

Digital Health Transformation in Nepal: Key Challenges and Opportunities

Nishchal Devkota,¹ Hom Prasad Adhikari,² Leison Maharjan,³ Neelam Thapa,¹ Shanti Gurung,¹ Birat Raj Kafle,¹ Avishek Singh⁴

¹Nepal Health Professional Council, Bansbari, Kathmandu, Nepal, ²Atharva Business College, Bansbari, Kathmandu Nepal, ³Patan Academy of Health Science, Lagankhel, Lalitpur, Nepal, ⁴Nepal Medical Council, Bansbari, Kathmandu, Nepal.

ABSTRACT

The digital health landscape in Nepal is in a crucial juncture of transitioning from individual donor-funded pilots to a national-level architecture that is integrated and supported by the Digital Health Blueprint and the National Health Sector Strategic Plan (2023-2030). Tracking health services interoperability standards through Fast Healthcare Interoperability Resources, implementation of open-source Electronic Medical Record Systems such as OpenMRS and deployment of District Health Information Software 2 Tracker modules for longitudinal patient monitoring at the municipal level have shown significant progress. The momentum is, however, constrained by structural challenges, such as geographical inequalities in Information and Communication Technology infrastructure, low digital literacy, high turnover of the healthcare workforce and the absence of common standards for electronic data. Nepal needs to shift the focus from project funding to institutionalized funding, institutionally designed training of workforces, and strong data governance. Although new developments, such as big data analytics and blockchain, offer exciting future avenues, the first is to have a solid base infrastructure that works dependably at scale and is stable, secure, and interoperable.



doi: 10.31729/jnma.v64i299.9529

Submission Date: November 3, 2025

Reviewed Date: December 2, 2025

Accepted Date: June 20, 2026

Published Date: June 30, 2026

Correspondence:

Name: Nishchal Devkota

Affiliation: Nepal Health Professional Council, Bansbari, Kathmandu, Nepal.

Email: nishchaldevkota1@gmail.com,

Phone: +977-9841919406



Keywords: artificial intelligence; digital health; infrastructure; robotics; telemedicine.

INTRODUCTION

Digital health has been growing in Nepal, especially after the COVID-19 pandemic and the launch of the Nepal Digital Health Blueprint, aimed at improving health care access and data-driven decision-making.¹⁻⁶ National initiatives, including interoperability efforts such as Fast Healthcare Interoperability Resources (FHIR) adoption and Electronic Medical Record (EMR) implementations, reflect the ongoing progress.^{7,8} However, geographical, infrastructural, governance, and workforce capacity constraints remain significant challenges. This short communication aims to provide an update on the current progress of digital health transformation in Nepal and discusses key barriers and opportunities for strengthening the health system.⁸⁻¹⁰

Current Status of Digital Health in Nepal

The digital health landscape in Nepal is undergoing a transition from program-specific digital health initiatives towards a more coordinated national digital health architecture which has been summarized in the Nepal Digital Health Blueprint and National Health Sector Strategic Plan (NHSSP 2023-2030) and linked national digital health governance frameworks. These

policy frameworks offer strategic guidance on building digital governance and interoperability and integration into health information systems at federal, provincial, and local levels.^{2,11} At the national level, this transition is most evident in the Health Management Information System (HMIS) and its District Health Information Software 2 (DHIS-2) backbone, which remains the support for routine health reporting, surveillance and program monitoring.¹²⁻¹⁴ The current evolution of HMIS reflects a shift from basic digitization of aggregate reports toward improved interoperability between facility-level clinical systems and national-level data systems.^{2,12,15} The Ministry of Health and Population (MoHP) has started rolling out FHIR-based data exchange systems for enhanced structured data sharing between hospital systems and HMIS. Historically, health workers were required to perform dual data entry, recording patient information in facility-based EMR systems while separately submitting aggregated reports to HMIS.¹⁶ A major advancement has been the testing of the interoperability of EMR systems and DHIS2 using standardized data exchange mechanisms in some pilot projects, which will assist in integrating clinical data into national health statistics and planning.^{2,7,14} Recent efforts, supported by government and technical partners, have enabled

the automation to some extent of data transfer from open source EMR platforms such as Open Source Medical Record System (OpenMRS) to DHIS2, greatly improving the reporting workflow and minimizing human error in a number of health facilities selected for this approach.^{17,18} A change at the facility level is seen in hospitals like Bayalpata Hospital in Achham, Charikot Hospital in Dolakha and the Trishuli hospital, where locally adapted OpenMRS based Electronic Health Record systems are being used. These systems facilitate routine clinical activities, such as monitoring patient records, scheduling follow-ups, and implementing care coordination for future visits or on-going care.¹⁹ Concurrently, Nepal has continued to roll out DHIS2 Tracker modules to facilitate longitudinal monitoring of individual patients within priority health programs like Human Immunodeficiency Virus (HIV) services and Antiretroviral Therapy (ART). This will replace aggregate reporting with tracking at the individual level, in the context of specific disease programs. Selected settings have implemented a range of enhanced patient identification approaches such as biometric-based patient verification with a focus on continuity of care and minimizing duplication of patient records between settings.^{20,21} At the subnational level, Nepal has extended the use of the web-based DHIS2 platform to local governments to support routine health information management. Municipalities have been given greater responsibility for health data reporting and oversight under the Local Government Operation Act 2017.^{22,23} Data quality is supported through periodic verification and review processes, including Routine Data Quality Assessments (RDQAs) in some settings.²⁴ Local health managers have access to health indicators through DHIS2 dashboards, enabling them to monitor, plan and budget based on evidence. At the same time, there has been strengthening of subnational digital health infrastructure, including through expanding telemedicine and mobile health (mHealth) applications. The remote platforms are growing in numbers for chronic care management and community health camps, helping to remove harsh physical and geographical barriers faced by the marginalized and rural people.²⁵ Most importantly, the MoHP has enforced rigorous regulations that require clinics, labs and hospitals to have digital systems for billing, lab reports and medical records.²⁶ This regulatory push aims to enforce institutional transparency while establishing the baseline data infrastructure necessary for national interoperability.

Key Challenges

Although there is transition to national architecture, there are significant structural, technical and human resource challenges to the implementation of digital health initiatives at scale in Nepal. There are four main areas that can be broken down into these challenges.:

Infrastructure Constraints and Geographic Disparities

One of the constraining factors is the lack of strength of Information and Communication Technology (ICT) infrastructure, especially in rural and mountainous areas. Digital

health systems struggle to operate in peripheral facilities due to frequent power outages, weak internet connections, and low availability of hardware.¹⁰ Even if digital health systems are part of a national platform, like DHIS2, users report slow system, server congestion during reporting hours, and offline synchronization failures.¹⁷ In addition, geographic terrain adds to these limitations and makes installation, maintenance and timely repair of digital infrastructure challenging and costly at district hospitals.²⁷ This leads to uneven growth of digital health, reinforcing structural inequities in access to health information and system performance.

Low Digital Literacy & High Human Resource Turnover

The limited capacity of the health care workforce, especially at the municipal and facility levels, greatly hampers the digital transition. For example, Non-Health Information Technology (non-HIT) staff demonstrate resistance and fear of errors when using electronic systems because of poor technical Information Technology (IT) skills and low digital literacy.^{17, 28} This is exacerbated by high levels of uncoordinated staff turnover and frequent transfer of trained personnel out of rural facilities, resulting in a chronic shortage of skilled manpower to operate EMR and DHIS2 platforms.^{10, 27}

Data Inconsistency and Fragmented Interoperability

The quality of health data routinely entered is a major issue, although a mandate for digital integration comes from the central government. Missing values, calculation discrepancies and human tallying errors continue to make the data in the national Health Management Information System (HMIS) inconsistent and incomplete.²⁹ Further, Nepal does not have a nationally enforced universal health information standard, so individual facilities continue to purchase different proprietary or hybrid software systems. This makes truly interoperable, seamless data exchange for continuity of care extremely difficult.³⁰

Financial Unsustainability and Socio-Cultural Barriers

Digital health interventions in Nepal have historically operated as fragmented, short-term pilot projects heavily reliant on external technical and international donor partners.¹⁰ The Ministry of Health and Population (MoHP) operates on a relatively modest health budget, prioritizing basic physical service delivery over long-term software maintenance, resulting in significant funding gaps for the ongoing maintenance and upgrades required by complex EHR infrastructures.^{27,30} Lastly, on the beneficiary side, low patient literacy, shyness, and socio-cultural discomfort related to remote video consultations, especially among the elderly and rural female populations, create barriers to patient-provider trust during telemedicine sessions.²⁷

Way Forward

Transforming Nepal's digital health landscape requires a dual approach: strengthening foundational structural elements while systematically preparing for emerging technological frontiers.

Strengthening Digital Health Foundations

The first priority is to move from policy direction to scalable implementation of interoperable systems. Efforts to achieve FHIR-based interoperability and EMR–DHIS2 integration should be scaled beyond pilot settings to ensure standardized, seamless data exchange across all levels of care. This will improve continuity of care, reduce duplication and improve use of national health information for decision-making.^{2,7,14} Open-source integrated platforms like Bahmni that integrate clinical, laboratory, pharmacy and administrative functions may offer a practical way to reduce fragmentation and enhance system coherence in resource-constrained environments.³¹

Sustained functionality of digital systems will require institutionalized financing and governance. Digital health investments need to be embedded in regular health sector planning and budgeting at federal, provincial and local levels to minimize dependence on external project-based support. At the same time, the development of structured digital health competencies should be integrated into both pre-service education and in-service training to ensure a capable workforce for system operation and use.^{2,11}

As digital systems grow, strong data governance is becoming a must. Strengthen national frameworks for data quality assurance, privacy protection, accountability and system interoperability to build trust and ensure safe use of health data.^{2,11} With the growth of the digital health ecosystem in Nepal, safeguards like encryption, access control and audit mechanisms are becoming more important. The experience of implementing electronic medical record and DHIS2-based reporting systems in Nepal suggests that data security and system design are critical to ensure system reliability, data integrity and operational continuity.^{28,29,31} The increasing penetration of telemedicine and digital health platforms, exposes the health systems to risks of data transmission, and the need for more robust protective mechanisms in the routine operation of health systems is even more important.

Emerging Digital Health Opportunities

In addition to system strengthening, emerging technologies provide other options for long-term improvement of Nepal's health system. In the national digital innovation ecosystem, the eSatya blockchain project and similar initiatives have explored permissioned blockchain architectures for decentralized management of health data, tracking referrals across health facilities, and transparency in the supply chain of health commodities. Although these applications are still in early stages, they demonstrate potential future use cases to improve data integrity, traceability and trust in interoperable health systems.^{28,29,32}

Increasing digitization of routine health data through EMRs, DHIS2 and related platforms also offers opportunities for big data analytics to support disease surveillance, health resource optimization and predictive public health planning.³³

Simultaneously, patient-centered digital tools such as mobile health applications, patient portals, and secure messaging systems may enhance continuity of care, treatment adherence, and patient engagement, particularly in long-term chronic disease management.³⁴

There is a growing global digital health conversation around advanced technologies such as artificial intelligence, robotics, precision medicine, immersive technologies and digital twins.³⁴ However, the successful adoption of these in Nepal will depend on the maturity of the underlying infrastructure, interoperability, governance structures and data quality systems. They are more longer-term issues than immediate implementation priorities for now.

CONCLUSIONS

The digital health system in Nepal is gradually shifting from a fragmented and project-driven approach to digitization to a more integrated national health system based on HMIS/DHIS2 and increasingly using electronic medical records. This represents real change, and is underpinned by policy changes, interoperability initiatives, and a gradual process of digitalization in hospitals and local governments. But the transition is still fragile. The performance of the system will depend more on the integration, governance and maintenance of the existing components, rather than on the procurement of additional tools. The current question is not about the possibility of digitizing, but about the possibility of making digital health reliable, interoperable and resilient in the real world. Achieving that demands that the data governance investment be disciplined, and in terms of workforce capability, financing, and system security. Without these foundations, digital platforms can lack the foundations to be used in the way they are intended. Meanwhile, new technologies, from analytics to patient-centric digital tools and even emerging ones such as blockchain, represent opportunities for the future too. But these should not be considered as a substitute for a stable system, they should be added to one. The actual leap forward for Nepal will not be the introduction of the latest technology, but rather the ability of the digital health ecosystem to be used on a regular, consistent, secure and large scale.

Acknowledgement: None.

Authors' contribution: Nishchal Devkota: Conceptualization, literature review, data analysis, manuscript preparation, and final approval; Hom Prasad Adhikari: Literature review, data interpretation, manuscript editing, and critical review; Leison Maharjan: Data organization, content verification, writing support, and manuscript review; Neelam Thapa: Critical review, content editing, and manuscript refinement; Shanti Gurung: Proofreading, formatting, reference management, and final manuscript review; Birat Raj Kafle: Proofreading, formatting, reference management, and final manuscript review; Avishek Singh: Proofreading, formatting, reference management, and final manuscript review.

Conflict of Interest: None.

Data Availability Statement: The data are available from the corresponding author upon reasonable request.

Ethical Consideration: Ethical issues (including plagiarism, data fabrication, and double publication) have been completely observed by the authors

Funding: None

REFERENCES

- Koirala P. Digital Health System in Nepal. The Kathmandu Post. 2024 Oct 9. Available from: <https://kathmandupost.com/columns/2024/10/09/digital-health-system-in-nepal>
- Ministry of Health and Population (MoHP), World Health Organization. Nepal Digital Health Blueprint towards 'Health for All'. Available from: <https://www.scribd.com/document/849673698/Nepal-Digital-Health-Blueprint-V1-Nov-24>
- World Health Organization. Electronic Medical Recording System Launched in Gandaki Province. Geneva: WHO; 2023 Apr 12. Available from: <https://www.who.int/nepal/news/detail/12-04-2023-electronic-medical-recording-system-launched-in-gandaki-province>
- World Health Organization. WHO Hands over Electronic Medical Record System to APF Hospital. Geneva: WHO; 2025 Jul 4. Available from: <https://www.who.int/nepal/news/detail/04-07-2025-who-hands-over-electronic-medical-record-system-to-apf-hospital>
- Gupta PP, Bhatta N, Das RK, Bhattarai A, Sarraf DP, Geissbuhler A. Mobile Health Teleconsultation and Telemedicine in operating Outpatient Departments during the COVID-19 Pandemic at a hospital in Eastern Nepal. J Family Med Prim Care. 2024 Nov;13(11):5282–5. DOI: [10.4103/jfmpc.jfmpc_980_24](https://doi.org/10.4103/jfmpc.jfmpc_980_24)
- Gupta PP, Uranw S, Gupta S, Das RK, Bhattarai A, Bhatta N, et al. Study of the Impact of a Telemedicine Service in Improving Pre-Hospital Care and Referrals to a Tertiary Care University Hospital in Nepal. J Family Med Prim Care. 2021;10(12):4531–5. DOI: [10.4103/jfmpc.jfmpc_9_21](https://doi.org/10.4103/jfmpc.jfmpc_9_21)
- Ministry of Health and Population (MoHP). Fast health interoperability resources (FHIR). Available from: <https://digitalhealth.mohp.gov.np/wp-content/uploads/2024/07/Fast-Health-Interoperability-Resources-FHIR-Workshop.pdf>
- National Innovation Centre (NIC) Nepal. Digital Health and Electronic Health Record Implementation Projects in Nepal. Kathmandu: NIC Nepal; 2024. Available from: <https://nicnepal.org/projects/digital-health>
- Wasti SP, Van Teijlingen E, Rushton S, Subedi M, Simkhada P, Balen J. Overcoming the Challenges Facing Nepal's Health System during Federalisation: an Analysis of Health System Building Blocks. Health Res Policy Syst. 2023;21(1):117. DOI: [10.1186/s12961-023-01033-2](https://doi.org/10.1186/s12961-023-01033-2)
- Parajuli R, Bohara D, KC M, Shanmuganathan S, Mistry SK, Yadav UN. Challenges and Opportunities for Implementing Digital Health Interventions in Nepal: a rapid review. Front Digit Health. 2022;4:861019. DOI: [10.3389/fdgh.2022.861019](https://doi.org/10.3389/fdgh.2022.861019)
- Ministry of Health and Population (MoHP). National Health Sector Strategic Plan (NHSSP 2023–2030). Government of Nepal; 2023. Available from: <https://mohp.gov.np>
- Department of Health Services (DoHS), Ministry of Health and Population, Nepal. Health Management Information System (HMIS) / DHIS2 National Reporting System. Kathmandu; 2025. Available from: <https://hmis.gov.np>
- DHIS2. District Health Information Software 2: Global Platform Documentation. University of Oslo / HISP Centre; 2025. Available from: <https://www.dhis2.org>
- Wiken J, Poudel S, Raut A. Strengthening PHC Capacity in the Public Sector through an Integrated Health Information System in Nepal. Primary Health Care Performance Initiative (PHCPI). 2022. Available from: <https://improvingphc.org/nepal-information-technology>
- Possible Health. Integrating Technology, Improving Patient Care. New York (NY): Possible Health. Available from: <https://possiblehealth.org/integrating-technology-improving-patient-care/>
- Bista P. Bridging the Tertiary Care Data Gap in Nepal. Digital poster presented at: DHIS2 Annual Conference (DAC2026); 2026 May 19; Oslo, Norway. Oslo: DHIS2 Community; 2026. Available from: <https://community.dhis2.org/t/bridging-the-tertiary-care-data-gap-in-nepal/72481>
- Bhatt PR, Bhandari R, Adhikari S, et al. Health Professionals' Experience on DHIS2 and its Utilization at Local Levels in Gandaki Province, Nepal. PLOS Glob Public Health. 2024;4(3):e0002890. DOI: [10.1371/journal.pgph.0002890](https://doi.org/10.1371/journal.pgph.0002890)
- Khadka KB. Insights and Challenges in the Early Implementation of Digital Health Initiatives in the Geographic and Resource-Constrained Setting of Gandaki Province. Kathmandu: Nepal Health Research Council; 2024. Report No.: NHRC-2024-DH. Available from: <https://elibrary.nhrc.gov.np/handle/20.500.14356/2729>
- Dhimel M, Pandey AR, Karki S, Chalise B, Bista B, Timilsina A, et al. Evaluation of Electronic Medical Recording System in Trisuli District Hospital, Nuwakot. Kathmandu: Nepal Health Research Council (NHRC); 2018. Available from: <https://nhrc.gov.np/wp-content/uploads/2019/04/Evaluation-of-Electronic-Medical-CTP.pdf>
- DHIS2. Nepal HIV Tracker. Oslo: University of Oslo. Available from: <https://dhis2.org/nepal-hiv-tracker/>
- National Centre for AIDS and STD Control (NCASC). HIV Care and ART Tracking System (DHIS2). Kathmandu: Ministry of Health and Population, Government of Nepal. Available from: <https://www.ncasc.gov.np/pages/hiv-care-and-art-tracking-system--dhis2-11/>
- Government of Nepal, Ministry of Law, Justice and Parliamentary Affairs. Local Government Operation Act, 2074. Kathmandu: Ministry of Law, Justice and Parliamentary Affairs; 2017. Available from: <https://dpnet.org.np/resource-detail/333>
- Ministry of Health and Population (NP). National Integrated Health Information Management System (IHIMS) Roadmap (2021–2030). Kathmandu (NP): Department of Health Services, Management Division, Integrated Health Information Management Section; 2021. Available from: <https://hmis.gov.np/posts/single/ihips-roadmap-2022-2030on%20Management%20Section;%202021>
- Public Health Update. Roll out of RDQA in Provincial and Federal Hospitals. Kathmandu: Public Health Update; 2022 Jan 9. Available from: <https://publichealthupdate.com/roll-out-of-rdqa-in-provincial-and-federal-hospitals>

25. Shrestha R, Khanal P, Karki S, Ghimire S. Challenges and Opportunities for Implementing Digital Health Interventions in Nepal: A rapid review. *Front Digit Health*. 2022 Sep 13. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC9480345/>
26. Okhati. Digital healthcare now mandatory in Nepal. Kathmandu: Okhati. Available from: <https://okhati.com.np/blog/digital-healthcare-now-mandatory-in-nepal>
27. Bhatta R, Aryal K, Ellingsen G. Opportunities and Challenges of a Rural-telemedicine Program in Nepal. *Journal of Nepal Health Research Council*. 2015;13(2):149-153. Available from: <https://pubmed.ncbi.nlm.nih.gov/26744201/>
28. Shah AK, Hinduja S, Mallik S, DeBerg HA, Aboulafia DM. Initial Experience in Implementing an Electronic Medical Record (EMR) in Nepal: A Necessary Step to Sustainable Change in Patient-centered Care. *International Journal of Clinical Care and Disease Management*. 2025;5(1). DOI: [10.53876/001c.141078](https://doi.org/10.53876/001c.141078)
29. Sanjel K, Sharma SL, Gurung S, Oli MB, Singh S, Pokhrel TP. Quality of Routine Health Facility Data for Monitoring Maternal, Newborn, and Child Health Indicators: A Desk Review of Dhis2 Data in Lumbini Province, Nepal. *PLoS One*. 2024;19(4):e0298101. DOI: [10.1371/journal.pone.0298101](https://doi.org/10.1371/journal.pone.0298101)
30. Devkota B, Devkota A. Electronic Health Records: Advantages of Use and Barriers to Adoption. *Health Renaissance*. 11(3):181-4. DOI: [10.3126/hren.v11i3.9629](https://doi.org/10.3126/hren.v11i3.9629)
31. Raut A, Yarbrough C, Singh V, Gauchan B, Citrin D, Verma V, et al. Design and Implementation of an Affordable, Public Sector Electronic Medical Record in rural Nepal. *J Innov Health Inform*. 2017 Jun 23;24(2):862. DOI: [10.14236/jhi.v24i2.862](https://doi.org/10.14236/jhi.v24i2.862)
32. ESatya. Blockchain-based Digital Trust and Decentralized Health Data Systems in Nepal: Technical Framework and Use Cases. Kathmandu: eSatya; 2023. Available from: <https://esatya.com>
33. Subrahmanya H, Shivaprakash T, editors. Development of Big Data Dimensionality Reduction Methods for Effective Data Transmission and Feature Enhancement Algorithms. In: *Proceedings of the International Conference on Advances and Applications of Artificial Intelligence and Machine Learning*; 2022. Cham: Springer; 2022. DOI: [10.1007/978-981-99-5974-7_1](https://doi.org/10.1007/978-981-99-5974-7_1)
34. Al Mahmud A, Joachim S, Jayaraman PP, Learmonth C, Tyagi S, Forkan ARM, et al. Digital Health Interventions to Support Chronic Disease Management: Systematic Scoping Review. *JMIR Mhealth Uhealth*. 2026;14:e63742. DOI: [10.2196/63742](https://doi.org/10.2196/63742)