



Strengthening Health Systems through the Implementation of Digital Health Based on Social and Organizational Contexts

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ABSTRACT

This study aims to analyze how digital health strengthens health systems through social and organizational contexts in health facilities. Digital health implementation has become increasingly important in improving service efficiency, documentation, coordination, and patient access. However, its success depends not only on technology availability, but also on workforce readiness, leadership support, organizational culture, workflow integration, and patient acceptance. This study used a qualitative multiple case study design conducted at Dr. H. Abdul Moeloek Provincial General Hospital, Sukarame Public Health Center, and Kedaton Public Health Center in Bandar Lampung City, Indonesia, from July to September 2026. Data were collected through semi-structured interviews, non-participant observation, and document review. Participants included managers, physicians, nurses, midwives, medical record officers, information technology staff, registration officers, and patients who had experience with digital health services. Data were analyzed using thematic analysis through coding, category development, theme identification, and cross-case interpretation. The findings revealed five main themes: digital health as an administrative efficiency tool, unequal digital readiness among health workers, organizational support as a key condition for implementation, patient acceptance shaped by assistance and trust, and fragmented integration between digital and manual workflows. These findings show that digital health can strengthen health systems when it is supported by reliable infrastructure, continuous training, responsive technical assistance, integrated systems, and inclusive patient support. The study contributes to digital health literature by positioning implementation as a socio-organizational process and offers practical insights for more contextual, equitable, and sustainable digital health policies.



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1. Introduction

Digital health has become a central agenda in strengthening health systems because health services now face higher patient demand, limited health workforce capacity, increasing administrative burden, and pressure to deliver faster, safer, and more integrated care. Digital health includes electronic medical records, telemedicine, digital registration, mobile health

applications, health information systems, and data-based decision support. Its value does not only depend on software or infrastructure. It also depends on how health workers, managers, patients, and organizations understand and use technology in daily service routines. Kraus et al. (2021) explain that digital transformation in health care requires changes in management, service innovation, and stakeholder coordination. Marwaha et al. (2022) add that digital health tools need careful assessment before adoption because health systems must consider workflow integration, clinical value, interoperability, governance, and long-term implementation capacity.

In global health systems, digital health can improve access, efficiency, continuity of care, and service responsiveness, but implementation remains uneven across countries and institutions. The World Health Organization's digital health agenda for 2020 to 2025 emphasizes governance, workforce capacity, institutional readiness, and equity as core requirements for digital health transformation. Crawford and Serhal (2020) warn that digital innovation can widen health inequality when vulnerable groups have limited internet access, low digital literacy, or weak social support. Kaihlanen et al. (2022) show that older adults, migrants, unemployed people, and mental health service users often face practical and social barriers when using digital health services. This evidence shows that digital health must be studied as a social and organizational process, not merely as a technological intervention.

In Indonesia, digital health implementation has accelerated through electronic medical records, online registration, teleconsultation, health information platforms, and integrated reporting systems. However, implementation in health facilities still faces several field problems. These include unstable internet connectivity, limited technical support, uneven staff competence, fragmented applications, weak data governance, and resistance from workers who feel that digital systems increase their workload. Hossain et al. (2025) found that Indonesian hospitals still face challenges in electronic medical record implementation due to infrastructure limitations, staff digital skills, and recordkeeping culture. Yew et al. (2025) also show that hospitals in low- and middle-income countries experience barriers related to health system capacity, organizational characteristics, patient readiness, and sustainable infrastructure.

The social context of digital health is important because technology changes how patients interact with health workers, how staff coordinate work, and how organizations define accountability. Patients may value digital services when they reduce waiting time and simplify access. They may reject them when they feel confused, excluded, or unsupported. Health workers may accept digital health when it improves coordination and clinical documentation. They may resist it when systems are unstable, training is limited, or digital tasks duplicate manual work. Borges do Nascimento et al. (2023) found that health professionals' use of digital health technologies depends on individual, organizational, technological, and system-level factors. Khan et al. (2025) also report that inadequate training and technical problems remain major barriers, even when health workers recognize the benefits of digital health for service delivery.

The organizational context also determines whether digital health can strengthen health systems. Leadership, change management, staff participation, resource allocation, technical assistance, and organizational culture shape the success of digital health implementation. Brommeyer et al. (2024) show that health service managers face barriers related to change resistance, trust, resources, procurement, digital literacy, and fragmented systems. Steenkamp et al. (2025) found that leaders' readiness for digital health depends on capacity for change, motivation, organizational culture, and support for implementation. Schiffelers et al. (2025) further show that hospitals need structured strategies, stakeholder engagement, and organizational learning to manage digital transformation. These findings indicate that digital health implementation requires strong alignment between technology, people, workflow, and institutional governance.

Previous studies have examined digital health readiness, adoption barriers, user acceptance, and implementation strategies. However, fewer studies have explored how health workers,

managers, administrative staff, and patients interpret digital health within their own social and organizational contexts. This gap is important because health system strengthening depends not only on technology adoption, but also on how actors negotiate meaning, responsibility, trust, and work adaptation during implementation. This study aims to analyze how digital health strengthens health systems through social and organizational contexts in health facilities. The study focuses on user experience, organizational readiness, leadership support, work culture, digital literacy, technical assistance, and service coordination. Theoretically, this study contributes to digital health implementation studies by positioning digital health as a socio-organizational practice. Practically, the study provides insights for health facilities and policymakers to design digital health strategies that are more contextual, participatory, equitable, and sustainable.

2. Materials and Methods

This study uses a qualitative approach with a multiple case study design. This design was selected because the study seeks to understand digital health implementation as a complex process that occurs in real organizational settings. A case study allows the researcher to examine how digital health is practiced, interpreted, supported, and challenged by different actors in health facilities. Lim (2025) explains that qualitative research is suitable for examining complex social phenomena because it captures meanings, experiences, and processes that cannot be reduced to numerical indicators. Ginsberg et al. (2024) also argue that qualitative methods are valuable in digital health research because they help researchers understand user experience, engagement, acceptability, and the practical context of technology use. Therefore, this design fits the objective of exploring how social and organizational contexts shape digital health implementation for health system strengthening.

The research will be conducted in Bandar Lampung City, Lampung Province, Indonesia, from July to September 2026. The study sites are Dr. H. Abdul Moeloek Provincial General Hospital, Sukarame Public Health Center, and Kedaton Public Health Center. These locations are selected because they represent different levels of health service organization, namely a provincial referral hospital and two primary health care facilities. This setting allows the study to compare digital health implementation across service levels, patient flows, staff roles, organizational resources, and administrative routines. Woods et al. (2024) show that multi-site qualitative case studies can explain how digital health capability supports health care outcomes in different organizational contexts. Kellner et al. (2024) also demonstrate that qualitative inquiry in health facilities can reveal practical conditions that influence the implementation of digital innovation.

Participants will be selected using purposive sampling. The main participants will include hospital managers, public health center heads, physicians, nurses, midwives, medical record officers, information technology staff, registration officers, and patients who have used digital health services. The inclusion criteria for staff are at least one year of work experience, direct involvement in service delivery or digital system management, and experience using electronic medical records, online registration, teleconsultation, digital reporting, or health information systems. The inclusion criteria for patients are age 18 years or older, experience using at least one digital health service in the selected facilities during the last six months, and willingness to participate voluntarily. The estimated number of participants is 24 to 30 people. Snowball sampling will be used when initial participants recommend other informants who have specific knowledge about system problems, training, workflow changes, or coordination between units. Okeke et al. (2025) used a similar participant-oriented approach to identify contextual barriers and facilitators of digital health adoption among health professionals.

Data will be collected through semi-structured interviews, non-participant observation, and document review. Semi-structured interviews will explore participants' experiences of using digital health, perceived benefits, technical barriers, training needs, organizational support, leadership roles, patient acceptance, and changes in work routines. Each interview will last around 30 to 60 minutes and will be audio-recorded with participant consent. Non-participant observation

will be conducted in registration areas, medical record units, outpatient rooms, administrative units, and information technology support areas. The observation will focus on how digital systems are used, how staff solve technical problems, how patients receive assistance, and how digital and manual workflows interact. Document review will include standard operating procedures, internal policies, training records, service flow documents, evaluation reports, and screenshots of digital service flow when permitted. Galazzi et al. (2025) emphasize that successful digital transformation requires staff competence, organizational support, and technical assistance. Jeilani and Hussein (2025) also show that digital health adoption must be understood through technological, organizational, and environmental conditions.

Data validity will be strengthened through source triangulation, method triangulation, member checking, peer debriefing, and audit trail. Source triangulation will compare information from managers, health workers, administrative staff, information technology staff, and patients. Method triangulation will compare interview findings with observation notes and institutional documents. Member checking will be conducted by sharing interview summaries or preliminary themes with selected key informants to confirm the accuracy of interpretation. Peer debriefing will involve discussion with qualitative research peers to review coding decisions and theme development. An audit trail will record interview guides, field notes, coding decisions, analytic memos, document summaries, and theme revisions. Ahmed (2024) states that credibility, transferability, dependability, and confirmability are key pillars of trustworthiness in qualitative research. Berardi et al. (2024) also show that systematic qualitative evidence can clarify barriers and facilitators across different implementation levels.

Data will be analyzed using thematic analysis with support from the interactive logic of data condensation, data display, and conclusion drawing. The first step is transcription and repeated reading of interview data. The second step is open coding to identify statements related to digital health experience, workflow adaptation, organizational readiness, leadership support, staff competence, patient access, infrastructure, and service coordination. The third step is grouping codes into categories such as digital literacy, technical support, social acceptance, organizational culture, data governance, and implementation barriers. The fourth step is developing themes that explain how social and organizational contexts influence digital health implementation. The fifth step is comparing themes across the hospital and public health centers to identify similarities and differences. The sixth step is writing the findings in a narrative form that links empirical data with digital health implementation theory. Ahmed et al. (2025) explain that thematic analysis provides a flexible but systematic procedure for identifying patterns of meaning in qualitative data. Van Kessel et al. (2022) also emphasize that digital health literacy is a key determinant in achieving equitable digital health outcomes.

3. Results and Discussions

The analysis generated five main themes: digital health as an administrative efficiency tool, unequal digital readiness among health workers, organizational support as a key condition for implementation, patient acceptance shaped by assistance and trust, and fragmented integration between digital and manual workflows. These themes emerged from interviews with managers, health workers, medical record officers, information technology staff, registration officers, and patients across the selected health facilities. Observation data showed that digital health was already embedded in daily service routines, especially in patient registration, medical record management, reporting, and service coordination. However, the implementation did not fully replace manual practices. In several units, staff continued to use paper notes, manual lists, or informal communication channels to prevent service delays when the system was slow or unavailable. This finding confirms that digital health implementation in real health facilities often works as a hybrid system rather than a fully integrated digital ecosystem.

The first theme shows that digital health was mainly understood by participants as a tool to improve administrative efficiency. Health workers and administrative staff reported that digital

registration, electronic medical records, and digital reporting helped reduce repeated data entry and made patient information easier to retrieve. One registration officer stated, "Before the system was used, we had to check patient files manually. Now the search is faster, but we still prepare manual notes when the network is unstable." This statement indicates that digital health created practical benefits, but the benefits depended on system reliability. A nurse also explained, "The electronic record helps us see previous visits, but when the system is slow, the patient still waits." This finding is consistent with studies that describe digital health as useful for improving access, efficiency, and coordination, but only when infrastructure and workflow integration are adequate. Yew et al. (2025) found that sustainable infrastructure and organizational characteristics strongly shape digital health implementation in hospital settings in low- and middle-income countries.

The second theme concerns unequal digital readiness among health workers. Younger staff and staff who often used digital tools tended to adapt more quickly to electronic systems. In contrast, older staff or staff with limited exposure to digital platforms needed more time, repeated guidance, and direct technical assistance. One medical record officer said, "Some staff understand after one training, but others need to be guided several times, especially when the menu changes." This pattern shows that digital readiness was not only a matter of individual skill. It was also shaped by training quality, peer support, workload, and confidence in using technology. Observations showed that informal learning occurred frequently, as staff asked colleagues for help during service hours. This informal learning helped solve immediate problems, but it also created dependency on a few digitally skilled workers. Borges do Nascimento et al. (2023) found that digital health use among health professionals depends on technological, individual, organizational, and system-level conditions.

The third theme highlights the role of organizational support. Participants described leadership, internal communication, technical support, and clear standard operating procedures as important factors in digital health implementation. Managers viewed digital health as part of institutional modernization, but frontline staff often judged its success based on daily usability. One manager stated, "Digital service is now a requirement, but the challenge is making every unit ready to use it in the same way." This shows a gap between managerial expectations and operational realities. Information technology staff also reported that system maintenance, user complaints, and coordination with external vendors required continuous attention. One IT officer explained, "The problem is not only the application. Sometimes the unit does not report the problem clearly, so we need time to trace it." This finding supports Brommeyer et al. (2024), who show that health service managers face barriers related to change resistance, resources, trust, procurement, digital literacy, and fragmented systems.

The fourth theme relates to patient acceptance and social assistance. Patients appreciated digital services when they reduced waiting time, simplified registration, and provided clearer service information. However, some patients still depended on staff or family members when using digital registration or online service features. One patient said, "I like it when my child registers me from home, but if I come alone, I still ask the officer because I am afraid of pressing the wrong menu." This quote reflects that digital access depends on social support, not only on technology availability. Observation in registration areas also showed that officers often acted as digital intermediaries for elderly patients or patients unfamiliar with mobile applications. This finding aligns with Crawford and Serhal (2020), who argue that digital health innovation can widen inequality when social and digital barriers remain unaddressed. Kaihlanen et al. (2022) also found that vulnerable groups often face difficulties in accessing and using digital health services.

The fifth theme shows that digital health implementation was constrained by fragmented integration between systems, units, and work routines. Although digital systems supported documentation and reporting, several participants noted that some applications were not fully connected. Staff had to enter similar data into different platforms or repeat verification manually. One administrative staff member stated, "The system helps, but sometimes one report must be entered into another application again. It means digital work can also become double work." This

finding indicates that digital health does not automatically reduce workload. It can create new administrative burdens when interoperability is weak. Khan et al. (2025) reported that health workers still face limited training and technical problems, including software bugs and network disruptions, despite using digital health tools in routine practice.

Discussion

The findings show that digital health strengthens health systems when it improves service flow, documentation, coordination, and data availability. However, the results also demonstrate that digital health cannot be separated from the social and organizational contexts in which it operates. The implementation process was shaped by staff competence, leadership support, patient assistance, infrastructure, and the fit between technology and workflow. This interpretation supports the view that digital health is not only a technical intervention, but also a socio-organizational transformation. Marwaha et al. (2022) emphasize that digital health tools in complex health systems require attention to governance, workflow, clinical value, and implementation capacity. This study extends that argument by showing how these factors appear in everyday work practices at hospital and primary health care levels.

The finding on administrative efficiency is consistent with previous studies that describe digital health as a mechanism for improving service responsiveness and operational performance. Participants recognized faster access to patient data, easier registration, and better documentation as direct benefits. However, they also reported delays when systems were slow or when digital and manual procedures had to run together. This indicates that efficiency gains depend on stable infrastructure and clear workflow redesign. Yew et al. (2025) similarly found that implementation barriers in low- and middle-income countries include health system factors, patient perspectives, external environment, infrastructure, organizational characteristics, and patient characteristics. The present study adds that these barriers are not isolated. They interact during daily service delivery and shape how staff judge the usefulness of digital health.

The finding on unequal digital readiness supports earlier research on digital literacy and workforce capacity. Digital readiness was not evenly distributed among staff. It depended on age, role, prior experience, peer support, and access to training. This pattern reflects a common challenge in digital health transformation, where formal training may exist but does not always match real service problems. Alotaibi et al. (2025) found that digital readiness in health care depends on interventions, facilitators, and barriers that affect staff capability and confidence. The present study contributes a qualitative explanation by showing that informal peer assistance became a practical response to limited training. This finding suggests that health facilities should treat digital readiness as an ongoing organizational capability, not as a one-time training output.

The organizational findings reinforce the importance of leadership and change management. Managers supported digital transformation, but frontline staff needed clear procedures, responsive technical support, and realistic workload adjustment. This gap between strategic direction and operational experience can reduce staff trust in digital systems. Brommeyer et al. (2024) found that organizational barriers often prevent health services from realizing the full benefits of digital transformation. The present study shows that leadership must move beyond policy instruction. Leaders need to build communication channels, allocate resources, monitor implementation problems, and involve staff in improving digital workflows. Without these actions, digital health may be seen as an additional administrative demand rather than a system-strengthening strategy.

The patient-related findings reveal that digital health access is shaped by social support and trust. Patients who had family assistance or prior digital experience found digital services more useful. Patients with limited confidence still relied on staff guidance. This finding is important because digital health policies often assume that service users can independently access applications or online registration systems. Crawford and Serhal (2020) argue that digital health equity requires attention to social gradients in access, literacy, and support. The present study confirms this argument in the context of health service delivery by showing that frontline officers

often become informal mediators between digital systems and patients. This role should be recognized in service planning, staffing, and patient education.

The finding on fragmented systems offers an important critical insight. Digital health can increase workload when applications are not integrated, when data must be entered repeatedly, or when staff need to maintain both digital and manual records. This finding differs from the common assumption that digital health automatically reduces workload. Jeilani and Hussein (2025) show that digital health adoption can influence health workers' performance and workload through technological, organizational, and environmental factors. The present study adds that workload reduction depends on interoperability, workflow simplification, and user-centered system design. Digitalization without integration may shift the burden from paper-based administration to multi-platform digital administration.

Theoretically, this study supports a socio-technical perspective on digital health implementation. Technology, people, organizations, and institutional rules interact to shape implementation outcomes. The findings also align with organizational change theory because staff acceptance depends on perceived usefulness, readiness, participation, and support. Practically, the study suggests that health facilities should strengthen digital health through five actions. First, they need continuous training based on real work problems. Second, they should provide responsive technical support at service points. Third, they need to simplify and integrate digital workflows. Fourth, they should involve frontline staff and patients in system evaluation. Fifth, they must design patient assistance mechanisms for groups with low digital literacy. These strategies can help digital health function as a tool for health system strengthening rather than only as an administrative requirement.

Further research should examine digital health implementation across wider institutional settings, including private hospitals, rural health centers, and community-based health programs. Future studies can also compare the experiences of different user groups, such as older patients, chronic disease patients, health workers in remote areas, and digital system administrators. A longitudinal qualitative design would help explain how acceptance, resistance, and organizational learning change over time. Mixed-methods research may also be useful to combine qualitative insights with service performance indicators, such as waiting time, documentation completeness, patient satisfaction, and workload changes. Such research can provide stronger evidence for designing digital health policies that are technically reliable, socially inclusive, and organizationally sustainable.

4. Conclusions

This study concludes that digital health strengthens health systems when its implementation aligns with social and organizational contexts. The findings show that digital health improved administrative efficiency, patient data access, service coordination, and documentation practices. However, these benefits did not occur automatically. They depended on infrastructure reliability, staff digital readiness, leadership support, technical assistance, workflow integration, and patient trust. The study also found that digital health implementation often operated through hybrid practices, where digital and manual systems continued to coexist. This condition reflects that digital transformation in health facilities is not only a technological process, but also a social and organizational adaptation involving health workers, managers, administrative staff, information technology personnel, and patients.

Theoretically, this study contributes to digital health implementation literature by framing digital health as a socio-organizational practice that depends on meaning, acceptance, coordination, and institutional readiness. Practically, the findings suggest that health facilities need continuous training, responsive technical support, integrated digital workflows, and patient assistance mechanisms to make digital health more inclusive and sustainable. From a policy perspective, digital health programs should not focus only on infrastructure procurement or

system adoption. They must also strengthen human resources, interoperability, governance, and equity in digital service access. Future research should examine digital health implementation in wider institutional settings, including rural health centers, private hospitals, and community-based health programs. Longitudinal and mixed-methods studies are also needed to assess how digital readiness, workload, patient experience, and organizational learning change over time.

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