



Implementation of Health Information Systems and the Quality of Administrative Services at Community Health Centers: A Literature Review

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ABSTRACT

Objective: This literature review aimed to identify and analyze the implementation of health information systems and their relationship with the quality of administrative services at Community Health Centers (Puskesmas). **Methods:** A literature search was conducted across several electronic databases using combinations of keywords related to health information systems, Community Health Center Management Information Systems, administrative services, service quality, and Puskesmas. Articles were selected based on predetermined inclusion and exclusion criteria and were subsequently analyzed and synthesized using a descriptive narrative approach. **Results:** The findings showed that the implementation of health information systems can improve the quality of administrative services by accelerating patient registration, facilitating patient data management, supporting documentation and reporting, improving document storage, and providing more accurate and accessible information. Health information systems also help reduce duplicate data entry, improve staff efficiency, shorten service times, and support decision-making. However, successful implementation remains influenced by infrastructure readiness, network stability, device availability, staff competence, training, management support, system integration, and data security and confidentiality. Technical barriers and limited user competence may lead to service delays, data-entry errors, and suboptimal system utilization. **Implications:** Community Health Centers should strengthen their technological infrastructure, improve staff competence through continuous training, provide technical support, and conduct regular system evaluations. The implementation of integrated, user-friendly health information systems that are aligned with service needs is expected to improve administrative efficiency, information accuracy, community satisfaction, and the overall quality of Puskesmas services.

Keywords: Health Information Systems; Community Health Center Management Information Systems; Administrative Services; Service Quality; Community Health Centers.

INTRODUCTION

Community Health Centers (Puskesmas) are primary healthcare facilities that play an important role in providing healthcare services to the community while simultaneously generating data for recording, reporting, program monitoring, and decision-making purposes. In service delivery, the quality of administrative services is one of the components that determines the smoothness of the service process because it includes patient registration, identity and insurance verification, medical record management, processing of service data, report preparation, referral management, and the provision of information for healthcare workers and Puskesmas managers. Administrative services that are slow, inaccurate, or poorly integrated can prolong waiting times and hinder continuity of care. Conversely, fast, accurate, and traceable administration can support organizational efficiency and provide a better service experience for the community (1).



One effort to improve the quality of administrative services is through the implementation of health information systems. A health information system is a combination of technology, human resources, procedures, and governance used to collect, process, store, present, and distribute health information. In the context of Puskesmas, these systems may take the form of the Community Health Center Management Information System, SIKDA Generik, e-Puskesmas, P-Care, referral systems, electronic medical records, and applications for recording and reporting specific health programs. The Community Health Center Management Information System is primarily used to process patient data and generate reports required for the management of healthcare services and health programs (2).

The implementation of health information systems is expected to accelerate the registration process, reduce manual document searches, improve data completeness, simplify report preparation, and provide information more rapidly to staff. Integrated systems also allow patient data to be used continuously across different service units, thereby reducing repeated documentation. More broadly, well-implemented electronic health records are associated with improved time efficiency, increased compliance with procedures, and a reduction in certain errors in service delivery. The planned and integrated implementation of referral information systems is also considered capable of reducing queues and improving coordination among healthcare providers (3).

Despite their potential benefits, the implementation of health information systems in Puskesmas still faces the problem of system fragmentation. National studies show that Puskesmas in Indonesia may use several information system platforms simultaneously, including those developed by the central government, local governments, and other parties. The use of multiple applications that are not fully integrated may result in the same data being entered into several systems, increase the administrative workload, and reduce work efficiency. A study at Gondokusuman II Community Health Center found that several information systems were used simultaneously and that staff had to re-enter the same social and clinical data into different systems. A similar situation was found in the use of P-Care and SIMPUS, which were not yet integrated, causing patient data processing to take longer (4).

The quality of implementation is also strongly influenced by the readiness of technological infrastructure. Computers, internet networks, electricity, security devices, and technical support are prerequisites for the consistent use of information systems. An assessment of information and communication technology maturity in primary healthcare services across nine provinces showed that the level of maturity ranged from basic to good, with variations in human resource capacity, software, hardware, and infrastructure. A national assessment of internet access in Puskesmas also showed that some facilities still lacked internet access or had only limited connectivity. Network disruptions, inadequate equipment, and applications that frequently experience errors can slow registration and reporting services that should otherwise become more efficient following digitalization (4).

In addition to infrastructure, user competence and acceptance are important factors in the success of health information systems. Staff need to understand system functions, correct data-entry procedures, data security, basic troubleshooting, and the use of the information produced. Research on SIMPUS acceptance shows that perceptions of system ease of use and usefulness are associated with user acceptance. However, discontinuous training, limited staffing, inconsistent operating procedures, and inadequate technical support may result in suboptimal system use. Studies on the usability of electronic health record systems also show that user experiences may differ according to profession, system brand, and work context. Systems that are difficult to use may increase workload, reduce user satisfaction, and contribute to professional burnout (5).

Organizational support and governance also determine the sustainability of implementation. Research on the adoption of primary healthcare information systems in Indonesia has identified human resources, infrastructure, organizational support, and work processes as the main groups of barriers. Implementation requires leadership commitment, clear role allocation, standard operating procedures, financing, system maintenance, and communication among Puskesmas, health offices, application providers, and other institutions. In maternal and neonatal referral services, health information system barriers arise not only from technology but also from coordination, information quality, and staff capacity to use the system to support referral decisions (6).

Integration and data quality are important aspects because the availability of a system does not necessarily guarantee complete, accurate, relevant, and timely information. The implementation of e-

Puskesmas in Badung Regency still faces problems related to data completeness, information validity, confidentiality, and the presence of program-specific applications that have not yet been integrated. An evaluation of the information system used for medicine utilization and request reports also showed that the system could support inventory management but was not always able to automatically meet all reporting requirements. These findings indicate that system success should not be assessed solely based on the availability of applications, but also on their ability to support actual administrative needs and workflows (7).

Experiences from primary healthcare services in other countries show that the implementation of electronic systems requires adjustment to the capacity and needs of each facility. The implementation of electronic health records in Nigerian primary care emphasized the importance of change planning, stakeholder support, capacity building, and system alignment with service processes. A study conducted in primary healthcare facilities in the Philippines also showed that system acceptance may change during transitions in technology or workflow, indicating that implementation strategies need to consider user readiness and facility context. Studies on large-scale electronic health record implementation further emphasize that success is influenced by interactions among organizational, human, and technological factors, rather than solely by the sophistication of the software (8).

In the context of administrative service quality, the success of an information system can be assessed through registration speed, accuracy of patient identification, ease of data retrieval, document completeness, reporting accuracy, reduced duplicate data entry, clarity of information, and the system's ability to support service coordination. However, existing studies still largely focus separately on user acceptance, technological readiness, or implementation barriers. Research that specifically synthesizes the implementation of health information systems and their relationship with the quality of administrative services in Puskesmas remains limited and is dispersed across various systems and study locations (9).

Based on the above description, this literature review aims to identify and analyze the implementation of health information systems and their relationship with the quality of administrative services in Puskesmas. This review is expected to provide an overview of the benefits, barriers, supporting factors, and system development strategies capable of improving efficiency, accuracy, data integration, and the quality of administrative services in Puskesmas.

METHOD

This study employed a literature review method to identify and analyze the implementation of health information systems and their relationship with the quality of administrative services at Community Health Centers (Puskesmas). The article search, screening, and selection processes followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines, which include the identification, screening, eligibility assessment, and inclusion stages. The PRISMA guidelines were applied to ensure that the literature-selection process was conducted and reported systematically, transparently, and traceably.

The review question was: "How are health information systems implemented, and how are they related to the quality of administrative services at Community Health Centers?" Articles were searched through PubMed, Scopus, ScienceDirect, and Google Scholar. The search was limited to articles published between 2016 and 2026, available in full text, and written in Indonesian or English. The final search was conducted on July 2, 2026. The search strategy used English keywords, including health information system, primary health care information system, primary healthcare information system, community health information system, health management information system, electronic health record, electronic medical record, administrative service, administrative service quality, service quality, administrative efficiency, community health center, public health center, and Puskesmas. These keywords were combined using the Boolean operators AND and OR.

The main search strategy was formulated as follows: ("health information system" OR "primary health care information system" OR "primary healthcare information system*" OR "community health information system*" OR "health management information system*" OR "electronic health record*" OR "electronic medical record*") AND ("administrative service*" OR "administrative service quality" OR "service quality" OR "administrative efficiency" OR registration OR reporting OR documentation) AND ("primary health care" OR "primary healthcare" OR "community health center*" OR "public health center*" OR puskesmas)

To broaden the search results, additional searches were conducted separately using the following combinations: ("health information system" OR "health management information system") AND ("administrative service*" OR "service quality") AND ("community health center*" OR puskesmas), ("electronic health record" OR "electronic medical record") AND (registration OR documentation OR reporting OR "administrative efficiency") AND ("primary health care" OR puskesmas), ("primary health care information system" OR "community health information system") AND (implementation OR adoption OR utilization) AND ("service quality" OR "administrative quality"), (SIMPUS OR "e-Puskesmas" OR "SIKDA Generik" OR "P-Care") AND ("pelayanan administrasi" OR "kualitas pelayanan" OR "administrative service")

The search for Indonesian-language articles used the keywords “sistem informasi kesehatan,” “Sistem Informasi Manajemen Puskesmas,” “SIMPUS,” “e-Puskesmas,” “SIKDA Generik,” “P-Care,” “rekam medis elektronik,” “implementasi sistem informasi,” “pelayanan administrasi,” “kualitas pelayanan administrasi,” “efisiensi administrasi,” “pencatatan dan pelaporan,” and “Puskesmas.” Keyword combinations were adjusted to the characteristics and indexing systems of each database.

Inclusion Criteria

Articles were included in the review when they met the following criteria:

1. Original research articles employing quantitative, qualitative, or mixed-methods designs.
2. Discussed the implementation, application, use, acceptance, or evaluation of health information systems.
3. Examined the Community Health Center Management Information System, e-Puskesmas, SIKDA, P-Care, electronic medical records, or other primary healthcare information systems.
4. Analyzed the quality of administrative services, including registration, patient data management, medical records, documentation, reporting, referrals, archiving, and the provision of service information.
5. Examined the relationship between information systems and the efficiency, speed, accuracy, completeness, convenience, or quality of administrative services.
6. Were conducted at Puskesmas, community health centers, or primary healthcare facilities with similar characteristics.
7. Included administrative staff, healthcare workers, Puskesmas managers, system users, patients, or community members using the services as respondents.
8. Were published between 2016 and 2026.
9. Were available in full-text form.
10. Were written in Indonesian or English.

Exclusion Criteria

Articles were excluded when they met any of the following criteria:

1. Did not discuss the implementation or use of health information systems.
2. Did not examine the quality, efficiency, or processes of administrative services.
3. Focused solely on clinical information systems without any relationship to administrative processes, documentation, reporting, or patient services.
4. Were conducted exclusively in hospitals, specialist clinics, pharmacies, or referral facilities without any connection to primary healthcare services.
5. Focused only on software development or application design without implementation, user testing, or service evaluation.
6. Examined only user satisfaction with an application without relating it to the quality of administrative services.
7. Were literature reviews, systematic reviews, editorials, commentaries, books, undergraduate theses, master's theses, dissertations, or conference proceedings available only as abstracts.
8. Were identified as duplicates.
9. Did not have accessible full-text versions.

Article Selection Process

Article selection was conducted according to the PRISMA stages. During the identification stage, all articles retrieved from PubMed, Scopus, ScienceDirect, and Google Scholar were collected. Duplicate articles were removed before the screening stage.

During screening, article titles and abstracts were examined for their relevance to the implementation of health information systems, administrative services, service quality, and Puskesmas. Articles that were irrelevant to the topic or did not meet the preliminary criteria were excluded.

Articles that passed the screening stage proceeded to the eligibility assessment through full-text review. At this stage, articles were examined in greater depth according to the inclusion and exclusion criteria. Articles that met all criteria were included and analyzed in the literature review. The numbers of articles identified, excluded, assessed for eligibility, and included in the review were presented in a PRISMA flow diagram.

Data Analysis

The data were analyzed using a descriptive narrative approach. Findings from each article were compared, summarized, and grouped according to thematic similarities. The findings were categorized into four main themes:

1. forms of health information system implementation at Puskesmas;
2. the relationship between health information systems and the quality of administrative services;
3. barriers to the implementation of health information systems; and
4. factors supporting the successful implementation of health information systems.

Forms of health information system implementation were categorized based on the use of SIMPUS, e-Puskesmas, SIKDA Generik, P-Care, electronic medical records, electronic registration systems, referral systems, and applications for program documentation and reporting.

The quality of administrative services was categorized according to service speed, the accuracy of patient identification and data entry, document completeness, ease of data retrieval, working-time efficiency, reporting accuracy, reduction of duplicate documentation, data integration, information security, and staff and patient satisfaction. Implementation barriers were categorized into inadequate infrastructure and equipment, network disruptions, lack of system integration, limited user competence, insufficient training, workload, resistance to change, limited technical support, and data security and confidentiality issues. Supporting factors were categorized into leadership support, availability of technological facilities, continuous training, system usability, user involvement, clear operational procedures, system integration, system maintenance, and periodic evaluation. The analysis results were presented in article-characteristics tables, findings-synthesis tables, and narrative descriptions to provide a comprehensive overview of health information system implementation and the quality of administrative services at Puskesmas.

RESEARCH RESULTS AND DISCUSSION

Research Results

Article Selection Process

The article search and selection process was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) stages. The initial search across PubMed, Scopus, ScienceDirect, and Google Scholar identified 7,019 articles. After 412 duplicate articles were removed, 6,607 articles proceeded to title and abstract screening. During the screening stage, 6,462 articles were excluded because they were not relevant to the research topic, did not discuss the implementation of health information systems, were not related to the quality of administrative services, or were not conducted at Community Health Centers or primary healthcare facilities. Consequently, 145 articles proceeded to the full-text retrieval stage. However, 11 articles could not be obtained, leaving 134 full-text articles to be assessed according to the inclusion and exclusion criteria. Following the eligibility assessment, 114 articles were excluded. The reasons for exclusion were as follows: 31 studies were not conducted at Community Health Centers or primary healthcare facilities; 29 did not discuss the implementation or use of health information systems; 24 did not examine the quality or processes of administrative services; 17 were not original research articles; and 13 involved study contexts or respondents that were not related to administrative services or users of Community Health Center information systems. Therefore, 20 articles met all eligibility criteria and were included in the literature review. The identification, screening, eligibility assessment, and article selection processes are presented in the PRISMA flow diagram in Figure 1.

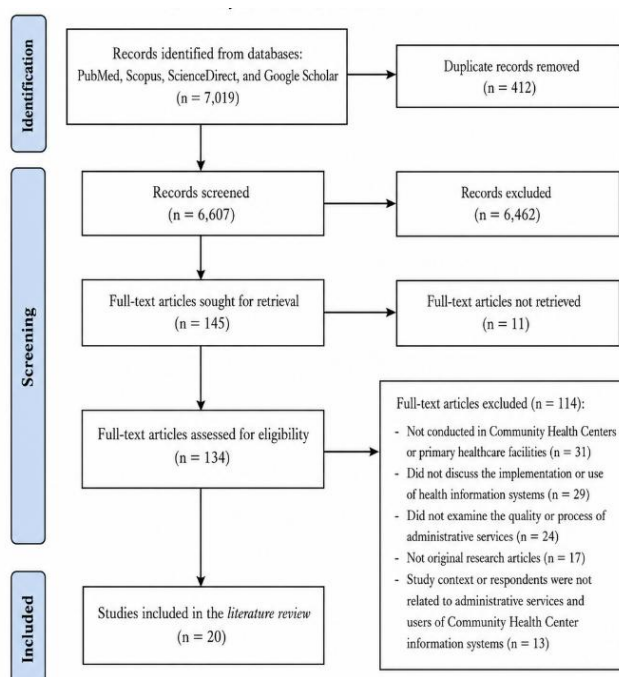


Figure 1. PRISMA Flowchart

Article Characteristics

Articles that met the inclusion criteria were analyzed in this literature review. The articles were published between 2016 and 2025, and most studies were conducted in Indonesia, particularly at Community Health Centers (Puskesmas), health offices, and primary healthcare facilities. Several studies from other countries, including Nigeria, the Philippines, Finland, and the United States, were also included to provide a broader perspective on the implementation of electronic health records and information systems in primary healthcare settings. The reviewed articles employed various research approaches, including quantitative studies with cross-sectional designs, qualitative studies using case-study approaches, evaluative studies, mixed-methods research, and system development and implementation studies. Study participants generally included registration staff, medical record officers, healthcare workers, system operators, Puskesmas managers, program managers, and healthcare facility leaders. Several studies also involved patients or service users to assess the acceptance and perceived benefits of health information systems. The information systems analyzed included the Community Health Center Management Information System (SIMPUS), SIKDA Generik, e-Puskesmas, P-Care, the Integrated Referral Information System (SISRUTE), the Integrated Emergency Management System, electronic health records, electronic registration systems, and applications for recording and reporting health programs. These systems were used to support patient registration, insurance eligibility verification, documentation of sociodemographic and clinical data, medical record management, referral services, medicine management, report preparation, and the provision of information for decision-making. The findings showed that the implementation of health information systems can improve the speed of data access, facilitate the retrieval of patient information, support reporting activities, and enhance the efficiency of administrative services. However, these benefits have not always been achieved optimally because of limited system integration, repeated data entry, inadequate internet connectivity, poor data quality, insufficient training, and inadequate organizational and technical support. A study conducted at Gondokusuman II Community Health Center, for example, found that seven different systems were used, requiring staff to repeatedly enter the same sociodemographic and clinical data and consequently reducing work efficiency. At the national level, studies of Community Health Centers in Indonesia have shown variations in the use of information systems, information and communication technology readiness, and the quality of internet connectivity across facilities and regions. These conditions indicate that the success of Puskesmas digitalization depends not only on the availability of applications, but also on infrastructure readiness, human resources, governance, and data integration.

Table 1. Synthesis of Health Information System Implementation and Quality of Administrative Services in Community Health Centers

Theme	Main findings	Implications for Community Health Centers
Implementation of health information systems	Community health centers use various systems, such as SIMPUS, SIKDA Generik, e-Puskesmas, P-Care, SISROUTE, and program recording applications. The simultaneous use of multiple applications is not always accompanied by data integration.	Community health centers need to map all applications used and establish an integrated main system to reduce service fragmentation.
Administrative speed and efficiency	Information systems can speed up registration, patient data retrieval, recording, reporting, and referral processes. However, repetitive input can extend service times.	Workflows and electronic forms need to be simplified and adapted to actual service processes.
Accuracy and completeness of data	The system helps produce more structured and easily searchable data, but still finds incomplete, invalid, late, or inconsistent data.	It is necessary to implement data validation, quality control, data audits, and determine officers responsible for information quality.
Integration and interoperability	The system's inability to exchange data means officers have to enter the same identity and service data into multiple applications.	Integration between SIMPUS, P-Care, referral system, electronic medical records, pharmacy, and reporting system needs to be strengthened.
Internet infrastructure and network	Computer limitations, network, power, server, and internet disruptions can cause service delays or the re-use of manual recording.	Health centers need to ensure the availability of devices, backup networks, system maintenance, and responsive technical support.
Human resource competencies	The ability of officers to operate systems, input data, handle disruptions, and maintain information security still varies.	Training needs to be provided periodically, not only at the start of implementation, but also when system updates and staff changes occur.
Ease of use and acceptance	Systems that are perceived as easy and useful tend to be more accepted by staff. Systems that are complicated, slow, or inconsistent with workflows can decrease user acceptance.	Users need to be involved in the design, development, testing, and evaluation of the system.
Organizational and management support	Leadership support, policies, funding, division of tasks, operational procedures, and communication between parties influence the success of implementation.	The Health Center leadership needs to establish clear policies, management teams, financing, and system evaluation mechanisms.
Data security and confidentiality	Digitalization increases ease of data access, but also raises the risk of unauthorized access, confidentiality breaches, and data loss.	Health centers need to implement access rights settings, user authentication, data backup, user activity recording, and information security education.
Referral services	Electronic referral systems facilitate information exchange and coordination, but can be hampered by network issues, incomplete data, disconnected systems, and response delays.	Integration of the referral system and coordination between Community Health Centers, hospitals, BPJS Kesehatan, and health services need to be strengthened.
Quality of administrative services	Information systems have the potential to improve speed, accuracy, document order, transparency, and continuity of service. These benefits are diminished if the system increases the administrative burden on staff.	Evaluation of service quality should include waiting time, data accuracy, document completeness, workload, user satisfaction, and the number of repeat inputs.
Evaluation and sustainability of the system	Some systems are implemented without regular evaluation of their function, usability, data quality, and suitability to service needs.	Health centers need to conduct periodic system evaluations and use the results for improvement, development, or termination of ineffective applications.

Source: Results of the literature review synthesis.

Literature Synthesis Results

The synthesis results showed that the implementation of health information systems at Community Health Centers (Puskesmas) encompasses various service functions. SIMPUS and e-Puskesmas are generally used to support patient registration, service documentation, medical record management, report preparation, and the provision of managerial information. P-Care is primarily used to serve participants of the National Health Insurance program, whereas SISRUITE and other referral systems are used to support communication and information exchange between Puskesmas and referral hospitals. The use of health information systems has transformed some administrative processes that were previously performed manually into electronic processes. Patient data can be stored, retrieved, and reused, thereby reducing the need for staff to search for physical documents. Electronic systems can also facilitate faster report preparation when the required data are complete and well structured. However, the implementation identified in the reviewed studies has not yet demonstrated the use of a single fully integrated system. Some Puskesmas use several applications with different functions and administrators. A study at Gondokusuman II Community Health Center found that the use of seven information systems resulted in repeated entry of patients' sociodemographic identities and clinical data. This situation increased the administrative workload and reduced the efficiency that should have been achieved through digitalization. Recent national studies have also shown that the number and types of information systems used by Puskesmas vary according to regional and facility characteristics. This variation indicates that digital transformation has progressed, but further standardization and integration are still required to enable information systems to comprehensively support healthcare services.

Effects on the Speed and Efficiency of Administrative Services

Health information systems can improve efficiency by reducing manual file searches, accelerating patient identification, assisting with insurance eligibility verification, and providing access to previous service information. When the system functions properly, data can be used across multiple service units, thereby making the service process more coordinated. The implementation of web-based systems also enables service data to be accessed and managed more quickly than fully paper-based documentation. For example, the web-based service system at Sukaraja Community Health Center was developed to support service management and information governance at the Community Health Center (10). Nevertheless, digitalization does not always accelerate service delivery. In National Health Insurance services, entering patient data separately into P-Care and SIMPUS may prolong service time. The lack of system integration requires staff to repeatedly verify and record patients' identity, insurance eligibility, and service data (11). Therefore, administrative efficiency is determined not merely by the availability of an application, but by the application's ability to replace manual processes, reduce duplicate documentation, and support service workflows without adding unnecessary steps.

Data Quality, Completeness, and Accuracy

One of the main benefits of health information systems is the availability of data that are more structured, easier to retrieve, and usable for both reporting and decision-making. Electronic data also have the potential to improve traceability because each patient's information can be stored and updated within a single service history. However, several studies have shown that the quality of the information produced still faces problems related to completeness, validity, timeliness, and consistency. The implementation of e-Puskesmas in Badung Regency has not yet been optimal because incomplete data, insufficiently valid information, limited indicators, and the presence of program-specific systems that have not been integrated were still identified. The available information has also been used mainly for reporting to health offices and has not yet been fully utilized for planning or for disseminating information to the community (12). Data quality is strongly influenced by how staff perform data entry, the availability of standardized data-entry procedures, the usability of electronic forms, and data-verification mechanisms. Errors during registration or initial documentation may affect reporting, referrals, follow-up services, and managerial decision-making. Therefore, information systems should provide automatic validation, alerts for incomplete data, and documented correction mechanisms (7).

System Integration and Interoperability

Integration was one of the main issues identified in the review. Community Health Centers (Puskesmas) may use SIMPUS for service documentation, P-Care for National Health Insurance participants, program-

specific applications for disease reporting, and SISRUITE for referral services. When these applications are unable to exchange data, staff must repeatedly enter the same information (13). The lack of system connectivity leads to wasted time, increases the risk of inconsistent information, and complicates the preparation of integrated reports. Fragmentation may also cause patient data to be dispersed across several applications, preventing a complete service history from being displayed in a single interface. In referral services, integration plays an important role because patient information must be transferred from Puskesmas to the receiving facility. Research on referral systems in Indonesia has shown that integration, data security, responsiveness, effectiveness, and efficiency are important components of the use of information technology to support referral services. Interoperability should be developed through the standardization of data elements, patient identifiers, terminology, and information-exchange mechanisms. Integration does not merely involve technically connecting applications, but also aligning workflows, authority, and the responsibilities of each institution (14).

Infrastructure and Internet Network Quality

The availability of computers, servers, internet networks, electricity, and supporting equipment is a prerequisite for the implementation of health information systems. When the network is slow or disconnected, staff often return to manual documentation and enter the data after the network becomes available again. This situation may result in duplicated work and delays in updating information. A national assessment of more than 10,000 Community Health Centers (Puskesmas) showed that the quality of internet connectivity and technological infrastructure still varies. These differences may affect the ability of Puskesmas to operate online applications consistently. An assessment of information and communication technology maturity in primary healthcare services across nine provinces also revealed variations in the readiness of human resources, hardware, software, and infrastructure. Therefore, digitalization policies should consider the actual capacity of each healthcare facility and disparities between regions.

User Competence, Acceptance, and Experience

The success of a system largely depends on the ability and willingness of staff to use it. Users who understand the benefits of the system and perceive it as easy to use tend to demonstrate higher levels of acceptance. A study conducted in Cirebon Regency found that most respondents considered SIKDA Generik easy to use and beneficial. Another study using the Technology Acceptance Model showed that perceived ease of use, perceived usefulness, attitudes toward use, behavioral intention, and actual use were associated with the acceptance of SIMPUS. This means that a system should not only function technically, but should also align with users' abilities, needs, and job requirements. An evaluation using the HOT-Fit method also highlighted the importance of alignment among human, organizational, and technological factors. At Community Health Centers in Cakung District, the relationship between human and technological factors was found to be strong, whereas the relationship between human and organizational factors was not equally strong. These findings indicate the need to improve communication, staff involvement, and management support. International studies have shown that systems with poor usability may hinder work, increase documentation burden, and reduce the quality of the user experience. Physicians' and nurses' experiences with electronic health record systems may also differ according to profession, system type, and work context. (15)

Discussion

Overall, the findings of the review indicate that the utilization of Community Health Center (Puskesmas) services results from the interaction of health needs, community expectations, accessibility, facility readiness, and service quality. Communities are more likely to use Puskesmas services when they are perceived as appropriate to their health problems, easily accessible, affordable, comprehensive, and professionally delivered (16). Access is not limited to the distance between a person's residence and the Puskesmas. It also includes the availability of transportation, travel costs, operating hours, waiting times, administrative procedures, National Health Insurance coverage, the availability of healthcare workers, the adequacy of medicines, and staff capacity to provide services. National studies and studies conducted in archipelagic regions have shown that the unequal distribution of healthcare facilities and personnel remains a major barrier for communities. The review also shows that technical quality and interpersonal quality are equally important. Communities require accurate diagnoses, available medicines, and competent healthcare workers. At the

same time, they also expect friendliness, empathy, clear information, respect for privacy, and opportunities to express complaints.

Service quality improvement should be carried out continuously. Research conducted at three Puskesmas showed that the success of quality improvement is influenced by leadership, staff involvement, multidisciplinary collaboration, a quality-oriented culture, resource support, and accreditation. Improvements in facilities alone are insufficient when they are not supported by an organizational culture that is oriented toward users' needs. Community needs and expectations also vary according to region and population group. Urban communities may place greater emphasis on service speed, waiting times, queueing systems, and digital information. Communities in remote areas may have greater needs for transportation access, equitable distribution of healthcare workers, mobile health services, and the availability of medicines and diagnostic equipment. Pregnant women require family support, effective communication, a sense of safety, and culturally sensitive care when using maternal health services at Puskesmas (17). Therefore, a single standardized service model may not adequately meet the needs of all Puskesmas. Service planning should be based on local health problems, population characteristics, geographic conditions, facility capacity, and community input within each service area.

Organizational Support and Governance

The implementation of an information system constitutes an organizational change rather than merely the installation of software. Community Health Centers (Puskesmas) require appropriate policies, clear task allocation, operational standards, adequate budgets, system maintenance, and technical support. Leaders must also ensure that staff have sufficient time, competence, and authority to perform their responsibilities effectively (18). A study of maternal and neonatal referral systems identified four main groups of barriers: technology, human resources, organizational support, and referral processes and implementation. These barriers may result in inefficiencies and delays in patients receiving appropriate care. The implementation of e-Puskesmas in Badung Regency also highlighted the need to improve the quantity and quality of human resources, internet connectivity, operational procedures, data completeness, system integration, and confidentiality protection (19). Therefore, managers should establish a team responsible for system operations, data quality, security, training, and problem resolution. Organizational support should be continuous and should not end once the system has been implemented.

Information Security and Confidentiality

The implementation of electronic systems improves the ease of storing and accessing data, but it also increases the risk of information misuse when access rights are not properly managed. These risks include the use of shared accounts, access by unauthorized staff, data loss, and the disclosure of patient information. Data confidentiality issues were identified in an evaluation of e-Puskesmas implementation in Badung Regency. This indicates that system quality should not be assessed only in terms of speed and administrative functionality, but also by its ability to maintain the integrity and confidentiality of patient information. Community Health Centers (Puskesmas) should implement individual user accounts, role-based access restrictions, periodic password changes, data backups, user activity logs, and incident-response procedures. Information security training should also be provided to all staff because data breaches are not always caused by technological weaknesses, but may also result from user error. The review findings indicate that the implementation of health information systems has considerable potential to improve the quality of administrative services at Puskesmas. The main benefits include easier data storage and retrieval, faster registration, more efficient report preparation, improved service monitoring, and better referral coordination. Electronic systems can also reduce dependence on paper-based documents and improve the availability of information for staff.

However, the implementation of health information systems does not automatically result in faster and higher-quality services. Under certain conditions, digitalization may increase workload because staff are required to enter data into multiple applications. The use of seven systems in a single Puskesmas and the separate entry of data into SIMPUS and P-Care demonstrate that system fragmentation is a major barrier to administrative efficiency. These findings indicate that the quality of administrative services should be assessed based on actual outcomes rather than merely on the number of applications used. Assessment indicators may include registration time, waiting time, the frequency of duplicate data entry, patient-identification accuracy,

data completeness, reporting speed, frequency of system disruptions, ease of information retrieval, and staff and patient satisfaction.

Successful implementation also reflects a sociotechnical process because it is influenced by the interaction among people, technology, organizations, and workflows. A technically sound system may still be ineffective when staff do not receive adequate training, leaders do not provide sufficient support, or workflows are not appropriately adjusted. Conversely, competent staff may still find it difficult to provide timely services when internet connectivity, devices, or systems do not function reliably. Ease of use is an important component because complex systems may slow documentation processes. Findings from studies in Indonesia indicate that perceived ease of use and perceived usefulness are associated with SIMPUS acceptance. International evidence also shows that the usability of electronic health record systems is related to work efficiency and users' professional experiences.

Integration should become a priority in the development of Puskesmas information systems. Integrated systems can reduce duplicate data entry, improve information consistency, and accelerate data transfer among registration units, consultation rooms, pharmacies, laboratories, referral services, and reporting units. Nevertheless, integration should be accompanied by data standardization, access governance, confidentiality protection, and clearly defined responsibilities for information management. Studies on the implementation of electronic health records in primary healthcare settings in Nigeria and the Philippines also show that technology implementation should be adapted to facility context, user readiness, workflow changes, stakeholder support, and organizational capacity. These findings reinforce the conclusion that a single implementation model may not be appropriate for all Puskesmas.

Implications for Community Health Center Management

The findings of this review have several implications for the management of Community Health Centers (Puskesmas). First, managers should map all information systems currently in use, including their objectives, users, data types, funding sources, and connections with other systems. Systems with overlapping functions should be evaluated to prevent additional administrative burden. Second, data integration should be prioritized. Patient identity, insurance eligibility, service, medication, laboratory, and referral data should be reusable without requiring repeated entry into different applications. Puskesmas managers need to coordinate with health offices, BPJS Kesehatan, application providers, and referral facilities. Third, Puskesmas should ensure the readiness of infrastructure, including computers, servers, internet access, electricity, local networks, and backup systems. Service procedures during system disruptions should also be established so that services can continue without causing data loss or duplication. Fourth, staff training should be conducted continuously. Training should cover application use, data-entry standards, data-quality checks, information security, basic troubleshooting, and the use of data for planning and evaluation. Fifth, users should be involved in system development. Input from registration staff, medical record officers, healthcare workers, pharmacy staff, laboratory personnel, and program managers is important to ensure that the system aligns with actual workflows and does not introduce unnecessary steps. Sixth, Puskesmas should develop clear evaluation indicators. Evaluations may include service time, data completeness and accuracy, frequency of system disruptions, number of repeated data entries, ease of use, staff satisfaction, patient satisfaction, and the system's ability to generate reports. Seventh, patient data protection should be strengthened through access controls, individual user accounts, data backups, activity audits, and procedures for managing security breaches (20).

Study Limitations

This review has several limitations. First, the information systems analyzed differed in their functions, characteristics, and levels of development; therefore, findings across studies could not be compared directly in all respects. Terms such as SIMPUS, e-Puskesmas, SIKDA, electronic medical records, and primary healthcare information systems may also refer to applications with different features. Second, some studies were conducted in only one or a few Community Health Centers (Puskesmas), meaning that their findings may not represent the overall conditions of Puskesmas throughout Indonesia. Differences in regional context, internet quality, staff capacity, local policies, and financial support may result in different implementation experiences. Third, most studies employed cross-sectional designs, case studies, or single-time-point evaluations. These designs cannot establish a causal relationship between the implementation of information

systems and improvements in the quality of administrative services. Fourth, several studies assessed systems based on user perceptions. Although such assessments are important, they may be influenced by users' experience, technological competence, workload, and duration of system use. Not all studies used objective indicators, such as waiting time, number of errors, reporting speed, or frequency of duplicate data entry. Fifth, studies focusing on staff and managers may not fully reflect patients' experiences. Changes in administrative services should also be evaluated in terms of ease of registration, waiting time, clarity of information, and community satisfaction.

CONCLUSION

The implementation of health information systems plays an important role in improving the quality of administrative services at Community Health Centers (Puskesmas) by accelerating registration, data management, reporting, referral processes, and information provision. However, implementation is still constrained by the lack of system integration, repeated data entry, limited infrastructure, poor data quality, and inadequate training and technical support. Successful implementation requires systems that are easy to use, secure, stable, aligned with service workflows, and supported by staff competence, effective management, and continuous evaluation.

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