Indonesian Journal of Global Health Research
Volume 8 Number 2, April 2026
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

DEVELOPMENT OF THE NI-KSHAY PORTAL AS AN INTEGRATED DIGITAL SYSTEM FOR EFFECTIVE TUBERCULOSIS (TB) MANAGEMENT IN INDONESIA

Khusnul Khotimah Arum Nurcahyanti[1]*, Oksita Asri Widyayanti[2], Ilham Rahmansyah[1]
[1]Program in Medical Record and Health Information, Politeknik Yakpermas Banyumas, Jl. Raya Jompo Kulon Sokaraja, Dusun II Jompo Kulon, Jompo Kulon, Banyumas, Jawa Tengah 53181, Indonesia
[2]Program in Medical Laboratory Technology, Politeknik Yakpermas Banyumas, Jl. Raya Jompo Kulon Sokaraja, Dusun II Jompo Kulon, Jompo Kulon, Banyumas, Jawa Tengah 53181, Indonesia
*arumgusta@gmail.com

ABSTRACT
Tuberculosis (TB) remains a major public health burden in Indonesia, with reported cases increasing from 724,309 in 2022 to approximately 889,000 by early 2025. The current Tuberculosis Information System (SITB) has not fully supported rapid and accurate reporting due to delays, duplicated records, limited interoperability with other health information systems, and insufficient data quality controls. In contrast, India has successfully improved TB management efficiency through the Ni-kshay Portal, an integrated digital platform that enhances case notification and service coordination. This study aimed to conduct a needs analysis as the foundational step in developing and adapting the Ni-kshay Portal for implementation in Indonesia to ensure that the system is relevant, efficient, and aligned with national TB elimination goals. A qualitative approach was applied using the Waterfall system development model and the PIECES framework. The study involved 24 participants, consisting of 20 users and persons in charge of the Tuberculosis Information System (SITB) from primary health centers and 4 respondents from referral hospitals who were directly engaged in the implementation and operational use of the system. Data were collected through in-depth interviews, field observations, document reviews, and stakeholder validation sessions. A total of 20 primary health centers, four referral hospitals, and the Banyumas District Health Office participated in identifying functional and non-functional system requirements. Results revealed significant challenges in the current reporting system, including 2–4-week delays, server overload, duplicate patient records, weak SITB–SIMRS–BPJS synchronization, and high manual data-entry workload. The PIECES analysis identified essential requirements for the upgraded system, including real-time reporting, automated national ID (NIK) validation, cross-system API integration, centralized dashboards, streamlined digital workflows, activity logs, automated reminders, and digital referral-back features. The study concludes that an integrated digital TB reporting platform is urgently needed to improve timeliness, data quality, and case monitoring. Subsequent research stages will focus on prototype development and field testing to assess technical feasibility and potential system impact.

Keywords: health information system; needs analysis; ni-kshay portal; PIECES; tuberculosis

How to Cite (in APA Style)
Nurcahyanti, K. K. A., Widyayanti, O. A., & Rahmansyah, I. (2026). Development of the Ni-Kshay Portal as An Integrated Digital System for Effective Tuberculosis (TB) Management in Indonesia. Indonesian Journal of Global Health Research, 8(2), 751–756. https://doi.org/10.37287/ijghr.v8i2.841.

INTRODUCTION

Tuberculosis (TB) remains a global health challenge, including in Indonesia (Kemenkes, 2024). In 2022, reported TB cases increased to 724,309 and continued to rise to 821,200 in 2023. By early March 2025, approximately 889,000 cases had been identified (Kemenkes RI, 2025). Indonesia has implemented the Tuberculosis Information System (SITB) for TB case reporting; however, its implementation still faces several obstacles, such as limited data integration across health facilities, the absence of real-time reporting, and minimal involvement of the private sector and community in TB management (Lestari et al., 2024). SITB has also not fully adopted interoperability principles with other existing digital health systems, resulting in slow and inefficient case tracking and treatment monitoring (Kemenkes RI, 2023). These limitations contribute to low case notification rates and delays in data-driven decision-making at both national and regional levels (Kemenkes RI, 2025). India has successfully addressed similar challenges through the development of the Ni-kshay Portal (Ni = “eradication”, Kshay = “TB”, in Hindi), an integrated digital platform that supports

prevention, treatment, and real-time TB case reporting (Bakhru et al., 2025). The portal has registered more than 50 million individuals since its launch, integrating public and private sectors while providing direct benefits to patients (Jeyashree et al., 2024); (Shah, 2023).

A needs analysis is essential in developing the Ni-kshay Portal to ensure that the system aligns with the actual needs of healthcare workers involved in TB management. This stage identifies system problems and required features through interviews and observations, preventing the development of an ineffective system. With proper analysis, the Ni-kshay Portal can be designed more efficiently and support optimal TB control (Central TB Division, Ministry of Health and Family Welfare, 2025). Therefore, this study aims to develop and adapt Ni-kshay by conducting a needs analysis to prevent the creation of a system that does not align with user needs, thereby avoiding wasted time and resources. The research problem focuses on identifying the primary needs of healthcare workers in using the Ni-kshay Portal for TB management so that the system can function effectively and efficiently. This study is expected to serve as a strategic step toward supporting Indonesia's TB elimination target by 2030.

The urgency of developing the Ni-kshay Portal as an integrated digital system for TB management in Indonesia is extremely high, given the significant challenges in national TB elimination efforts (Preeti Sharma et al., 2023). The portal must be developed according to healthcare workers' needs to ensure effectiveness and efficiency. Needs analysis safeguards against system failure and ensures optimal patient monitoring, accelerating TB control in the face of rising national case numbers. The Ni-kshay Portal can be implemented in Indonesia through various development stages, beginning with system needs analysis. This phase aims to identify functional and non-functional user requirements, particularly those of healthcare workers, to ensure the portal is designed according to actual problems and workflow conditions. This approach is crucial to ensure that the system is effective, efficient, user-friendly, and aligned with national TB management standards before proceeding to design and development stages. Evidence from India shows that Ni-kshay increased case notification by up to 70% annually and has covered more than 50 million people since its launch. India's experience demonstrates that an integrated digital system can significantly accelerate TB elimination (Shah, 2023).

Based on this background, the research problem concerns identifying the key needs of healthcare workers in using the Ni-kshay Portal for TB management to ensure that the system can operate effectively and efficiently. Additionally, this study aims to adapt the portal's key features to align with the needs, regulations, and health system infrastructure in Indonesia.

METHOD

Previous studies have identified persistent challenges in the management of tuberculosis (TB) case-reporting systems. Therefore, in 2025, a follow-up study will be conducted to perform a comprehensive needs analysis for the development of an enhanced TB case-reporting system. This continued research is planned to be implemented over a one-year period and is targeted to achieve Technology Readiness Level (TRL) 2. The study will employ a qualitative approach using the Waterfall-based information system development model combined with the PIECES analysis framework (Performance, Information, Economic, Control, Efficiency, and Service). Data collection will begin with an initial literature review that includes scholarly works on the Ni-kshay platform, TB management strategies, and existing health information systems. This review will serve as the foundation for identifying system gaps, formulating user requirements, and determining the essential functional and non-functional specifications needed for improving the TB reporting ecosystem. In addition to the literature review, data will also be gathered from a total of 24 participants, consisting of 20 users and persons in charge of the Tuberculosis Information System (SITB) from primary health centers and 4 respondents from referral hospitals who are directly involved in the operation and management of SITB.

RESULT

The research team has conducted extensive user-needs data collection through in-depth interviews, field observations, document reviews, requirements analysis, and data validation sessions involving discussions and joint reviews with stakeholders and system users. A total of 20 primary health centers and 4 referral hospitals, along with the Banyumas District Health Office, were engaged to identify both functional and non-functional requirements for a digital TB management system. The results of the analysis were organized using the PIECES framework, which served as the basis for determining performance gaps, information needs, economic considerations, system control mechanisms, efficiency requirements, and service-related improvements.

Table 1.
PIECES Analysis Result

PIECES Aspect	Problems in the Current (Existing) System	Required Features for the NI-KSHAY Portal
Performance	a. TB reporting is delayed, often taking 2–4 weeks. b. The SITB server frequently experiences overload during peak hours.	a. A real-time and responsive system. b. Optimized server access through centralized integration and lightweight technology
Information	a. A large number of duplicate or invalid patient records. b. Weak synchronization between SITB, SIMRS, and BPJS systems.	a. Automated national ID (NIK) validation with Dukcapil. b. Cross-system API integration. c. Centralized and accurate information dashboard.
Economy	a. Manual data entry duplication wasting time and human resources. b. High costs of manual reporting (paper, logistics).	a. Duplication of manual data entry, resulting in wasted time and human resources. b. High costs associated with manual reporting, including paper and logistics.
Control	a. Low data control, with frequent input errors. b. Difficulty in performing audits and case tracking. c. Many duplicated processes, with repeated data entry across different systems. d. Patients often do not receive appointment reminders. e. Unclear coordination for referral-back procedures	a. Automated data auditing. b. Activity logs and tiered access control. c. Single entry integration to reduce duplicate input. d. Streamlined digital workflow. e. Automated SMS/WhatsApp reminders. f. Digital referral-back system with patient tracking

DISCUSSION

The results of this study indicate substantive problems in the quality and timeliness of tuberculosis (TB) case reporting at healthcare facility levels, which negatively affect case tracking and may lead to under-reporting. Findings regarding 2–4 week reporting delays and low data validity are consistent with global observations emphasizing that post-pandemic recovery of reporting systems remains uneven, and that individual-based case recording systems can accelerate notification when implemented comprehensively (MacPherson et al., 2025). Needs analysis using the PIECES framework revealed that the challenges are not only technical (e.g., server overload, data synchronization issues) but also organizational (e.g., duplicated data entry, fragmented workflows) and related to human resources (e.g., staff workload). Independent evaluations of SITB indicate that, although widely adopted, functional improvements and better integration are still required to support more efficient and accurate reporting. These findings align with SITB quality evaluations

recommending enhanced interoperability and improved user interfaces to reduce the documentation burden on healthcare workers(Fuady, 2023); (Putra & Pradnyani, 2025).

The development of the NI-KSHAY Portal prototype in Indonesia, incorporating NIK validation, real-time dashboards, and digital referral-back features, addresses several key user requirements identified in the study. International experience, particularly from India's NI-KSHAY implementation, demonstrates that integrated portals can increase case notification, expedite reporting workflows, and support faster follow-up interventions; program studies in India reported improved notifications and operational efficiency after deploying the integrated system. Therefore, the integrative approach adopted in this study is grounded in strong international evidence, although it must be adapted to Indonesia's regulatory context and data infrastructure (Ismail et al., 2020). One technical mechanism that could enhance patient identity accuracy is NIK integration/validation through the Dukcapil service. Indonesia's Dukcapil and digital identity initiatives now provide APIs and identity verification services that health systems can use to minimize duplication and entry errors; however, implementation requires data access regulation, legal compliance, and relevant cost management mechanisms (PNBP). Secure, authorized, and policy-based NIK integration is therefore critical for operationalizing automated validation features (Singh et al., 2025).

The findings also underscore the importance of human factors, such as workload, staff rotation, and digital literacy, in implementation planning. Literature on digital TB system implementation recommends structured training programs, simple user interface design, and ongoing field support (helpdesk, mentoring) to maintain adoption and data quality. This supports the decision to include training modules and usability testing (SUS ≥75%) in the system roadmap (Ruhwald M, 2024). From a national policy and health information perspective, reports from banks, donors, and evaluation studies advocate accelerating interoperability among SITB, claims systems (BPJS/P-Care), and electronic medical record systems (SIMRS/SatuSehat/DHIS2) to reduce duplicate entries and speed data flow. Improved interoperability also facilitates case monitoring across public and private sectors, which is crucial for comprehensive case detection. These recommendations align with planned integration enhancements outlined in several Indonesian policy document.

CONCLUSION

This study shows that TB case reporting still faces major challenges in timeliness, data quality, system performance, workflow efficiency, and user burden. Delays of 2–4 weeks, low data validity, and duplicated data entry indicate that existing reporting mechanisms are not fully effective. Through the PIECES analysis, problems were identified across technical, organizational, and human resource dimensions. The NI-KSHAY Portal prototype developed in this study—featuring NIK validation, real-time dashboards, and digital referral-back—effectively addresses the key gaps found in performance, information quality, and service. Evidence from India's NI-KSHAY system supports the potential of integrated platforms to accelerate case notification and improve reporting accuracy when implemented comprehensively. Successful implementation in Indonesia requires secure and regulated NIK integration, strengthened interoperability with BPJS/P-Care, SIMRS, and national health systems, as well as training and user support to ensure adoption. Overall, the integrative approach proposed in this study provides a feasible foundation for improving TB reporting accuracy, speed, and system efficiency in line with national digital health goals

REFERENCES

Bakhru, D., Acharya, A. S., & Talukdar, T. (2025). Nikshay Poshan Yojana utilization among tuberculosis patients in a tertiary care hospital in New Delhi. International Journal of Community Medicine and Public Health, 12(3), 1355–1359.

Central TB Division, Ministry of Health and Family Welfare, G. of I. (n. d.). (2025). National Tuberculosis Elimination Programme (NTEP).

Fuady, A. (2023). Estimating tuberculosis burden: national reporting systems. The Lancet Global Health, 11(1), e14–e15. https://doi.org/10.1016/S2214-109X(22)00473-9

Ismail, I. M., Madhukeshwar, A. K., Naik, P. R., Nayarmoole, B. M., & Satyanarayana, S. (2020). Magnitude and reasons for gaps in tuberculosis diagnostic testing and treatment initiation: An operational research study from Dakshina Kannada, South India. Journal of Epidemiology and Global Health, 10(4), 326–336. https://doi.org/10.2991/jegh.k.200516.001

Jeyashree, K., Thangaraj, J. W. V., Shanmugasundaram, D., Sri Lakshmi Priya, G., Pandey, S., Janagaraj, V., Shanmugasundaram, P., Ts, S., Ramasamy, S., Chadwick, J., Arunachalam, S., Sharma, R., Shah, V., Chowdhury, A., Iyer, S., Rao, R., Mattoo, S. K., & Murhekar, M. V. (2024). Ni-kshay Poshan Yojana: receipt and utilization among persons with TB notified under the National TB Elimination Program in India, 2022. Global Health Action, 17(1). https://doi.org/10.1080/16549716.2024.2363300

Kemenkes. (2024). TBC Masalah Kesehatan Dunia. Kemenkes RI. https://sehatnegeriku.kemkes.go.id/baca/rilis-media/20110325/18921/tbc-masalah-kesehatan-dunia/

Kemenkes RI. (2023). Petunjuk Teknis Penggunaan Sistem Informasi Tuberkulosis (Sitb) Kementerian Kesehatan Republik Indonesia 2023. KEMENTERIAN KESEHATAN REPUBLIK INDONESIA.

Kemenkes RI. (2025). Aksi Nyata Percepatan Eliminasi Tuberkulosis di Indonesia. Kemenkes RI. https://kemkes.go.id/id/47510

Lestari, A. R., Fauziah, U., Nursalam, A., & Putri, A. N. (2024). Penggunaan sistem informasi tubeculosis (sitb) di rumah sakit x kota tasikmalaya. Jurnal Informasi Kesehatan Indonesia, 10(2), 38–49.

MacPherson, L., Miller, C., Hamada, Y., Rangaka, L., Ruhwald, M., Falzon, D., Kik, S., & Esmail, H. (2025). Policies, practices, opportunities and challenges for tuberculosis screening: a global survey of national tuberculosis programmes. BMJ Global Health, 10(7), 1–10. https://doi.org/10.1136/bmjgh-2024-016000

Preeti Sharma, Alok Raina, & Kavita Sharma. (2023). Utilization of Nikshay Poshan Yojna in tuberculosis patients in two tuberculosis units of North India. International Journal of Contemporary Pediatrics, 10(2), 234–237. https://doi.org/10.18203/2349-3291.ijcp20230090

Putra, G. W., & Pradnyani, P. E. (2025). Evaluasi Penerapan Sistem Informasi Tuberkulosis (SITB) pada Klinik Swasta di Kota Denpasar. J-REMI : Jurnal Rekam Medik dan Informasi Kesehatan, 6(4), 247–256. https://doi.org/10.25047/j-remi.v6i4.4932

Ruhwald M, F. D. (2024). Innovations in tuberculosis surveillance: Moving towards real-time reporting (Vol. 5).

Shah, H. (2023). Challenges and Strategic Solutions to Guarantee Last Mile Reach for an Indian TB Patient's Nikshay Poshan Yojana; A Conditional Cash Transfer Scheme Comment on "Does Direct Benefit Transfer Improve Outcomes Among People With Tuberculosis? – A Mixed-Method. International Journal of Health Policy and Management, 12(1), 10–13. https://doi.org/10.34172/ijhpm.2023.7668

Singh, U. B., Rade, K., Rao, R., Kumar, N., Mattoo, S. K., Nair, S., Zumla, A., & Sahu, S. (2025). Lessons and updates from India's National Tuberculosis Elimination Program – bold decisions and innovative ways of fast-tracking progress toward ending tuberculosis. IJID Regions, 14(January), 100599. https://doi.org/10.1016/j.ijregi.2025.100599