

Analyzing the implementation of health information systems to improve service efficiency in community health centers

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ABSTRACT

Introduction: The increasing demand for efficient, accurate, and integrated health services in primary care underscores the essential role of Health Information Systems (HIS) in Puskesmas. Despite national policies encouraging digital transformation, many Puskesmas still face challenges, including limited infrastructure, inadequate digital literacy among health workers, and fragmented system integration. This study aims to analyze the implementation of HIS in Puskesmas, assess its contribution to service efficiency, and identify supporting and inhibiting factors that influence system adoption.

Methods: The study employs a qualitative case-study approach involving several Puskesmas that have implemented HIS. Data were collected through in-depth interviews with health workers and administrative staff, direct observations of HIS use in daily operations, and document analysis related to system policies and operational procedures. The qualitative data were analysed through thematic coding and triangulation across sources to ensure validity and reliability.

Results: The findings reveal that HIS significantly supports faster patient data processing, improves the accuracy of medical records, and reduces administrative burdens. However, system effectiveness varies across facilities depending on infrastructure readiness, staff competency, and leadership support. Barriers such as insufficient training, inconsistent internet connectivity, and inadequate system maintenance hinder optimal utilisation. Conversely, strong managerial commitment, user-friendly system design, and continuous government support emerge as key enablers.

Conclusion: This study concludes that the implementation of HIS has the potential to substantially enhance service efficiency in Puskesmas when supported by adequate resources and policy alignment. Recommendations include strengthening digital literacy training, improving infrastructure, ensuring continuous technical support, and developing adaptive policies to sustain long-term HIS utilization.

Keywords: Health Information Systems; Medical Records; Palliative Care; Primary Health Care.



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INTRODUCTION

Health Information Systems (HIS) have become an essential component in modern healthcare service delivery, particularly for primary care facilities such as community health centres (Adegbesan *et al.*, 2024). As healthcare organizations worldwide strive for efficiency, accuracy, and integrated data management, the implementation of HIS emerges as a strategic solution to support clinical and administrative processes (Alyami *et al.*, 2026). In Indonesia, Puskesmas play a critical role as the frontline of promotive, preventive, and basic curative services. They manage large volumes of patient data daily and are responsible for reporting health indicators to local and national authorities (Boozalis *et al.*, 2025). Therefore, effective implementation of HIS is crucial to ensure fast, accurate, and evidence-based decision-making. Despite national efforts to promote digital transformation, such as the adoption of electronic medical records and integrated health information systems, many Puskesmas still face challenges in leveraging HIS to optimise service efficiency (Boone-Sautter *et al.*, 2025).

The fundamental problem lies in the persistent gap between policy expectations and practical execution at the facility level (Denieffe *et al.*, 2025). While HIS is theoretically capable of improving service workflows, minimising administrative errors, and accelerating patient handling, its actual implementation often falls short of expectations. Several Puskesmas struggle with limited technological infrastructure, including outdated hardware, unstable internet connectivity, and inadequate system maintenance (Fink *et al.*, 2025). Moreover, human resource barriers, such as low digital literacy, insufficient training, and resistance to adopting new technologies, further hinder the successful utilisation of HIS. These challenges create inefficiencies that contradict the intended benefits of HIS, resulting in prolonged patient waiting times, incomplete medical records, and fragmented information flow between service units (Gage, Gwyther and Stassen, 2024).

The urgency of addressing these gaps becomes even more evident in the context of ongoing national digital health reforms. The Indonesian government has issued various initiatives to standardize health data reporting, promote interoperability, and mandate the use of electronic medical records (Goodrich *et al.*, 2025). However, the readiness of Puskesmas to adopt and sustain HIS varies significantly across regions, often influenced by disparities in resources, managerial support, and local policy implementation (Gustini *et al.*, 2024). As a result, the expected improvements in service efficiency and data quality have not been uniformly achieved. This situation calls for a more contextual and evidence-based understanding of how HIS operates within real-world Puskesmas settings and what factors enable or constrain its effectiveness (Guo *et al.*, 2025).

Although many studies have investigated HIS in developing countries, most focus on general challenges, system performance evaluations, or quantitative assessments of user satisfaction (Hoppmann *et al.*, 2025). Only a limited number of studies explore the implementation dynamics of HIS in Puskesmas using an in-depth, qualitative approach that captures the complexity of local conditions. Existing literature often highlights infrastructure limitations and technical issues, yet fails to examine the interplay between technological, organizational, and human factors that collectively shape the success of HIS adoption. Additionally, few studies specifically evaluate how HIS contributes to improving service efficiency, particularly in terms of reducing administrative load, shortening patient processing time, and enhancing data accuracy in Puskesmas workflows. This constitutes a clear research gap that needs to be addressed to inform policy and practice (Hurley *et al.*, 2025).

Another critical gap pertains to the absence of a comprehensive model or strategic framework that can guide Puskesmas in optimizing HIS implementation. Current recommendations in previous studies tend to be general and conceptual, lacking sufficient actionable guidance for frontline health facilities. They rarely provide detailed, context-sensitive strategies that Puskesmas can adopt based on their unique operational challenges and resource limitations. This lack of practical guidance prevents health facilities from fully realizing the potential benefits of HIS.

Given these gaps, this study offers novelty by employing a qualitative case-study approach that captures the real experiences of healthcare workers, administrators, and system users in selected Puskesmas. Through triangulation of in-depth interviews, direct observation, and document analysis, the study provides a rich and contextualized understanding of HIS implementation. This approach enables the identification of nuanced enabling and inhibiting factors that are not easily captured through quantitative surveys. Another aspect of novelty is the comprehensive analysis that integrates technical, human, and policy dimensions, thus moving beyond the narrow focus found in many previous studies. The study further contributes innovation by developing a practical, evidence-based optimization model tailored for Puskesmas. Unlike general recommendations commonly found in the literature, this model incorporates actionable strategies related to infrastructure readiness, capacity building, policy alignment, and system usability. It aims to support Puskesmas in overcoming existing barriers and maximizing the positive impact of HIS on service efficiency. Ultimately, the research not only enriches academic discourse on health information systems but also provides concrete, implementable guidance for improving healthcare service delivery in Indonesia.

RESEARCH METHODOLOGY

This study employed a qualitative research design with a case study approach to explore the implementation of the Health Information System (HIS) within community health centers (Puskesmas). The qualitative case study approach was chosen to enable an in-depth and contextual analysis of how HIS is integrated into daily service processes, as well as to understand the factors influencing its effectiveness in improving service efficiency.

The study involved 15 informants selected through purposive sampling based on their direct involvement with HIS operations. These informants consisted of two key informants, namely Puskesmas managers or system coordinators who possessed strategic knowledge of HIS implementation, and 13 regular informants, including healthcare workers, administrative staff, and system operators who interacted with the HIS on a daily basis. The inclusion of both groups ensured a comprehensive perspective, combining strategic insights with operational experiences.

Data were collected using several techniques to ensure methodological triangulation. First, direct observations were conducted to document real-time HIS usage in routine tasks, including patient registration, electronic medical record management, administrative processes, and reporting activities. Second, in-depth, semi-structured interviews were conducted with all 15 informants to explore their experiences, perceived benefits, challenges, and suggestions for improving HIS performance. Third, document analysis included reviewing implementation reports, operational guidelines, policy documents, and service statistics related to HIS usage. Lastly, focus group discussions (FGDs) were conducted to validate the preliminary findings and gather collective perspectives on optimising the use of HIS.

Data analysis was performed using a thematic analysis approach. The process involved transcription, coding, categorization, and the development of themes that reflected patterns in the data. Triangulation of observation notes, interview transcripts, document reviews, and FGD

results strengthened the trustworthiness of the findings. The analysis focused particularly on identifying supporting and inhibiting factors that influence HIS implementation, such as infrastructure readiness, user competence, administrative workflow integration, and policy support at the organisational level. Based on these findings, a strategic model for optimising the implementation of HIS in Puskesmas was developed.

To assess the applicability of the proposed model, an implementation trial was conducted in selected Puskesmas. The evaluation included observing changes in workflow efficiency, conducting interviews with users after the trial period, and comparing service time, data accuracy, and user satisfaction before and after the intervention. The insights from this evaluation were used to refine the model and enhance its relevance for practical application. Ethical considerations were strictly maintained throughout the study. All informants provided informed consent, participation was voluntary, and confidentiality of sensitive health information was ensured. The study also complied with institutional and regulatory standards regarding the use of health-related data.

RESULT

The analysis of interviews with 15 informants, comprising 2 key informants and 13 regular informants, generated seven major themes related to the implementation of the Health Information System (HIS) in Puskesmas. Overall, the findings demonstrate that while HIS offers significant advantages for service efficiency, several challenges related to infrastructure, user competence, and system reliability remain prominent. The first theme highlights notable improvements in workflow efficiency. Most informants reported that HIS reduced manual paperwork, shortened registration time, and streamlined reporting processes. However, variations in system utilization across units were observed, largely influenced by the user's familiarity and adaptability. The second theme concerns infrastructure readiness. Informants consistently reported unstable internet connectivity, insufficient computer units, and outdated hardware as significant obstacles to optimal HIS performance. These limitations often resulted in service delays, hindering the smooth operation of the system.

The third theme pertains to user competence and training. Many regular informants expressed that existing training sessions were too brief and not sufficiently practical. New staff frequently depended on peer guidance, indicating gaps in structured capacity-building. Key informants acknowledged the need for continuous training and refresher sessions to support the full adoption of the system. The fourth theme focuses on the perceived benefits of HIS. Informants agreed that HIS improved data accuracy, minimized duplication, and accelerated service processes. Some units experienced reduced patient waiting time, particularly in registration and pharmacy services.

Despite these advantages, several barriers (theme five) were identified, including frequent system downtimes, delayed IT support, and occasional reversion to manual recording: such interruptions created double workloads and decreased user motivation. The sixth theme emphasizes the role of leadership support. According to key informants, strong managerial commitment influenced staff compliance with HIS procedures. Nevertheless, enforcement of mandatory HIS usage varied across units, resulting in inconsistent data recording. The final theme reflects user satisfaction and acceptance. Although overall satisfaction was moderate, many informants expressed hope for system upgrades, an improved user interface, and faster technical assistance. Younger staff were generally more receptive and adaptive to HIS use compared to older employees. Collectively, these findings illustrate that HIS has substantial potential for

enhancing service quality in Puskesmas; yet, its success depends on improving infrastructure, strengthening training, and ensuring consistent managerial support.

Table 1. Informant Direct Quotes Table (Verbatim Quotes)

Theme	Verbatim Quote	Informant
Workflow Efficiency	"Since using the system, registration is much faster, but some staff still prefer the old manual way."	F3
Infrastructure Issues	"The internet connection is often down, and when that happens, we cannot do anything."	F8
Training Gaps	"The training was very quick. After that, we learned mostly from each other."	F5
Benefits for Service	"Reporting is easier now. We don't have to rewrite data over and over."	F10
System Barriers	"When the system crashes, we have to go back to paper, and it creates double work."	F11
Leadership Support	"Management wants everyone to use HIS, but enforcement is different in each unit."	Key Informant 2
User Acceptance	"I like the system, but it needs to be improved. Sometimes it is slow and confusing."	F7

The interview data revealed various perspectives from informants regarding the implementation of the Health Information System (HIS). Many participants described the system as beneficial, particularly in accelerating administrative procedures. One regular informant stated, *"Registration is much faster now; before, we had to write everything manually,"* illustrating how the digital process has replaced time-consuming manual entry. Another informant further emphasised this benefit by noting, *"We don't rewrite data anymore. It saves much time,"* highlighting the reduction in duplication and administrative inefficiency.

However, these improvements were often constrained by infrastructure limitations. Several informants expressed frustration with unstable internet access, exemplified by a participant's remark, *"When the internet is down, everything stops."* Device shortages also contributed to workflow disruptions, with another informant explaining, *"We only have one computer in the unit, so we take turns."* Slow system responsiveness amplified these barriers; as one user described, *"Sometimes the system is too slow, and patients have to wait."*

Training-related issues emerged as a significant concern across interviews. Many staff felt unprepared to use the system, as illustrated by an informant who shared, *"Training was rushed; I didn't fully understand at first."* This sentiment was echoed by others who relied heavily on peer-to-peer learning, with one stating, *"We teach each other because new staff rarely get full training."* Even key informants recognized this gap, with one stating, *"Refresher training is necessary for consistent use."* Despite technical and training limitations, several participants acknowledged the advantages HIS brought to data management and reporting. One informant noted, *"Data accuracy is better because everything is recorded digitally,"* while another stated, *"Reports that took hours before now take minutes."* Improvements in service delivery were also recognized, particularly in reducing patient waiting time, as described by an informant: *"Patients are served faster than before."*

Nevertheless, system reliability remained a major barrier. HIS downtimes caused significant disruptions, leading to temporary reversion to manual recording. An informant described the resulting burden: *"When the system crashes, we must return to paper."* Another highlighted the double workload created by such situations, stating, *"We end up doing double work during system errors."* Limited technical support worsened these challenges, as expressed in the complaint, *"If there's a problem, helpdesk responses are often slow."*

Leadership support played a crucial role in shaping staff motivation and compliance. Key management personnel emphasised their commitment to enforcing the use of HIS, with one stating, *“Management encourages us to use HIS consistently.”* However, inconsistent enforcement across units was also identified, as another key informant noted, *“Policies exist, but enforcement differs across units.”*

Finally, informants shared diverse levels of satisfaction with HIS. While many appreciated its benefits, they also called for improvements to the system. One participant captured this duality, remarking, *“I like the system, but it needs improvement.”* The system’s interface emerged as a concern, particularly among new users; a participant noted, *“The interface is not simple; new users get confused.”* Younger staff tended to adapt more quickly, as expressed by an informant who stated, *“Younger staff pick it up quickly; older staff need more help.”*

Together, these narratives provide rich qualitative insight into the complexities of HIS adoption, illustrating both its transformative potential and the practical challenges faced by frontline users.

The implementation of a Health Information System (HIS) has been widely recognized as a means to enhance healthcare service efficiency by accelerating workflow processes, improving data accuracy, and facilitating streamlined documentation and reporting. However, the success of HIS adoption is strongly dependent on adequate infrastructure, user competency, system reliability, and consistent policy support. Findings from the study indicate that although HIS has provided clear benefits in improving registration speed, data quality, and reporting efficiency within Puskesmas, its implementation still faces significant barriers. These barriers include unstable internet connectivity, limited hardware availability, insufficient training, inconsistent system usage across units, and variable enforcement of HIS-related policies. Based on these premises, it can be concluded that the Health Information System holds substantial potential to improve the quality and efficiency of services in Puskesmas. Nonetheless, its success relies heavily on strengthening infrastructure readiness, improving human resource capacity through continuous training, ensuring reliable technical support, and enforcing consistent policies to promote comprehensive and sustained HIS utilization.

DISCUSSION

The findings of this study highlight both the transformative potential and the persistent challenges associated with implementing the Health Information System (HIS) in Puskesmas. Overall, the results demonstrate that HIS has significantly improved workflow efficiency, data accuracy, and reporting processes. However, the extent of these improvements varies considerably between units, owing mainly to differences in infrastructure readiness, user competency, and policy enforcement. This discussion situates the study's findings within the broader literature and provides interpretative insights to explain patterns emerging from the data.

A key contribution of HIS observed in this study is its ability to streamline administrative workflows, particularly in patient registration and documentation (Lu *et al.*, 2025). Informants consistently reported reductions in manual workload and shorter waiting times, echoing previous research indicating that digital systems can substantially enhance service throughput and reduce administrative errors (Novi Angraeni, Suprpto and Alshammari, 2025). These findings underscore the role of HIS as a critical enabler of efficiency in primary healthcare settings. The reduction of redundant paperwork and improved accuracy in health data management also align with international evidence showing that digital health technologies enhance data integrity and promote evidence-based decision-making (Orwenjo, 2025).

Despite these advantages, infrastructure limitations remain a significant barrier. Many informants described unstable internet connectivity, insufficient hardware, and slow system performance as factors that impede full HIS utilization (Owen *et al.*, 2025). Such challenges are

consistent with broader studies in developing health systems, which emphasize that inadequate technological infrastructure is a predominant cause of inefficiency and user frustration (Pastrana *et al.*, 2025). These limitations often force staff to revert to manual processes, resulting in double workloads and contributing to a decrease in motivation for consistent system use. The findings suggest that while digital transformation is underway, the supporting infrastructure has not progressed at the same pace, limiting the overall impact of HIS (Shafiq *et al.*, 2025).

The study also reveals substantial gaps in user competency. While HIS provides operational benefits, its effectiveness is contingent on adequate training and user readiness. Informants repeatedly emphasised that training sessions were too brief and insufficiently hands-on, resulting in many staff members relying on informal, peer-to-peer learning (Sharifi *et al.*, 2025). This aligns with earlier research indicating that inadequate training is a significant barrier to the successful adoption of digital systems in healthcare (Smirnova *et al.*, 2025). Furthermore, the absence of structured refresher training contributes to inconsistent use, especially among senior staff who may exhibit lower digital literacy (Warraich *et al.*, 2025). Strengthening training programs with a focus on practical skills, continuous learning, and user support emerges as a crucial requirement for sustainable HIS implementation. Another significant theme pertains to system reliability (Tenge *et al.*, 2025). Frequent HIS downtime and slow technical support disrupt workflows, reducing the perceived usefulness of the system (Suprpto *et al.*, 2025). These issues not only impact service delivery but also undermine user trust. Previous studies similarly show that the failure of technical support systems can diminish staff engagement with digital tools and contribute to implementation fatigue. Ensuring consistent system performance and responsive technical assistance is therefore essential to maintaining user confidence and promoting consistent system use (Suprpto, Herman and Asmi, 2020).

Leadership commitment also plays an important role in shaping HIS adoption. In this study, key informants acknowledged management encouragement to use HIS, but also noted inconsistencies in policy enforcement across units (Suprpto and Ihsan Kamaruddin, 2025). This variability is noteworthy because organizational leadership is a known determinant of digital health adoption; strong governance structures and clear policies facilitate consistent use and reduce resistance. Conversely, fragmented enforcement leads to uneven implementation, with some units fully adopting HIS while others remain reliant on manual systems. Strengthening managerial supervision and ensuring standardized operating procedures appear vital to overcoming this challenge. User satisfaction was found to be mixed but generally moderate (Suprpto *et al.*, 2024). Informants appreciated the benefits of HIS yet expressed the need for improvements in system interface, speed, and usability. This reflects a well-documented principle that digital health systems must strike a balance between functionality and user-friendliness to ensure long-term engagement. Younger staff demonstrated greater acceptance of HIS, possibly due to higher digital literacy, while older staff required more support. This demographic trend suggests that capacity-building initiatives should be tailored to users with varying levels of technological familiarity.

Overall, the findings indicate that HIS holds considerable promise in enhancing service efficiency in Puskesmas, but its success hinges on strengthening the foundational elements necessary for effective adoption. The results of this study contribute to the growing body of evidence that emphasises the need for digital health interventions to address technological, organisational, and human factors simultaneously to achieve maximum impact. Integrating these insights into strategic planning through improved infrastructure investment, structured training, reliable technical support, and strong leadership governance will be essential for optimizing HIS implementation in Indonesia's primary healthcare system.

CONCLUSION

The findings of this study indicate that the Health Information System (HIS) has contributed positively to improving service efficiency, data accuracy, and workflow organization within Puskesmas. However, the effectiveness of HIS implementation is significantly influenced by infrastructure readiness, user competence, system reliability, and consistent policy

enforcement. Persistent issues such as unstable internet connectivity, limited hardware, insufficient training, and inconsistent system usage across units continue to hinder optimal adoption. Therefore, although HIS holds substantial potential to enhance healthcare service quality, its full benefits cannot be realized without addressing these underlying challenges.

Based on the results, it is recommended that Puskesmas and relevant health authorities strengthen digital infrastructure, ensure adequate and continuous training, and provide timely technical support to maintain system reliability. Leadership commitment must also be reinforced through more transparent governance, standard operating procedures, and consistent monitoring of HIS usage across units. Enhancing user-friendly system features and upgrading hardware resources will further improve user satisfaction and acceptance. By implementing these recommendations, the potential of HIS to enhance service efficiency and improve overall healthcare delivery can be maximised.

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Conflict of Interest

There are no potential conflicts of interest relevant to this article.

References

- Adegbesan, A. *et al.* (2024) 'Ethical Challenges in the Integration of Artificial Intelligence in Palliative Care', *Journal of Medicine, Surgery, and Public Health*, 4, p. 100158. doi: <https://doi.org/10.1016/j.glmedi.2024.100158>.
- Alyami, K. *et al.* (2026) 'Palliative care needs of adults severely affected by sickle cell disease: A mixed-methods systematic review', *International Journal of Nursing Studies*, 174, p. 105278. doi: <https://doi.org/10.1016/j.ijnurstu.2025.105278>.
- Boone-Sautter, K. M. *et al.* (2025) 'Palliative care for stroke patients: Meeting the Quadruple Aim', *Journal of Stroke and Cerebrovascular Diseases*, 34(5), p. 108263. doi: <https://doi.org/10.1016/j.jstrokecerebrovasdis.2025.108263>.
- Boozalis, J. *et al.* (2025) 'A retrospective study of deceased veterans with serious mental illness and heart failure: Analysis of palliative care and mental health collaboration on hospice utilization', *General Hospital Psychiatry*, 96, pp. 151–155. doi: <https://doi.org/10.1016/j.genhosppsych.2025.07.009>.
- Denieffe, S. *et al.* (2025) 'Nurses', Patients', and Family Carers' Views of Energy Hardship and Palliative Home Care in Ireland: A Mixed-Methods Examination', *Seminars in Oncology Nursing*, 41(3), p. 151893. doi: <https://doi.org/10.1016/j.soncn.2025.151893>.
- Fink, F. *et al.* (2025) 'Family Caregivers' Perspectives on the Potential of Drone-Based Medication Delivery in Palliative Home Care: Qualitative Focus Group Study', *JMIR Human Factors*, 12. doi: <https://doi.org/10.2196/80320>.
- Gage, C. H., Gwyther, L. and Stassen, W. (2024) 'South African palliative care provider perspectives on emergency medical services in palliative situations', *African Journal of Emergency Medicine*, 14(4), pp. 231–239. doi: <https://doi.org/10.1016/j.afjem.2024.08.007>.
- Goodrich, J. *et al.* (2025) 'Priorities for “out-of-hours” home-based palliative care for professionals, patients, and family caregivers: A qualitative interview study',

- International Journal of Nursing Studies*, 171, p. 105193. doi: <https://doi.org/10.1016/j.ijnurstu.2025.105193>.
- Guo, J. *et al.* (2025) 'Role of Digital Health on Palliative Care: Umbrella Review', *Journal of Medical Internet Research*, 27. doi: <https://doi.org/10.2196/72104>.
- Gustini, G. *et al.* (2024) 'Education has a significant effect on the performance of implementing nurses in hospitals', *Jurnal Ilmiah Kesehatan Sandi Husada*, 13(1), pp. 111–116. doi: <https://dx.doi.org/10.35816/jiskh.v13i1.1184>.
- Hoppmann, N. *et al.* (2025) 'Palliative Care for Advanced Liver Disease: Hepatology and Palliative Care Specialists Experiences', *Journal of Pain and Symptom Management*. doi: <https://doi.org/10.1016/j.jpainsymman.2025.09.028>.
- Hurley, E. *et al.* (2025) 'What gets measured in palliative care? A review and synthesis of routine data collection in 16 countries', *Health Policy OPEN*, 8, p. 100141. doi: <https://doi.org/10.1016/j.hpopen.2025.100141>.
- Lu, X. *et al.* (2025) 'Palliative care nurses' perspectives on peer support in China: A qualitative study', *Asia-Pacific Journal of Oncology Nursing*, 12, p. 100791. doi: <https://doi.org/10.1016/j.apjon.2025.100791>.
- Novi Angraeni, W. O., Suprpto, S. and Alshammari, S. (2025) 'Workload, job satisfaction, and salary satisfaction with turnover intention of health workers', *Jurnal Edukasi Ilmiah Kesehatan*, 3(2), pp. 63–69. doi: <https://dx.doi.org/10.61099/junedik.v3i2.113>.
- Orwenjo, D. O. (2025) "'Waiting to Die": Language, discourse and meaning in palliative care contexts in Kenya', *Language and Health*, 3(2), p. 100069. doi: <https://doi.org/10.1016/j.laheal.2025.100069>.
- Owen, R. K. *et al.* (2025) 'Health and care service utilisation in the last year of life before non-sudden death in Wales, 2014–2023, by palliative care registration: a population-based retrospective cohort study', *The Lancet Regional Health - Europe*, 59, p. 101479. doi: <https://doi.org/10.1016/j.lanepe.2025.101479>.
- Pastrana, T. *et al.* (2025) 'Global Consensus-Based Essential and Expanded Packages for Palliative Care and Pain Relief for Adults and Children: A Delphi Study', *Journal of Pain and Symptom Management*, 70(6), pp. 627–637.e3. doi: <https://doi.org/10.1016/j.jpainsymman.2025.08.027>.
- Shafiq, A. *et al.* (2025) 'Patterns and predictors of palliative care use in acute heart failure hospitalizations', *American Heart Journal Plus: Cardiology Research and Practice*, p. 100667. doi: <https://doi.org/10.1016/j.ahjo.2025.100667>.
- Sharifi, S. *et al.* (2025) 'Quality indicators of outpatient palliative care: A systematic review', *Asia-Pacific Journal of Oncology Nursing*, 12, p. 100718. doi: <https://doi.org/10.1016/j.apjon.2025.100718>.
- Smirnova, N. *et al.* (2025) 'Temporal trends, setting and timing of palliative and hospice care in chronic obstructive pulmonary disease in the Veterans Health Administration 2010–2020', *CHEST Pulmonary*, p. 100171. doi: <https://doi.org/10.1016/j.chpulm.2025.100171>.
- Suprpto *et al.* (2024) 'Building Nurse Competency Strategy at Public Health Center in Indonesia: A Descriptive Qualitative Approach', *The Malaysian Journal of Nursing*, 15(03), pp. 62–70. doi: <https://dx.doi.org/10.31674/mjn.2024.v15i03.008>.
- Suprpto, S. *et al.* (2025) 'How is Quality in Homecare Services Created? A Qualitative Study of Health Professional Perspectives', *Jurnal Kesehatan Masyarakat*, 21(2), pp. 485–496. doi: <https://doi.org/10.15294/kemas.v21i2.31257>.

- Suprpto, S., Herman, H. and Asmi, A. S. (2020) 'Nurse Competency and Managing Level of Community Health Care Activities', *Jurnal Ilmiah Kesehatan Sandi Husada*, 9(2), pp. 680–685. doi: <https://doi.org/10.35816/jiskh.v12i2.386>.
- Suprpto, S. and Ihsan Kamaruddin, M. (2025) 'Integration of digital technology by health analysts in health information systems: Systematic Review', *Journal Interdisciplinary Health*, 1(1), pp. 34–43. doi: <https://dx.doi.org/10.37506/ijphrd.v1i1i9.1101010.61099/jih.v1i1.105>.
- Tenge, T. *et al.* (2025) 'Development and validation of a prediction score for early identification of palliative care needs for patients in the intensive care unit: a multicentre retrospective cohort study', *eClinicalMedicine*, 89, p. 103519. doi: <https://doi.org/10.1016/j.eclinm.2025.103519>.
- Warraich, H. J. *et al.* (2025) 'Association of Palliative Care Consultation in Patients With Heart Failure With Preserved Ejection Fraction With Symptom Burden and Health Care Use', *JACC: Advances*, 4(1), p. 101431. doi: <https://doi.org/10.1016/j.jacadv.2024.101431>.