



ANALYSIS OF THE READINESS OF PUSKESMAS MANAGEMENT IN THE IMPLEMENTATION OF TELEMEDICINE

Nelda Linda Aceh¹, Ermi Girsang², Sri Lestari Ramadhani Nasution^{3*}

¹Postgraduate Program in Public Health, Universitas Prima Indonesia, Jl. Sampul No.3, Sei Putih Bar., Medan Petisah, Medan, Sumatera Utara 20118, Indonesia

²Department of Public Health, Universitas Prima Indonesia, Jl. Sampul No.3, Sei Putih Bar., Medan Petisah, Medan, Sumatera Utara 20118, Indonesia

³COE for Degenerative Disorders and Integrated Health, Universitas Prima Indonesia, Jl. Sampul No.3, Sei Putih Bar., Medan Petisah, Medan, Sumatera Utara 20118, Indonesia

*srilestariramadhaninasution@unprimdn.ac.id

ABSTRACT

Telemedicine has the potential to improve access, efficiency, and quality of health services. Its implementation in first-level health facilities requires management readiness, namely human resources, facilities and infrastructure, policies and governance, and financing. This study analyzes the readiness of the management of the UPTD Puskesmas Gunungsitoli District in implementing telemedicine as well as its supporting and inhibiting factors. The research uses a qualitative approach with a case study design. Informants 2 key informants (Head of the Health Center and the Person in Charge of the Health Information Program/System) and 6 supporting informants (doctors, nurses, midwives, and medical record officers), data was collected through in-depth interviews, observations, and documentation, and then analyzed with the Miles and Huberman interactive model. The results showed that overall management readiness was not optimal. Human resources and infrastructure facilities are quite adequate, but still limited. Health workers have basic digital competencies and willingness to adapt, but have never received telemedicine training. Basic digital infrastructure such as devices, internet, Electronic Medical Records, and SATUSEHAT are available, although equipment is limited and internet connections are not stable. Policy, governance, and financing readiness is still lacking because there are no special operational procedures, clear implementation structures, monitoring and evaluation mechanisms, and special funds. The support and commitment of leaders are the main supporting factors. It is concluded that management readiness needs to be strengthened through increasing human resource capacity, strengthening digital infrastructure, formulating policies and SOPs, establishing clear governance, and allocating adequate budgets.

Keywords: digital health transformation; health centers; management readiness; telemedicine

How to cite (in APA style)

Aceh, N. L., Girsang, E., & Nasution, S. L. R. (2026). Analysis of the Readiness of Puskesmas Management in the Implementation of Telemedicine. *Indonesian Journal of Global Health Research*, 8(6), 1161–1168. <https://doi.org/10.37287/ijghr.v8i6.2842>.

INTRODUCTION

Digital transformation in the health sector is now a systemic need. Telemedicine, which is a remote health service based on information and communication technology, is present to overcome geographical barriers, limitations of medical personnel, and inequality in the distribution of health facilities. Puskesmas as the spearhead of primary services play a strategic role in its implementation (Saimi, 2025). However, the success of telemedicine is determined by the readiness of health center management, namely human resources (HR), infrastructure, policies and governance, and financing. Without this readiness, telemedicine has the potential to fail or cause new problems, such as misdiagnosis, violation of patient privacy, and inequality of digital access (Yuda & Januraga, 2026). The government has prepared the basis for regulations through (Permenkes No. 20, 2019) on telemedicine, (Permenkes, 2024) on Medical Records, and the SATUSEHAT platform. However, regulations do not automatically guarantee successful implementation in the field. In North Sumatra, services with only an ID card starting October 1, 2025 have the potential to increase patient visits, thus demanding service innovations such as telemedicine.

This research focuses on the UPTD of the Gunungsitoli District Health Center, which serves 24 work areas with 51,536 residents and 181 workers. Patient visits reach 90-100 people per day, while medical record officers are only 3 people. The new officers participated in telemedicine socialization once without follow-up. In addition, the devices are limited, the 100 Mbps internet network is not yet stable for real-time services, and there is no SOP for telemedicine specific and clarity on financing mechanisms, including its integration with BPJS Kesehatan.

Several previous studies have examined the readiness of digitalization at the health center. (Yulina et al., 2025) examined the implementation of telemedicine at the Kotabumi Ilir Health Center with the framework of Technology-Organization-Environment (TOE). Readiness is in the category of being quite ready with the dominant technology dimension, while the organizational and environmental dimensions still need to be strengthened. (Nurvita Wikansari & Febrianta, 2024) mapping the readiness of RME at the Pajangan Health Center, Bantul. Obstacles were found in human resources (lack of medical records and information technology personnel), organization (no SOPs and roadmaps), funds (no special funding from the health office), and infrastructure facilities (lack of devices and slow internet). (Marbun, 2025) researched the readiness of human resources and IT infrastructure for RME at the Lolofitu Moi Inpatient Health Center UPT. Human resources are quite ready, but managerial support in the form of technical training and mentoring is still very limited.

Different from the three, this study specifically analyzes telemedicine, not RME. This study uses a management readiness framework consisting of human resources, infrastructure, policies and governance, and financing. In contrast to Yulina et al. (2025) who use the TOE framework, this study also examines supporting and inhibiting factors in health centers in the archipelago with limited digital infrastructure, a context that is still minimally researched. The research gap is that the study of telemedicine is still dominated by technological aspects, service benefits, and user satisfaction, while management readiness as a determinant of success has not been fully studied.

This research is important because without management readiness, telemedicine risks becoming a symbolic program that does not improve service quality, and can even reduce public trust.

The purpose of this study is to analyze the readiness of the management of the UPTD Puskesmas of Gunungsitoli District in the implementation of telemedicine, including human resources, infrastructure, policies and governance, as well as financing, and identify supporting and inhibiting factors. The research contribution is in the form of a multidimensional management readiness framework for health management studies, as well as strategic recommendations for health centers and policy makers in strengthening the digital transformation of primary services.

METHOD

This study uses a qualitative approach with a case study design at the UPTD Puskesmas Gunungsitoli District. This approach was chosen to deeply understand the readiness of management in the implementation of telemedicine, which is multidimensional (structural, cultural, and psychological) and not sufficiently measured by numbers. The location was chosen because this health center plays a strategic role as a first-level service facility, has a gap between policy demands and implementation readiness, and faces limited resources. The research is planned to last for one month. The informants were determined by purposive sampling and consisted of 2 key informants (Head of the Health Center and the Person in Charge of the Health Information Program/System) and 6 supporting informants (doctors, nurses, midwives, and medical record officers). The number of informants is flexible until data saturation is achieved. Primary data was collected through semi-structured in-depth interviews and observations with observation sheets, while secondary data came from documentation such as SOPs, internal policies, RUKs, RPKs, activity reports, as well as supporting literature and regulations.

Data was analyzed using Miles and Huberman's interactive model, namely data reduction, data presentation (narrative, matrix, and thematic tables), as well as drawing conclusions and verification. The validity of the data was maintained through triangulation of sources and techniques, without inferential statistical tests. This research follows the ethical code of ethics for health research by submitting ethical clearance to the Health Research Ethics Commission before data collection begins. Its implementation upholds four ethical principles: informed consent given voluntarily, confidentiality of informant identity and data through anonymization and secure storage, the principle of non-maleficence towards informants, and scientific honesty in data processing and reporting.

RESULT

Overview of Research Locations and Characteristics

UPTD Puskesmas Gunungsitoli District was established in 2012 by the Gunungsitoli City Government with the status of a non-inpatient health center. In 2016, the Health Office equipped doctors, analysts, pharmacists, nutritionists, medical recorders, and sanitarians, as well as assisted the health center until it obtained Intermediate accreditation in November 2017. Its status was upgraded to an inpatient health center with a capacity of 10 beds and 24-hour RTGD services in 2019, and the health center received Plenary reaccreditation in 2023.

Geographically, the health center is located in Gunungsitoli District, Gunungsitoli City, North Sumatra Province. Since the establishment of the Kauko Health Center in 2020, its working area includes 21 villages and 3 sub-districts with an area of about 109.09 km², the second largest in Gunungsitoli City. The projected population in mid-2026 will reach 50,519 people (24,654 males and 25,865 females) with 12,824 families. The area and population distribution affect the range of services, especially for people who are far from health facilities, so telemedicine is a potential alternative.

The health center is supported by 181 health workers and support personnel. The average patient visit reaches 90-100 people per day or around 2,340 visits per month. Digital services that have been running include the Mobile JKN application, the Health Center Information System (SIP), various Ministry of Health reporting applications (for example, ASIK, CKG, and EPPGBM), and WhatsApp for service coordination. Electronic Medical Records (RME) are still in the process of implementation. Various obstacles are still faced, namely network limitations, device limitations, and not optimal system integration.

The research informants totaled eight people, consisting of the Head of the Health Center (IP1), doctors (IP2), medical records officers (IP3), SIP officers (IP4), coordinating midwives (IP5), treasurers (IP6), infrastructure officers (IP7), and the person in charge of the management cluster (IP8). The age of the informants was 32-48 years old, with D-3 to S-1 education and a working period of 5-20 years. All interviews and observations were conducted in the work environment of the health center.

Human Resource Readiness

The readiness of human resources is in the category of quite ready. According to the Head of the Health Center, most of the officers have been able to operate computers and Android smartphones. The gap occurs in elderly or near-retired officers who have difficulty adapting due to age factors and limited digital literacy. The Head of the Health Center (IP1) stated that older officers are still "gaping" so that only young officers can be relied upon.

The officers are familiar with the term telemedicine but do not understand how to operate it. They do not understand the remote consultation process, service recording mechanisms, digital referral procedures, and procedures for communicating with patients electronically. Special training has

never been carried out. The only intervention was the socialization of the introduction of features by BPJS Kesehatan in one meeting, without learning how to operate. The doctor (IP2) stated that they had never received special training and only participated in socialization, while IP8 said that the officer only knew the name of telemedicine without knowing how to use it.

However, no resistance to change was found. Officers are willing to use telemedicine if it is supported by comprehensive training. Another challenge arises from the service user side. The officer assesses that not all people are able to use digital technology, especially residents in remote villages and the elderly who are more comfortable meeting with doctors in person. IP5 reminded that the internet network on Nias Island is uneven and some areas do not even have a network. The implementation of telemedicine is therefore considered to be gradual, with officer training as the first step (IP3).

Readiness of Facilities and Infrastructure

The readiness of facilities and infrastructure is in the category of quite ready. The health center already has computers, laptops in various rooms, a 100 Mbps internet network, SIP, P-Care, and RME that are in transition. The Head of the Health Center considers that the facilities are not bad, but they are not adequate for the number of patients served. The obstacles found are divided into three things.

First, limited devices. Computers are sometimes slow or completely damaged so repairs take several days. During that time, the officer has to share the device in another room (IP7). Second, the network is unstable. The capacity of 100 Mbps is not enough for all users, from the officer to the patient, and only the room close to the internet device has a stable signal (IP3). Third, the operational impact of the network disruption. The patient queue switches to the offline system, data reporting is done manually and then re-input when the network recovers so that the work is repeated, and the referral letter cannot be issued so that the patient is asked to return the next day. This condition causes discomfort for the officer and the patient. The doctor (IP2) mentioned that some patients were angry, so the officer had to provide understanding.

Based on observations, telemedicine applications and digital service spaces are not yet available, while data security systems require special attention. Telemedicine at this health center is therefore still in the planning stage, not yet in the operational stage. Network constraints also stem from the geographical condition of the Nias islands, with some areas without internet access.

Policy and Governance Readiness

Policy and governance readiness is in the category **of not ready**. The Head of the Health Center stated that regulations, decrees, and SOPs for telemedicine are not yet available because they are not yet a priority. The organization's current focus is on the preparation of BLUD (January 2026), the procurement of ECG equipment, and RME cooperation with third parties. The results of interviews and observations show that there is no

1. SOPs that regulate service flows, division of tasks, remote consultations, documentation, and telemedicine reporting;
2. Decree on the formation of a team or organizational structure for telemedicine management;
3. achievement targets, success indicators, and implementation stages;
4. monitoring and evaluation from relevant policy stakeholders.

The Health Office has also not required telemedicine regulations, even regional hospitals in Nias have not used it (IP1). On the other hand, leaders and officers have a good commitment. The Head of the Health Center supports telemedicine if it is supported by government policies, infrastructure, and resources. The medical record officer said that the RME has not been fully operational due to

the obstacles of cooperation with vendors that are still being resolved. IP8 hopes that telemedicine will be "exposed" slowly as the RME is realized.

Financing Readiness

Financing readiness is in the category of not ready. There is no special budget for telemedicine in the RAB of health centers (IP6). The source of expenditure for health centers only comes from the health service and operational assistance (BOK) funds, which are currently prioritized for BLUD preparation, the procurement of ECG and physiotherapy equipment, and the salaries of BLUD employees. The cost of human resource development for telemedicine has not been taken into account and the financing sustainability strategy has not been prepared. BPJS support for digital service financing is also not yet available.

The Head of the Health Center assessed that the biggest challenge is not only the initial procurement of the system, but also the long-term operational sustainability. Telemedicine requires routine costs for device maintenance, system updates, network capacity building, and periodic training. The informant expects financing support from local governments, central governments, related agencies, and BPJS (IP1, IP6).

Supporting and Inhibiting Factors

Supporting factors include: (1) openness of health workers, as there is no active or covert refusal and telemedicine is seen as helping services; (2) commitment of leaders, who are willing to help prepare and change work culture; and (3) basic digital infrastructure that has been available as an initial foundation.

Inhibiting factors include: (1) new digital competence limited to knowing, not yet understanding, with digital literacy below 50% and without formal training; (2) inadequate network and geographical challenges of the archipelago; (3) lack of internal policies; (4) lack of budget allocation; and (5) low community readiness and face-to-face service culture, which makes patients more likely to return to conventional services when digital systems are constrained.

Miles and Huberman Analysis Matrix

The data reduction yields four main themes and key findings, as presented in Table 1.

Table 1. Telemedicine Management Readiness Data Reduction Matrix

Theme	Key Statements	Code	Interpretasi
HR	"There has never been any special training in telemedicine" (IP1); "only short socialization" (IP2); "if there is training we are ready" (IP3)	Limited training, low digital literacy, willingness to learn	Psychological readiness exists, competencies are not evenly distributed
Infrastructure	"Computers are available but limited"; "Internet is often slow during business hours" (IP7); "There is no telemedicine data security system yet"	Limited devices, unstable internet, data security not yet	Basic infrastructure exists, not yet optimal
Policy	"There is no telemedicine SOP yet" (IP8); "not yet in the priority program" (IP3); "supportive leadership" (IP1)	SOPs do not exist, have not yet become a priority, leadership support	Commitment exists, governance is not structured
Financing	"There is no special budget yet" (IP6); "if there is a program from the Health Office, we are ready" (IP1)	Special funds do not exist, depending on external support	The sustainability of the program is not yet guaranteed

From the presentation of the data, the conclusion is drawn that the organization has the will to change (change commitment), but the ability to implement change (change efficacy) is still weak. The overall readiness of management is at the early-stage readiness.

Tabel 2. Ringkasan Kategori Kesiapan

Dimensions	Key Findings	Category
HR	High commitment and willingness to learn; digital competencies vary; training is not yet available	Quite ready
Infrastructure	Devices, internet, SIPs and RME are available but limited and unstable; data security is not yet in place	Quite ready
Policy and governance	SOPs, SKs, monitors, and planning are not yet available; leadership support exists	Not ready yet
Financing	No dedicated budget and sustainability strategy	Not ready yet

DISCUSSION

The findings that officers have a positive attitude but are not yet skilled are in line with the Organizational Readiness for Change framework which distinguishes between change commitment and change efficacy. In the study site, commitment was quite strong, but efficacy was still weak because structured training was not available. (Nurvita Wikansari & Febrianta, 2024) found a similar pattern, namely positive perceptions without adequate technical competence, while (Yulina et al., 2025) referred to this condition as pseudo-readiness. One-time socialization is more of an introduction than the formation of competence. The statement of the Head of the Health Center that services "can run but take a long time" shows a risk to the quality of services if telemedicine is implemented before human resources are trained. In addition to technical competence, psychological and cultural factors, such as age gaps and concerns about change, also need to be considered (Firna & Pratama, 2026).

Permenkes No. 20 of 2019 requires ICT infrastructure, stable internet networks, integrated information systems, supporting devices, data security, and competent personnel. The results of the study show that most of these requirements have not been met optimally. These findings are in line with Kurniawan and Putri (2023), who place IT infrastructure as an important factor for the success of telemedicine in primary services. Network limitations are not only related to bandwidth, but also telecommunication inequality in the archipelago, so it requires cross-sector support. Telemedicine also requires integration with RME so that patient data can be accessed quickly, accurately, and securely. Because RME is not yet fully operational, the integration prerequisites have not been met. This condition is in line with Rogers' innovation diffusion theory which emphasizes the importance of infrastructure and user readiness (Siregar, 2022).

The absence of SOPs, SKs, monitoring and evaluation, and strategic planning shows a policy vacuum that causes programs to lose direction and operational legitimacy. This condition reflects the low readiness of the organization according to Weiner (2009). (Herawati et al., 2023) also found that the absence of SOPs and governance is a factor in the failure of digital health programs in primary facilities. Based on George R. Terry's POAC theory, the organizing and controlling functions are not effective because there is no implementing structure and supervisory mechanism (Novariza et al., 2026). This is in line with (Permenkes No. 44, 2016) which emphasizes planning, organizing, implementing, and supervising. The organization's priority for the transition of BLUD and RME shows that telemedicine is still seen as an additional program, not an integral part of services.

Telemedicine has not yet become a budget priority because basic services and the transition of BLUD are considered more urgent. (Budyanti et al., 2022) show that non-urban health centers tend to place telemedicine at a low budget priority, with BPJS, BOK, and APBD mechanisms that have not been integrated. The available budget is more sufficient for basic tools and does not include human resource development, system maintenance, and digital infrastructure. This condition risks creating an infrastructure trap, namely devices are available but not supported by trained human resources. The Ministry of Health of the Republic of Indonesia (2023) also emphasizes the vulnerability of telemedicine sustainability if it depends on external assistance.

The four dimensions of readiness affect each other. The low readiness of human resources is related to the absence of training policies, while policies and financing are influenced by the lack of inclusion of telemedicine in strategic planning such as the Strategic Plan, Renja, RUK, and RPK. These conditions form a cycle that is interlocking: unavailable policies hinder the strengthening of human resources, limited financing hinders policy implementation, and weak planning causes budget support to be unavailable (Hakim, 2025). Conceptual models can be formulated as strategic planning, financing, policies and governance, human resource development, infrastructure, and telemedicine implementation. Thus, the main obstacles to telemedicine are managerial and systemic, not just technology. This model is a conceptual novelty that can be applied to other health centers, especially in the archipelago.

Telemedicine is also related to the National Health Transformation agenda, especially the implementation of RME based on the Minister of Health Regulation No. 24 of 2022 and data integration through SATUSEHAT. Although basic tools and networks are available, their use is not optimal because they have not been followed by strengthening governance, human resource competence, and financing. These conditions not only hinder telemedicine, but also the readiness of health centers in the implementation of RME and data interoperability. Therefore, digital transformation in primary services requires comprehensive management readiness through strategic planning, internal policies, sustainable financing, human resource competence, and adequate facilities and infrastructure.

CONCLUSION

Based on the results of the study, the UPTD Puskesmas of Gunungsitoli District is not comprehensively ready to implement telemedicine. The readiness of human resources and infrastructure facilities is in the category of being quite ready, characterized by the openness of officers to change, the availability of basic digital infrastructure, but there are still limitations in competencies, training, internet networks, devices, and the implementation of RME. Meanwhile, the readiness of policies and governance and financing is in the category of not ready, because there are no SOPs, implementation teams, monitoring and evaluation, strategic planning, and special budget allocation for telemedicine. Supporting factors include leadership commitment, positive responses of health workers, and basic digital infrastructure, while the main obstacles include network instability due to the geographical conditions of the archipelago, limited human resource competencies, lack of internal policies, limited financing, and public preference for face-to-face services. Overall, the main obstacle is not only the technological aspect, but the readiness of management in integrating human resources, facilities, policies, and financing into planned and sustainable telemedicine governance.

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