



Evaluating SIMPUS Implementation at Teladan Community Health Center: a HOT-Fit Framework Analysis

Ahmad Fuadi Nasution¹, Emri Girsang², Sri Lestari Ramadhani Nasution³

¹ Student of the Master of Public Health Study Program, Faculty of Medicine, Dentistry and Health Sciences, Universitas Prima Indonesia

^{2,3} Master of Public Health Study Program, Faculty of Medicine, Dentistry and Health Sciences Universitas Prima Indonesia, PUI PHYTO Degenerative and Lifestyle Medicine, Universitas Prima Indonesia

Email correspondence: srilestariramadhaninasution@unprimdn.ac.id

<p>Track Record Article</p> <p>Revised: 23 June Accepted: 15 August Published: 31 August</p> <p>How to cite: Nasution, A. F., Girsang, E., & Nasution, S. L. R. (2025). Evaluating SIMPUS Implementation at Teladan Community Health Center: a HOT-Fit Framework Analysis. <i>Contagion : Scientific Periodical of Public Health and Coastal Health</i>, 7(2), 106–120.</p>	<p style="text-align: center;">Abstract</p> <p><i>Health centers in Indonesia are mandated to implement a Health Center Information System (SIP) in accordance with Minister of Health Regulation No. 31 of 2019. The Teladan Medan Health Center has adopted several information systems, including e-Puskesmas; however, implementation challenges persist. This study aims to evaluate the implementation of the Management Information System (SIMPUS) at the Teladan Medan Health Center using the Human-Organization-Technology (HOT)-Fit framework. This research employs a descriptive qualitative approach and was conducted from December 2024 to July 2025. The study involved five informants, comprising both key and supporting participants. Data were analyzed through reduction, presentation, and conclusion-drawing to identify patterns relevant to each HOT-Fit dimension. Findings indicate that, from the human aspect, users experienced difficulties with data entry, with approximately 60% of informants reporting input errors. Organizationally, the structure is well-established, monitoring and evaluation activities are in place, and system usage guidelines exist—although they are adapted directly from Ministry of Health protocols. Technologically, discrepancies were observed between drug inventory data in the system and actual stock in the pharmacy warehouse. In terms of net benefits, the system has reduced reliance on manual processes and improved data accuracy; however, full integration across all programs remains a significant challenge. It is recommended that the Medan City Health Office promote the integration of program-specific information systems into a unified platform and ensure server reliability to support system performance</i></p> <p>Keywords: System evaluation, information systems, HOT-Fit</p>
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INTRODUCTION

Digital transformation in the healthcare sector has emerged as a national priority aimed at enhancing service efficiency and reinforcing data-driven health governance. A key innovation at the primary care level is the implementation of the Community Health Center Management Information System (SIMPUS), which functions as an integrated platform for recording, reporting, and managing health data within community health centers. SIMPUS plays a strategic role in supporting the execution of various national initiatives, including the Healthy Indonesia Program through a Family Approach (PIS-PK) and the acceleration of Universal Health Coverage (UHC) in Indonesia (Kemenkes RI, 2021).

SIMPUS has the potential to enhance equity in both access to and delivery of healthcare services. The system facilitates the identification of underserved and vulnerable populations,

including individuals in remote areas, those experiencing poverty, the elderly, and people with disabilities. Through its digital reporting and mapping capabilities, SIMPUS can be leveraged to detect gaps in service provision and guide the allocation of interventions to areas with the greatest need (Putri & Nurlaela, 2023) .

The primary objective of the Community Health Center Management Information System (SIMPUS) is to enhance the quality of health development within the operational areas of community health centers (Pusdatin Kemenkes RI, 2019). In North Sumatra, adoption of the system remains limited, with usage reported at only 32.6%. This low figure prompted the establishment of the Ministry of Health's Strategic Plan for 2015–2019 (Dinkes Sumut, 2018) . One of the key targets outlined in the plan is the improvement of an integrated health information system, with a specific goal of achieving 50% availability of data communication networks to support access to e-health services(Kemenkes RI, 2019) .

Although several prior studies have explored the implementation of SIMPUS in urban settings, they have typically concentrated on isolated aspects, such as user readiness or overall system effectiveness. This study offers a distinct contribution by highlighting the challenges posed by fragmentation among multiple, parallel subsystems (e.g., e-Puskesmas, SIHA, SITB) and examining their impact on workflow efficiency and data consistency across services. In doing so, it addresses a theoretical gap in the literature concerning information system interoperability and integration within the primary care context. This research also contributes to the achievement of the Sustainable Development Goals (SDGs), particularly SDG 3: Good Health and Well-being, and aligns with the WHO Digital Health Strategy (2022), which promotes the digital transformation of health service systems and the strengthening of health data governance. The effectiveness of an information system can be assessed using the Human-Organization-Technology Fit (HOT-Fit) model. According to Yusof et al. (Yusof et al., 2008) , the HOT-Fit framework evaluates system performance based on three core dimensions: human, organizational, and technological factors. Applying the HOT-Fit model in this study not only supports efforts to enhance the quality of SIMPUS services but also provides a foundation for informed policy-making in community health center management.

The Teladan Medan Public Health Center has implemented several information systems, including e-Puskesmas, ASIK, SITB, SIHA, and others commonly used across health centers. However, challenges persist related to user experience, system reliability, and organizational support. Users have reported frequent issues with SIMPUS functionality, including unresponsiveness during operation, which prevents data entry. Additionally, the system is prone to errors and occasionally shuts down unexpectedly (force close), disrupting

user activities and hindering workflow efficiency. Based on these considerations, this research is essential to conduct a comprehensive evaluation of SIMPUS implementation using the Human-Organization-Technology Fit (HOT-Fit) framework as an analytical approach.

METHODS

This study employs a descriptive qualitative approach to evaluate the implementation of the Community Health Center Management Information System (SIMPUS) at the Teladan Medan Community Health Center, using the Human-Organization-Technology Fit (HOT-Fit) framework. The research was conducted at Puskesmas Teladan in Medan, North Sumatra, a facility that actively utilizes various information systems. The study period spanned from December 2024 to June 2025.

Informants in this study were selected using a purposive sampling technique, based on the criteria of being directly involved in the use of SIMPUS within their respective work units and having worked at the Teladan Community Health Center for a minimum of one year. A total of five informants participated in the study, comprising two key informants and three supporting informants. The key informants included the Head of the Community Health Center and the medical records officer, both of whom play a central role in the management and implementation of SIMPUS. The supporting informants consisted of the registration officer, SP2TP officer, and pharmacy service officer, selected for their direct involvement in data entry operations, utilization of SIMPUS modules, and coordination across service units. A sample size of five informants is considered adequate for a qualitative study, as the emphasis is placed on the depth and richness of information rather than statistical generalization.

Data collection was conducted using four methods: in-depth interviews, observation, documentation, and triangulation. Face-to-face interviews were carried out using semi-structured interview guidelines and were recorded with the informants' consent. Each interview lasted between 30 and 60 minutes and explored topics related to the human dimension (system usage and user satisfaction), organizational aspects (structure and environment), technological factors (system and information quality), and net benefits (improvements in job performance). Data collection continued until saturation was reached—that is, when subsequent interviews no longer produced substantive new insights.

Data validity was ensured through method triangulation—comparing findings from interviews, observations, and document analysis—and source triangulation, which involved contrasting perspectives from informants at both structural and operational levels (Sugiyono,

2017). The collected data were analyzed qualitatively using an interactive approach, consisting of three main stages: data reduction, data presentation, and conclusion drawing.

RESULTS

Table 1. Informant Characteristics

Informant	Sex	Education	Position
Informant 1	Female	Bachelor's Degree in Medicine	Head of Community Health Center
Informant 2	Male	Bachelor's Degree in Medical Records	Medical Records Officer
Informant 3	Female	Bachelor's Degree in Nutrition	Registration Officer
Informant 4	Female	Bachelor's Degree in Nutrition	SP2TP Officer
Informant 5	Female	Bachelor's Degree in Pharmacy Profession Pharmacist	Pharmacy

Evaluation of SIMPUS Implementation Based on Human Aspects

The Teladan Community Health Center employs a range of health information systems to support both general services and specialized health programs. These systems include e-Puskesmas, SITB (Tuberculosis), SIHA (HIV/AIDS), ASIK (Immunization), E-PPGBM (Toddler Nutrition), SMILE HIV, SMILE TB, SELENA Pharmacy, and SIMONA. This diverse system usage reflects the center's commitment to digital integration in service delivery, although it also presents challenges in terms of user adaptation and system interoperability.

The implementation of various information systems, including SIMPUS, naturally involves individuals responsible for their execution. This evaluation focuses on the human aspects as perceived by users. The following are the results obtained from interviews with informants:

"...each program has its own person in charge of each system, sir" (Informant 1)

"...I'm the person in charge of the Electronic Medical Records in the e-Puskesmas" (Informant 2)

"There is a person in charge, I'm the one in charge of registration..." (Informant 3)

"...the person in charge is the head of each program..." (Informant 4)

Based on interviews with informants, it can be concluded that information system management at the Teladan Community Health Center is organized according to specific programs and service units. The following section presents insights from informants regarding their knowledge and understanding of the information systems operated by staff members:

"This information system is designed to simplify the registration process for patient data input and storage in electronic medical records. The goal is to facilitate effective decision-making at the Community Health Center (Puskesmas) management." (Informant 1)

"The information system here, e-Puskesmas, is a system for patient input, both new and existing, until the patient's registration is complete and entered into the records and reports." (Informant 3)

Based on the interviews conducted with informants, it can be concluded that officers possess a reasonably good understanding of the fundamental functions of information systems—particularly the e-Puskesmas platform—in supporting service delivery and data management at the Puskesmas. The following section presents the informants' responses regarding the training provided to officers in the use of these information systems:

"Everyone has been trained, sir..." (Informant 1)

"We have training for e-Puskesmas or Electronic Medical Records, sir. I was trained when I first joined. For e-Puskesmas, I was the only one trained by the system founder, sir. Then I taught all those in charge of polyclinics or clusters, as they now call them, how to use the information system, sir, e-Puskesmas." (Informant 2)

Another informant stated:

"We never received any special training, sir. We were only trained by this gentleman in the electronic medical records department, because he was the only one who participated in the training last year, sir." (Informant 3)

"I've had training on all the information systems I'm responsible for, sir. Only the e-Puskesmas department hasn't. But we were only taught by Mr. James, who is in the Medical Records department, on how to use that system." (Informant 5)

Although information systems training has generally been conducted at the Teladan Community Health Center, interviews with several informants reveal that the training has been unevenly distributed and remains insufficiently formalized—especially regarding the use of e-Puskesmas. The evaluation of SIMPUS implementation from a human-centered perspective focuses on user satisfaction. The following are insights gathered from informant interviews:

"So far, it's going well, sir, although there are occasional errors..." (Informant 1)

"Our medical records meet our needs, sir." (Informant 2)

Another informant stated:

"It hasn't been running as planned, sir, because we still often find, sir, especially in the pharmaceutical department, that there is a difference between the remaining stock in the system and the real amount in the warehouse" (Informant 5)

Based on interviews with several informants at the Teladan Community Health Center, it can be concluded that the benefits of SIMPUS implementation—particularly through e-Puskesmas—have been recognized by some staff members. However, these benefits have not yet been fully optimized or equitably distributed across all service units. The following summarizes the insights gathered from the informant interviews:

"There are many obstacles. They have to bridge with BPJS, and sometimes the bridging system fails..." (Informant 1)

"There are no obstacles on our side, sir. It's just the application system." (Informant 2)

"On the user side, we sometimes make input errors, sir..." (Informant 3)

"The problem with monthly reporting is just the program itself, it takes a long time to submit the report..." (Informant 4)

"The problem is that it's not integrated..." (Informant 5)

Based on interviews with five informants, it can be concluded that the implementation of the information system at the Teladan Community Health Center continues to face several challenges, both from the user side and the software side. Common obstacles include technical system issues (such as bridging and software errors), delays in inter-program reporting, user input mistakes, and a lack of integration between systems.

Evaluation of SIMPUS Implementation Based on Organizational Aspects

Evaluation of SIMPUS implementation based on organizational aspects (*organization*) seen from the organizational structure, the results of interviews with informants are as follows:

"Each room or cluster has a staffing structure, sir, according to their respective responsibilities, although some have double duties." (Informant 1)

"We have a staffing structure, but it's more specific to each program, sir." (Informant 4)

Based on the interview results, it can be concluded that the organizational structure at the Teladan Health Center has been established and is functioning in accordance with service needs. Coordination and support among staff members are reflected in their communication practices. All informants reported that effective communication is well maintained between the head of the community health center and the personnel responsible for the information system. The following are insights shared by the informants:

"I maintain communication with all the staff at the Community Health Center, sir..." (Informant 1)

"Communication with the head of the Community Health Center is good, sir..." (Informant 5)

Based on the interview results, all informants indicated that the coordination aspect of SIMPUS implementation has yielded positive outcomes. The evaluation of SIMPUS from an organizational perspective focuses on the organizational environment. Facilities and infrastructure play a critical role in the successful implementation of the information system at the Teladan Medan Health Center. The following are insights gathered from the informant interviews:

"Our facilities include computers, sir, and we also have WIFI..." (Informant 1)

Another informant stated:

"...we only have one computer, sir, and our room is also quite small for carrying out work activities, sir..." (Informant 2)

"...we don't have a monitor that displays the patient's queue number so that it can be done automatically, sir." (Informant 3)

Based on the interview results, it can be concluded that the facilities and infrastructure for implementing the information system at the Teladan Community Health Center are in place, but have not yet been fully optimized. To ensure effective implementation, regular monitoring

and evaluation of the application or information system are essential. The following summarizes insights from the informant interviews:

"We monitor monthly, sir. We evaluate every semester, sir, every six months." (Informant 1)

"Monitoring and evaluation are monthly, sir, because we have to calculate drug expenditures, remaining stock, and how many orders we need to make. We also check for expired stock." (Informant 5)

Based on the interview results, it can be concluded that the implementation of the information system at the Teladan Community Health Center is supported by a regularly scheduled monitoring and evaluation mechanism. The system is implemented in accordance with established guidelines for using the application or information system. The following summarizes the insights provided by the informants:

"There are information system guidelines for each application..." (Informant 1)

"Each program has its own guidelines, sir, directly from the center. So we only use those as a guideline and have implemented them in accordance with the guidelines, sir." (Informant 4)

"The guidelines are in place, sir, and they have been implemented accordingly so far, sir." (Informant 5)

Based on the interview results, it can be concluded that the availability and utilization of implementation guidelines for the information system at the Teladan Community Health Center are well established and effectively applied.

Evaluation of SIMPUS Implementation Based on Technological Aspects

The evaluation of SIMPUS implementation from a technological perspective focuses on system quality, assessed through indicators of ease of use, efficiency, and feature completeness. The following summarizes insights from the informant interviews:

"...it makes things easier, sir, but not all programs can pull data from this e-Puskesmas." (Informant 1)

"...everything is easier now that we have e-Puskesmas, electronic medical records..." (Informant 2)

"...everything is easier when it comes to calculating visits..." (Informant 3)

Based on the interview results, it can be concluded that the e-Puskesmas system offers convenience in terms of ease of use. The quality of the system, when evaluated through the efficiency indicator in its implementation at the Puskesmas, is reflected in the following insights from informants:

"No, sir, but if the server is down or the WiFi network is unstable, it can take a long time to access it, sir." (Informant 1)

"If the server is down, it can take a long time..." (Informant 2)

"No, sir. At most, we only have to re-enter the complete data for new patients. For existing patients, we only update the data if there are any changes, sir." (Informant 3)

Based on the interview results, it can be concluded that the efficiency of the e-Puskesmas system is generally considered satisfactory. However, technical issues—such as unstable servers and poor internet connectivity—remain significant obstacles that hinder overall system efficiency. System quality is also evaluated through the completeness of features available in the information system implemented at the Puskesmas. The following summarizes insights from the informant interviews:

"Not all of the features in e-Puskesmas can be accessed, sir. They don't apply to them. You still have to access them from the application or information system within each program." (Informant 1)

"The features are complete, sir." (Informant 2)

Another informant stated:

"The e-Puskesmas isn't yet compatible, sir, because it hasn't been fully integrated across all programs. So we have to request additional reports from each program." (Informant 4)

"The features are complete, but the inputted drug data is sometimes out of date. So the data in the system differs from the actual quantities in the warehouse." (Informant 5)

Based on the interview results, it can be concluded that the features of the e-Puskesmas system are considered fairly complete in terms of general service functions. However, comprehensive integration with all vertical program information systems is still lacking, and issues with data accuracy persist in certain features, such as the pharmacy module. The evaluation of SIMPUS implementation from a technological perspective also considers the quality of information, assessed through indicators of relevance—including completeness, accuracy, timeliness, and availability. The following summarizes insights from the informant interviews:

"If the patient data is complete and accurate, yes sir, because we have one-stop registration, everything starts from the e-Puskesmas, sir, in the registration section" (Informant 1)

Another informant stated:

"The drug data from the e-Puskesmas isn't accurate, sir, because we have to calculate the actual stock as well. The data in the application is very different from the actual stock in the pharmacy warehouse. So, that's our job every month, sir." (Informant 5)

In general, the relevance of information in the e-Puskesmas system is considered satisfactory in supporting services at the Teladan Community Health Center. Patient data within clinical services is complete, accessible, and accurate. However, weaknesses remain in the accuracy of drug stock information, which often requires manual correction by staff. System quality is further evaluated based on data reliability indicators in the implementation

of the information system at the Community Health Center. The following summarizes insights from the informant interviews:

"Right on time, huh..." (Informant 1)

"Right on time, sir..." (Informant 2)

"Reports are always made on time, sir, to the Medan City Health Office..." (Informant 4)

Based on the interview results, it can be concluded that, in terms of data reliability, the e-Puskesmas system is considered fairly dependable in delivering timely reporting data. It has been routinely used for monthly reporting to the Dinas Kesehatan Kota Medan.

Evaluation of SIMPUS Implementation Based on Net Benefit Aspect

The benefit component (net benefit) evaluates the information system based on the ease it provides in its implementation at the Community Health Center. The following summarizes insights from the informant interviews:

"...this entire information system can improve the effectiveness and efficiency of services at the community health center through integrated data management..." (Informant 1)

"It's very helpful for our work, sir..." (Informant 3)

Another informant stated:

"Yes, not completely, sir" (Informant 5)

Based on the interview results, it can be concluded that the information system at the Teladan Community Health Center provides significant benefits in enhancing work efficiency, time management, and data handling. The implementation of the system has yielded various advantages, as reflected in the insights shared by informants:

"The community health center can manage data, sir... It's definitely very useful and makes reporting and policy-making easier." (Informant 1)

"The benefit is that we no longer have to manage all the medical records manually, sir. We don't need to manually input them into the clinics or each cluster." (Informant 2)

Another informant stated:

"I don't think the benefits from e-Puskesmas are sufficient, sir, because it's not updated, so for reporting the use of drug requests, I have my own Excel manual to help with that. If it's from e-Puskesmas, we have to check the actual stock, because it's very different" (Informant 5)

Based on the interview results, it can be concluded that the implementation of the information system at the Teladan Community Health Center has delivered tangible benefits in enhancing work convenience, operational efficiency, and the management and reporting of health service data. However, these benefits have not yet been fully optimized across all units—particularly in the pharmacy module, where the data does not accurately reflect actual conditions.

DISCUSSION

Evaluation of SIMPUS Implementation at Model Community Health Centers Based on Human Aspects

The implementation of the Community Health Center Management Information System (SIMPUS) is governed by the Regulation of the Minister of Health of the Republic of Indonesia No. 31 of 2019, which mandates that every community health center must operate a Community Health Center Information System (SIP). The Medan Teladan Community Health Center has adopted various management information systems to support both general services and specialized programs. These systems include e-Puskesmas, SITB (Tuberculosis), SIHA (HIV/AIDS), ASIK (Immunization), E-PPGBM (Toddler Nutrition), SMILE HIV, SMILE TB, SELENA Pharmacy, and SIMONA. However, fragmentation among these modules remains a significant challenge, impeding work efficiency and compromising the accuracy of reporting.

This phenomenon is not unique to Indonesia; it is also a common global trend in developing countries. Studies by Luna (2014) in Latin America and research on primary care systems in Africa indicate that the lack of integration in health information systems leads to data redundancy, reporting errors, and disruptions in continuity of care. In India and the Philippines, similar challenges have been addressed through the development of open-source national platforms, such as DHIS2 (District Health Information System 2), which serves as a central architecture for integrating various types of program data (Gurung et al., 2021 ; Pal et al., 2023).

The Exemplary Community Health Center has a well-structured information system management framework, with each system assigned to a designated individual based on the relevant program or work unit. This finding aligns with the Human-Organization-Technology Fit (HOT-Fit) theory proposed by Yusof et al. (2008), which emphasizes that a clear organizational structure and appropriate role allocation are key determinants of successful health information system implementation.

SIMPUS training for system operators at the Teladan Community Health Center (Puskesmas Teladan) is considered uneven, with formal training not provided consistently to all staff. This imbalance increases the risk of input errors, low utilization of system features, and a diminished sense of ownership over the system (Siregar, 2018). Strengthening competency-based capacity building is therefore a critical strategy in SIMPUS management (Putri et al., 2024).

The human aspects of SIMPUS implementation at Puskesmas Teladan have shown notable progress in role clarity, system comprehension, and user experience. However, gaps

remain in training and system integration. To address these challenges, formal and continuous training is essential for all staff involved in information systems, particularly in the use of e-Puskesmas. Additionally, standardized operational procedures—adopted from the Ministry of Health—are needed to guide system usage. Equally important is the integration of cross-system information to prevent data duplication and enhance overall efficiency.

Evaluation of SIMPUS Implementation at Model Community Health Centers Based on Organizational Aspects

The organizational structure at the Teladan Community Health Center has been established based on service area clusters and their respective work programs. This reflects the center's application of functional organizational design principles, which, according to Lippeveld et al. (2020), *are fundamental to the successful implementation of health information systems in primary care facilities. However, the presence of double-tasking practices among some staff members indicates an imbalance in human resource distribution. As noted by Dinh-Le et al. (2021)*, a disproportionate division of tasks within a digital health system can reduce compliance, compromise data input accuracy, and hinder effective system implementation

The Teladan Community Health Center (Puskesmas Teladan) is equipped with basic facilities, including computers and internet access (Wi-Fi) in every room. However, certain units still face limitations, such as an insufficient number of computers for the medical records staff, cramped workspaces, and the absence of an automated queuing system. These challenges suggest that the physical infrastructure is not yet fully adequate to support optimal use of SIMPUS. According to Luna et al. (2022) uneven or non-ergonomic technological infrastructure can impede work efficiency, delay data input processes, and diminish the overall quality of service delivery.

Compared to global trends, the challenges faced by this exemplary community health center mirror those encountered in other developing countries, such as Nigeria, Nepal, and the Philippines. In these contexts, infrastructure imbalances, limited human resources, and dependence on vertical program systems have led to fragmented and disconnected information systems, making integrated data analysis difficult (Pal et al., 2023 ; Gurung et al., 2021).

The organizational aspects of SIMPUS implementation at the Teladan Community Health Center reflect a functional structure supported by effective staff communication. Evaluation of the organizational environment suggests that while SIMPUS has adequate foundational elements, it has not yet reached an optimal level. To enhance its impact, efforts should focus on modernizing facilities, ensuring the provision of resources for each unit, and systematically

utilizing monitoring results. These improvements would enable the information system to serve not only administrative functions but also contribute meaningfully to the efficiency and quality of overall health services

Evaluation of SIMPUS Implementation at Model Community Health Centers Based on Technological Aspects

The evaluation of information system implementation from a technological perspective focused on system quality—assessed through indicators such as ease of use, efficiency, and feature completeness—and information quality, which includes relevance and data reliability. At the Teladan Community Health Center, the e-Puskesmas system was found to significantly streamline the recording process, patient visit monitoring, and reporting. However, these benefits have not been fully realized due to the lack of integration across programs (e.g., TB, HIV, and nutrition), which forces staff to rely on separate applications for specific reporting tasks.

The system is considered fairly efficient under stable technical conditions, particularly when managing older patients. However, server disruptions and reliance on Wi-Fi network stability pose significant challenges that hinder work efficiency (Cahyani et al., 2020) . Efficiency is compromised when staff are required to re-enter data or wait for the system to recover. A slow or unstable system contributes to increased work-related stress among healthcare workers and leads to reduced service productivity(Lee et al., 2021) .

Pharmacy features that are not aligned with real-world conditions suggest that system validation and maintenance are suboptimal. Errors in drug data can have serious consequences for patient safety, logistics reporting, and service accountability. While the data in e-Puskesmas is generally relevant for routine services, it is not yet sufficiently reliable for vertical programs, often necessitating duplicate input or manual reprocessing. Inconsistencies in pharmacy data also indicate that the system is not fully trusted for managerial decision-making. According toJaspers et al., (2022), an effective health information system must meet four key data quality criteria: completeness, consistency, accuracy, and timeliness. When data is inaccurate or requires additional manual handling, the system fails to fulfill its role as a reliable tool for data-driven decision support (Rasid et al., 2022) .

Globally, several solutions and frameworks have proven effective in addressing health information system challenges. One example is the Integrated Health Information Platform (IHIP), used in India and Nepal, which consolidates various program systems into a single national dashboard(Gurung et al., 2021) . Another is the Open Health Information Exchange (OpenHIE), an open system architecture designed to support interoperability between systems

using international standards such as HL7 FHIR, SNOMED CT, and ICD-11 (WHO, 2022b) . Additionally, the SmartCare Zambia project demonstrates the benefits of a modular and integrated cloud-based platform, which enables system use both online and offline (Mikkelsen-Lopez et al., 2020) .

The implementation of SIMPUS through e-Puskesmas at the Teladan Community Health Center has made a positive contribution to work convenience and basic operational efficiency. However, the technology behind SIMPUS requires further enhancement through the integration of program systems into a centralized platform, enabling all work units to operate in a synchronized and efficient manner. Regular system validation and maintenance are essential, particularly for critical features such as pharmacy, patient visits, and reporting.

Evaluation of SIMPUS Implementation at Exemplary Community Health Centers Based on Net Benefit Aspects

The implementation of an information system at the Teladan Community Health Center (Puskesmas Teladan) has significantly enhanced work efficiency, particularly in patient data recording, visit reporting, and data management. The transition from manual to electronic recording has helped reduce administrative burdens, save time, and lower the rate of input errors, as reported by several informants. These findings are consistent with research by Nguyen et al. (2022) , which demonstrated that digital health information systems can improve decision-making speed, streamline clinical workflows, and reduce recording errors by up to 80% in primary care facilities across developing countries.

In addition, reducing paper usage contributes to cost efficiency and supports the principles of environmentally sustainable health facilities, as encouraged by the WHO policy on sustainable health system digitalization (WHO, 2022) . Another benefit reported by staff at the Teladan Community Health Center is that the information system simplifies the management of health service data, including patient records, visit tracking, medication supplies, and disease reporting.

Alami et al., (2020)

emphasized that the primary advantage of a health information system lies in its ability to generate real-time, relevant, and structured data to support evidence-based policymaking. Accordingly, the system not only facilitates administrative tasks but also enhances managerial decision-making capacity.

The implementation of SIMPUS, particularly through e-Puskesmas, at the Teladan Community Health Center has delivered tangible improvements in work efficiency and effectiveness, streamlined reporting and decision-making processes, and reduced recording

errors and reliance on manual procedures. However, these benefits have not been evenly distributed across all service units—most notably in the pharmacy module, which continues to experience data discrepancies. Therefore, to maximize the benefits of information system implementation, it is essential to strengthen system integration, improve data validation mechanisms, and ensure consistent training across all units.

CONCLUSIONS

The evaluation of the management information system implementation at the Medan Teladan Community Health Center reveals several key findings across multiple dimensions. From the human aspect, users face constraints related to input errors. Organizationally, a formal structure is in place, monitoring and evaluation activities have been conducted, and usage guidelines exist—although these are primarily adopted from the Ministry of Health. Technologically, system quality remains suboptimal due to a lack of integration across all programs, frequent server disruptions, and data bridging failures. Additionally, discrepancies between drug data in the system and actual stock in the pharmacy warehouse highlight reliability issues. Despite these challenges, the net benefit of the system is evident in improved operational efficiency. However, full optimization is hindered by the absence of comprehensive data integration. It is therefore recommended that the Medan City Health Office promote the integration of program-specific information systems into a unified platform and ensure server stability to support consistent and reliable system performance.

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