managers and policymakers to monitor service coverage, identify gaps in program achievement, and make evidence-based adjustments in a timely manner. At the clinical level, electronic data supports diagnostic accuracy and treatment decision-making, while at the managerial level it enables performance monitoring, resource allocation planning, and accountability reporting — functions that are indispensable in the context of an integrated and accountable primary health care system

Primary Health Center, as first-level health service facilities, have a strategic role in providing health services that include promotive, preventive, curative, and rehabilitative efforts. Therefore, strengthening the health information system in Primary Health Center is one of the important efforts to improve the quality of health services. A robust health information system not only records transactions but also generates the structured data necessary to evaluate whether health programs are achieving their

intended outcomes, to support clinical continuity between patient visits, and to inform both operational and strategic decisions by health center managers and district health authorities. One of the innovations developed to support the digitalization of primary health care services is the e-Primary Health Center application, an information system designed to manage various health service data such as patient registration, electronic medical records, nutrition services, maternal and child health services, immunization, and routine reporting (Ghozali, Hadning, & Winanta, 2019),(Hanafi, Panjaitan, Ramadhan, & Purba, 2025).

Merangin District is one of the regions in Jambi Province that has implemented the e-Primary Health Center application as part of efforts to digitalize health services. The number of primary health centers using this application has increased from year to year. However, in its implementation, several challenges remain, including limited human resources in operating the application, limitations in information technology infrastructure, and the suboptimal utilization of electronic data for evaluating service performance. This last challenge is particularly consequential: when electronic data are collected but not optimally utilized, the potential benefits of digitalization — including informed program evaluation, service continuity, and evidence-based clinical and managerial decision-making — remain unrealized, ultimately limiting the contribution of the application to actual improvements in health center performance. These conditions may affect service effectiveness and the achievement of primary health center performance indicators (Dessy Angraini, Ikke Sabrina Putri, & Zulfa, 2023). Therefore, this study aims to analyze the implementation of the e-Primary Health Center application in improving the performance of primary health centers in Merangin District.

Method

This study employed a qualitative approach with an exploratory study design to obtain an in-depth understanding of the implementation of the e-Primary Health Center application in improving primary health center performance. Qualitative research aims to explore phenomena holistically in their natural context and to understand participants' experiences, perceptions, and interactions related to the implementation of health information systems (Nasution et al., 2023). The study was conducted at several primary health centers in Merangin District, Jambi Province, Indonesia. Eight health centers were purposively selected to represent different geographical characteristics, including urban, rural, remote, and very remote areas. Data collection was carried out from November to December 2025.

Informants were selected using purposive sampling based on their involvement, knowledge, and experience related to the implementation of the e-Primary Health Center application. A total of 27 informants participated in the study, consisting of key informants, main informants, and supporting informants. Key informants included health policy decision-makers at the district level such as the Head of the District Health Office and related program managers. Main informants consisted of health workers directly involved in using the e-Primary Health Center system, including heads of health centers, doctors, nurses, midwives, and medical record or IT officers. Supporting informants included program coordinators and community members who utilized health services and could provide perspectives regarding the impact of the application on service delivery.

Data were collected through in-depth interviews, focus group discussions (FGDs), and direct observations. In-depth interviews were conducted using semi-structured interview guidelines to explore policies, experiences, challenges, and perceived benefits

related to the implementation of the e-Primary Health Center system. FGDs were conducted with health workers to obtain collective perspectives regarding the implementation process, including perceived advantages, operational barriers, and possible improvement strategies. Observations were also carried out to document actual practices in the use of the application during health service delivery. The main research instrument was the researcher, supported by interview guides, observation sheets, audio recordings, and field notes.

The analysis focused on three main components of implementation: input, process, and output. Input components included human resources, budget availability, infrastructure, regulatory support, and baseline data. Process components included socialization and training, coordination and communication, application utilization, adherence to standard operating procedures, and monitoring and evaluation. Output components included timeliness of reporting, completeness of service data, service efficiency, data quality, and the level of system utilization among health workers. Data analysis was conducted using a qualitative analysis approach consisting of data reduction, data display, and conclusion drawing. Data reduction involved selecting and simplifying relevant information obtained from interviews, FGDs, and observations. The reduced data were then organized and presented in narrative form to facilitate interpretation and identification of patterns. Finally, conclusions were drawn through continuous verification of the collected data.

To ensure the trustworthiness of the data, this study applied triangulation techniques, including source triangulation and method triangulation. Source triangulation was performed by comparing information obtained from different informants, while method triangulation involved comparing findings from interviews, FGDs, and observations. Ethical considerations were strictly maintained throughout the study. All participants were informed about the objectives of the research and provided informed consent prior to participation. Participants' identities were kept anonymous and confidentiality of the information was ensured. Ethical approval for this study was obtained from the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, Universitas Jambi (No. 81/DST/UN21.8/PT.01.04/2026).

Result and Discussion

Characteristics of Informants

A total of 27 informants participated in this study, consisting of key informants, main informants, and supporting informants. Key informants included policy-level stakeholders from the Merangin District Health Office who were responsible for the management and supervision of health information systems. Main informants were health workers directly involved in the use of the e-Primary Health Center application at the primary health center level, including heads of health centers, doctors, nurses, midwives, and medical record or IT officers. Supporting informants included program coordinators and community members who utilized health services and were able to provide perspectives on the impact of the e-Primary Health Center application on service delivery. The characteristics of informants are presented in Table 1.

The distribution of informants showed that the majority were female health workers, reflecting the composition of the workforce in primary health centers, particularly among nurses and midwives who play a major role in health service delivery. In terms of educational background, most informants had diploma-level education, followed by bachelor's degree holders and a small proportion with postgraduate

education. This variation in educational background provided diverse perspectives regarding the implementation and utilization of the e-Primary Health Center application in daily health service activities.

Table 1
Characteristics of Informants

Characteristics	Category	n
Gender	Male	8
	Female	19
Education	Master	1
	Bachelor	8
	Diploma	18
Informant Type	Key informants	2
	Main informants	19
	Supporting informants	6

Informants were selected from eight primary health centers representing different geographical characteristics in Merangin District, including urban, rural, remote, and very remote areas. This variation allowed the study to capture differences in the implementation of the e-Primary Health Center application, particularly in relation to infrastructure availability, internet connectivity, and human resource capacity. The diversity of informant roles and backgrounds contributed to a comprehensive understanding of how the e-Primary Health Center application was implemented and how it influenced the performance of primary health centers in Merangin District.

Input Factors in the Implementation of e-Primary Health Center

The findings of this study indicate that several input factors influence the implementation of the e-Primary Health Center application in primary health centers in Merangin District. These factors include the availability of human resources, infrastructure, financial support, and policy support that enable the system to be utilized in health service activities (Wenang et al., 2021). Human resources were generally available to operate the e-Primary Health Center application in primary health centers. Health workers responsible for managing the system included administrative staff, nurses, midwives, and medical record officers. Most of them had received basic training related to the use of the application and were able to utilize it for recording patient data and service activities. However, differences in digital literacy among health workers still influenced the effectiveness of system utilization.

Infrastructure availability also affected the implementation of the e-Primary Health Center application. Several primary health centers already had computers and internet access that supported the use of the system in daily services. The availability of these facilities facilitated patient registration, data entry, and health service reporting through the application. Nevertheless, some health centers located in remote areas still experienced limitations in internet connectivity. Financial support also played a role in supporting the operation of the e-Primary Health Center system. Budget allocation from the district health office was used for providing equipment, system maintenance, and operational needs related to the use of the application. This support helped ensure that the system could continue to be used in supporting health service management at primary health centers. Policy support from the district health office also influenced the implementation of the e-Primary Health Center application. Regulations and technical guidance encouraged health centers to adopt electronic systems in managing health

service data and reporting activities. The presence of these policies strengthened institutional commitment to utilizing the e-Primary Health Center application in health service management (Arsyam, Sulaiman, & Setiawan, 2025).

Process of e-Primary Health Center Application Implementation

The findings of this study indicate that the implementation of the e-Primary Health Center application in primary health centers in Merangin District was carried out through several stages, including socialization, training, system utilization in service activities, and monitoring from the district health office. These stages were intended to ensure that the application could be integrated into routine health service management at the primary health center level (Samino, Agung, Wayan, Christina, & Supriyanto, 2025).

The initial stage of implementation involved socialization activities conducted by the district health office to introduce the e-Primary Health Center application to health workers. Through these activities, health workers were informed about the functions, objectives, and benefits of using the application in managing health service data and reporting activities. Socialization helped increase awareness among health workers regarding the importance of adopting digital systems in health service management. Training activities were also conducted to improve the capacity of health workers in operating the e-Primary Health Center system. The training generally focused on the use of the application for patient registration, recording health service data, and generating reports. Through these training activities, health workers became more familiar with the application and were able to integrate its use into their daily service activities.

In the service process, the e-Primary Health Center application was used to support patient registration, recording of medical services, and management of health service data. The use of the system helped facilitate the process of data entry and allowed health centers to manage service records more systematically. As a result, health workers were able to access and manage patient data more efficiently in supporting service delivery. Monitoring and technical assistance from the district health office were also carried out to ensure that the implementation of the e-Primary Health Center application ran effectively. Monitoring activities were conducted periodically to evaluate the use of the system and to identify technical problems encountered by health workers. This support helped maintain the continuity of system utilization and ensured that the application could function as intended in supporting health service management (Acharya et al., 2023).

Output of e-Primary Health Center Implementation on Primary Health Center Performance

The findings of this study indicate that the implementation of the e-Primary Health Center application has contributed to improvements in the performance of primary health centers in Merangin District. The use of the application supports more systematic management of health service data, facilitates reporting processes, and assists health workers in managing patient information. These improvements contribute to strengthening health service management at the primary health center level (Ferdiana Rossi, Eko Purwanto, & Pipin Widyaningsih, 2025).

One of the main outputs identified in this study was the improvement in the efficiency of data recording and management. Through the use of the e-Primary Health Center system, health workers were able to record patient visits and service data electronically, reducing the need for manual recording. This electronic system helped simplify the process of storing and retrieving patient information and minimized the risk

of data duplication or loss. The implementation of the e-Primary Health Center application also improved the timeliness and accuracy of health service reporting. Health centers were able to generate reports more quickly through the system, which facilitated the submission of service data to the district health office. As a result, the reporting process became more organized and supported better monitoring of health programs at the district level (Ngugi, Were, & Babic, 2021).

Another output observed was the improvement in the efficiency of health service management. The availability of digital patient records allowed health workers to access service information more easily during the service process. This facilitated coordination among health workers and supported more efficient service delivery within the primary health center. Overall, the implementation of the e-Primary Health Center application has supported improvements in the management of health service data and reporting systems at primary health centers in Merangin District. The system provides better access to service information and supports the availability of data needed for planning and decision-making in health service management.

Challenges in the Implementation of e-Primary Health Center

The findings of this study indicate that although the implementation of the e-Primary Health Center application has provided several benefits in supporting health service management, there are still several challenges faced by primary health centers in Merangin District. These challenges are related to infrastructure limitations, human resource capacity, technical system issues, and the workload of health workers in operating the application (Rosmita, Samur, Hartono, & Daud, 2025). One of the main challenges identified was the limitation of internet connectivity, particularly in primary health centers located in rural and remote areas. Unstable internet connections occasionally disrupted the process of data entry and reporting through the e-Primary Health Center application. As a result, health workers sometimes had to delay data input until a stable connection was available.

Human resource capacity also became a challenge in the implementation of the system. Although most health workers had received basic training on the use of the application, differences in digital literacy and technical skills among users still affected the efficiency of system utilization. Some health workers required additional technical assistance to operate certain features of the application effectively. Technical issues related to the application system were also reported during the implementation process. These issues included system errors, slow system performance, and occasional difficulties in accessing certain features. Such technical constraints could temporarily hinder the recording and reporting of health service data. In addition, the use of the e-Primary Health Center application sometimes increased the workload of health workers, particularly when they had to perform both service delivery and data entry activities simultaneously. Despite these challenges, health workers continued to use the application as part of the health information management system, while expecting further improvements in infrastructure, technical support, and system performance in the future (Sari, Fitri, Hartono, & Daud, 2025).

Conclusion

The implementation of the e-Primary Health Center application in primary health centers in Merangin District has generally supported improvements in health service management and primary health center performance. The system facilitates electronic recording of patient data, improves the efficiency and timeliness of reporting, and supports better management of health service information. The implementation process has been supported by the availability of human resources, infrastructure, financial support, and policy support from the district health office. However, several challenges remain, including unstable internet connectivity in some areas, variations in digital literacy among health workers, and technical issues related to system performance. Despite these challenges, the e-Primary Health Center application has demonstrated potential to strengthen health information management and service efficiency at the primary health center level. Therefore, future efforts should focus on improving infrastructure, enhancing user capacity through continuous training, and strengthening technical support to optimize the utilization of the system. Further research is recommended to examine the long-term impact of digital health information systems on service quality and health outcomes in primary health care settings.

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