



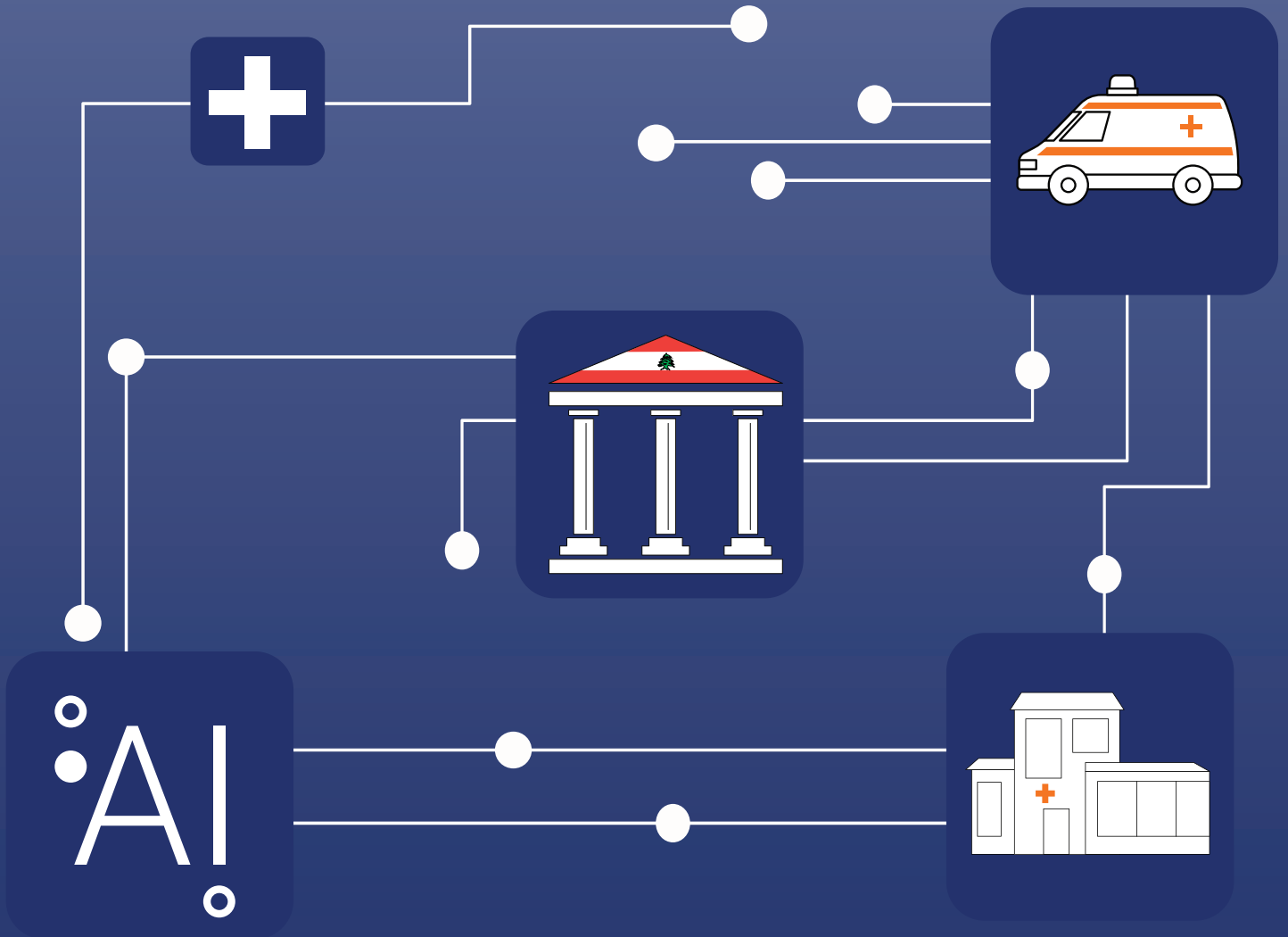
MENA OBSERVATORY
ON RESPONSIBLE AI
مركز الشرق الأوسط وشمال أفريقيا للأبحاث الإصطناعية المسؤولة

Governing Responsible Artificial Intelligence and Data
in the Middle East and North Africa (MENA)

The American
University in Cairo
Onsi Sawiris
School of Business
Access to Knowledge
for Development Center

IDRC · CRDI
International Development Research Centre
Centre de recherches pour le développement international
Canada

Fostering Responsible Health Data Governance and AI Practices in Lebanon



**FOSTERING RESPONSIBLE HEALTH DATA
GOVERNANCE AND
AI PRACTICES IN LEBANON**

Policy Report

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I. KEY MESSAGES

What is the problem?

Lebanon's health data governance faces major gaps, worsened by recent crises. Issues include inconsistent data collection, lack of national standards for privacy and storage, and poor interoperability across sectors. These weaknesses heighten risks of data misuse, breaches, and compromised quality, limiting AI's potential in the health system.

What are the underlying factors?

Governance Level

- Lebanon's fragmented and uncoordinated data governance strategies lack a unified national vision, with key initiatives like OMSAR's Digital Transformation Strategy (2022) and MoPH's Vision for Digital Health Transformation (2023) hindered by unclear roles and responsibilities.
- The absence of comprehensive data protection laws and standardized security measures leaves health data vulnerable to misuse and breaches.

Health Sector Level

- Data-driven initiatives like the National E-health Program (2013) and Meditrack (2017) have enhanced system efficiency.
- The ESU has been instrumental in managing crises, including COVID-19 and the 2022 cholera outbreak, but implementation of the Right to Access Information Law (2017) remains weak due to limited digitization.
- Outdated laws and weak data protection frameworks limit safe AI use in healthcare.

Financing Level

- Fragmented healthcare financing leads to disintegration of health data, limiting AI ability.
- Insufficient budgets for e-health and MoPH's Digital Health Department delay digitalization.

Delivery Level

- Outdated surveillance methods, reliant on paper-based reporting until 2017, caused delays in outbreak detection.
- A lack of multisectoral collaboration and trained cybersecurity experts hampers digitalization and the safe use of AI.

What do we know about the three recommendations?

• Recommendation 1

Strengthen health data management by implementing robust laws, policies, and legal frameworks at both the national and institutional levels

• Recommendation 2

Reinforce Data Sharing and Interoperability of Data Systems to Enhance Collaborative Healthcare Practices, Facilitate Seamless Exchange of Health Information, and enable effective AI deployment in healthcare

• Recommendation 3

Enhance the knowledge, education, and capacities of healthcare providers, IT and analyst workforce, and data handling personnel to promote efficiency, integrity of health data management and effective AI utilization

II. BACKGROUND TO THE POLICY BRIEF (METHODS)

A K2P Policy Brief brings together global research evidence, local evidence, and context-specific knowledge to inform deliberations about health policies and programs. It is prepared by synthesizing and contextualizing the best available evidence about the problem and viable solutions and options through the involvement of content experts, policymakers and stakeholders.

The preparation of the Policy Brief involved the following steps:

- 1) Selecting a priority topic according to K2P criteria
- 2) Selecting a working team who deliberates to develop an outline for the policy brief and oversee the litmus testing phase.
- 3) Developing and refining the outline, particularly the framing of the problem and the viable options
- 4) Litmus testing by conducting one to one interviews with up to 15 selected policymakers and stakeholders to frame the problem and make sure all aspects are addressed.
- 5) Identifying, appraising and synthesizing relevant research evidence about the problem, options, and implementation considerations
- 6) Drafting the brief in such a way as to present concisely and in accessible language the global and local research evidence.

- 7) Undergoing merit review
- 8) Finalizing the Policy Brief based on the input of merit reviewers, translating into Arabic, validating translation, and disseminating through policy dialogues and other mechanisms.

III. THE PROBLEM

Lebanon, a country with frequent emergencies, exhibits significant shortcomings in its health data governance, that were further pronounced by compounded crises of the last few years. These deficiencies include but are not limited to, inconsistencies in the types of collected data, the absence of national standards for data privacy, protection, and storage, and the lack of seamless interoperability and data sharing across sectors. The absence of rigorous health data governance increases the risk of data misuse, inappropriate data sharing, unconsented commodification of health data, and data breaches and jeopardizes the quality of the data. Without robust health data governance, the potential use of AI in the health system faces substantial limitations. AI systems rely on high-quality, consistent, and securely managed data to function effectively; without this, AI-driven solutions are at risk of inaccuracies, data misuse, inappropriate sharing, and breaches of privacy. Additionally, the absence of clear standards could hinder AI adoption, as it would struggle to navigate fragmented, unreliable data systems. If these governance gaps are not addressed, Lebanon's transition towards a digitized, AI-integrated health system that can withstand unprecedented shocks will be delayed.

IV. SIZE OF THE PROBLEM

The repercussions of not having strong and comprehensive health data governance practices are profound; impacting not only individuals but healthcare systems as a whole.^{1,23} Without effective health data governance, the risk of data misuse, inappropriate data sharing, and unconsented commodification of health data increases, and the quality of data is jeopardized.

⁴³ Inadequate management of health data can lead to legal liability impacting patients and healthcare organizations.⁵ Incomplete health data can compromise decisions affecting patient safety and well-being. Poor documentation or missing documentation interrupts at times the continuity of care for patients and makes it harder to show the level of skill and competency of healthcare professionals.⁶ At a national level, the absence of data governance can affect the ability of stakeholders to make decisions that are evidence-informed due to the lack of timely and reliable health data.⁷ Moreover, the lack of standardized data structures hinders data sharing making interoperability across sectors very difficult.^{8,9,10} The Lebanese healthcare system exhibits gaps in health data governance with key issues including the lack of unified health data management practices nationally and across institutions. These data governance system challenges hinder the ability of the health sector to manage the use of data responsibly deterring its efficiency.^{11,12} For the potential use of artificial intelligence (AI) in Lebanon's healthcare system, these governance challenges are particularly problematic. AI systems rely on large volumes of high-quality, consistent, and secure data to perform accurate analysis and deliver reliable insights. The current fragmentation and inconsistencies in health data collection, management, and sharing make it difficult for AI systems to access the structured, complete datasets needed for accurate predictions and diagnostics. Without standardized data, AI algorithms may produce skewed or inaccurate results, which can lead to poor decision-making and potentially harm patient outcomes. Additionally, the lack of robust privacy protections and data security

1 Hovenga, E. J. (2013). Impact of data governance on a nation's healthcare system building blocks. *Stud Health Technol Inform*, 193, 24-66.

2 Olinqua. (2023). Why data governance is critical to healthcare integration success. Retrieved from <https://olinqua.com/why-data-governance-is-critical-to-healthcare-integration-success/>

3 Tiffin, N., George, A., & LeFevre, A. E. (2019). How to use relevant data for maximal benefit with minimal risk: digital health data governance to protect vulnerable populations in low-income and middle-income countries. *BMJ Glob Health*, 4(2), e001395. doi:10.1136/bmjgh-2019-001395

4 Juddoo, S., George, C., Duquenoy, P., & Windridge, D. (2018). Data Governance in the Health Industry: Investigating Data Quality Dimensions within a Big Data Context. *Applied System Innovation*, 1(4). doi:10.3390/asi1040043

5 Faridoon, A., & Kechadi, M.T. (2024). Healthcare Data Governance, Privacy, and Security—A Conceptual Framework. Retrieved from <https://arxiv.org/html/2403.17648v1>

6 Kinnunen, Ulla-Mari, Kivekäs, Eija, Palojoki, Sari, Saranto, Kaija. (2020). Register-Based Research of Adverse Events Revealing Incomplete Records Threatening Patient Safety. *Digital Personalized Health and Medicine. Proceedings of MIE 2020*, 270, 771-775. doi:10.3233/SHTI200265

7 Tilahun, B., Teklu, A., Mancuso, A., Endehabtu, B. F., Gashu, K. D., & Mekonnen, Z. A. (2021). Using health data for decision-making at each level of the health system to achieve universal health coverage in Ethiopia: the case of an immunization programme in a low-resource setting. *Health Research Policy and Systems*, 19(2), 48. doi:10.1186/s12961-021-00694-1

8 Ali, N. (2022). EHR interoperability challenges and solutions Retrieved from <https://www.ehrinpractice.com/ehr-interoperability-challenges-solutions.html>

9 Dunskiy, I. (2024). Interoperability in healthcare: Challenges, Solutions and examples. Retrieved from <https://demigos.com/blog-post/interoperability-in-healthcare/>

10 Torab-Miandoab, A., Samad-Soltani, T., Jodati, A., & Rezaei-Hachesu, P. (2023). Interoperability of heterogeneous health information systems: a systematic literature review. *BMC Medical Informatics and Decision Making*, 23(1), 18. doi:10.1186/s12911-023-02115-5

11 Abou Mrad, L., Rizkallah, K., & Shemali, H. (2022). Case Study on the Digital Transformation of Health System in Lebanon.

12 MOPH. (2023). Digital Health Vision

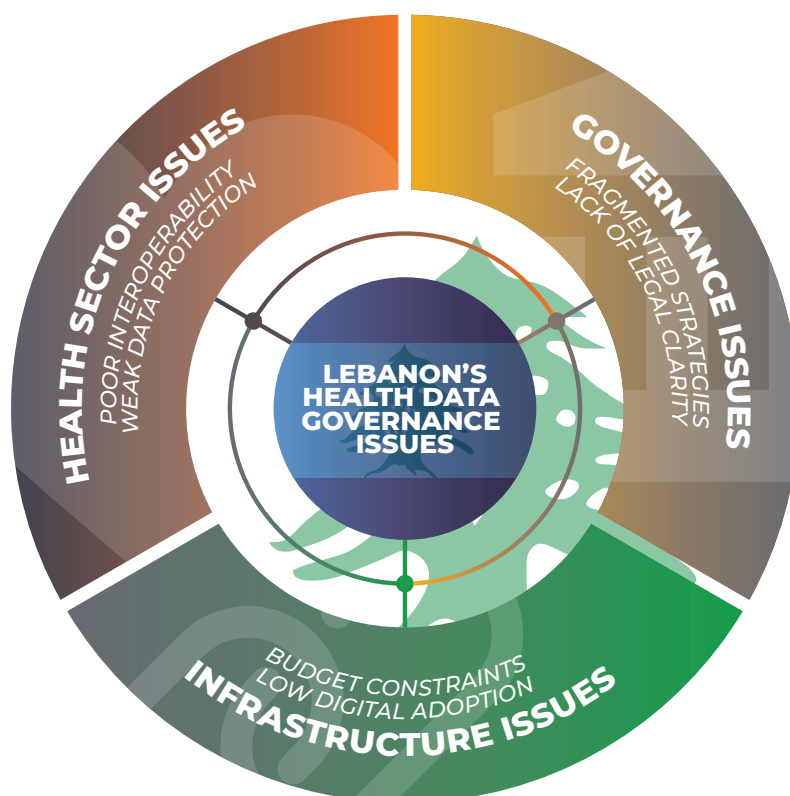


Figure 1: Key challenges in Lebanon's health data governance categorized into health sector, governance, and infrastructure issues.

standards increases the risk of breaches, further diminishing trust in AI applications.

In Lebanon, the lack of data sharing and collaboration represented a huge obstacle in the context of health emergencies, especially during the COVID-19 pandemic. Invalid estimation of COVID-19 spread in the community and the inability to forecast trends in the number of cases led to decision-making based on poor information impacting the country's response to the pandemic.¹³ These issues highlight the critical need for reliable data infrastructure, especially when deploying AI solutions that could help forecast outbreaks, manage resources, and improve patient outcomes.

Lebanon has not yet enacted a comprehensive law specifically to protect health data from potential threats and breaches. The only existing legislation addressing personal data protection is Law No. 81/2018, "Electronic Transactions

and Personal Data" that have many loopholes and is insufficient.^{14,15} Additionally, the absence of standardization in the types of health data to be collected, which varies according to different data users, poses further challenges to AI integration. For AI to be successfully and responsibly implemented in Lebanon's healthcare sector, significant improvements in health data governance, standardization, and security must be made to ensure accurate, reliable, and ethical use of AI technologies.

V. UNDERLYING CAUSES OF THE PROBLEM

At the Governance Level

Lebanon lacks a national vision for data governance across sectors, resulting in fragmented and uncoordinated strategies. Efforts like OMSAR's Lebanon Digital Transformation National Strategy (2022) and MoPH's Vision for Digital Health Transformation (2023) aim to address governance, infrastructure, and digital literacy issues but lack consensus on roles and responsibilities.¹⁶ The 2019 National Cyber Security Strategy also remains unimplemented due to delays in issuing decrees.¹⁴ At the health sector level, Lebanon has a history of data-driven decision-making,

¹³ Abou Hassan, F. F., Bou Hamdan, M., Ali, F., & Melhem, N. M. (2023). Response to COVID-19 in Lebanon: update, challenges and lessons learned. *Epidemiology & Infection*, 151, e23. doi:10.1017/S0950268823000067

¹⁴ Halabi, M. (2021). *The Legal and regulatory challenges of making e-transactions a defining part of the Lebanese economy* Retrieved from https://laur.lau.edu.lb:8443/xmlui/bitstream/handle/10725/13746/Mirna_Mohamad_Halabi_Thesis_Redacted.pdf?sequence=1&isAllowed=y

¹⁵ Sofia, K. (2019). *Electronic transactions in Lebanon*. Retrieved from <http://hdl.handle.net/10725/10627>

Ghosn, N., Nasredine, A., Baddour, Y. M., Coulombier, D., & Nasserline, S. (2008). Electronic surveillance of outbreaks in Lebanon. *BMC Proc*, 2 Suppl 3(Suppl 3), S2. doi:10.1186/1753-6561-2-s3-s2

¹⁶ OMSAR. (2022). Lebanon Digital Transformation-National Strategy.

with initiatives like the unified database (2003), National E-health Program (2013),^{22,17} and Medi-track (2017) improving system efficiency.¹⁸ The Epidemiological Surveillance Unit (ESU), reactivated in 1995, has been instrumental during crises such as COVID-19 and the 2022 cholera outbreak.¹⁹ The Lebanese government enacted “The Right to Access Information Law” in 2017, which was amended in 2021, along with its implementation decree 2020. This law permits any person and the general public free access to all public information and documents with few limitations. However, implementation remains weak due to slow responses and limited digitization.²⁰ The sharing of health-related information is governed by the “Communicable Diseases Law” issued in 1957, mandating healthcare providers and healthcare facilities to report to the MoPH on selected communicable diseases.²⁵ Despite efforts, Lebanon lacks a comprehensive legal framework for personal data protection. The only existing law, Law No. 81/2018, has several loopholes, and its enforcement is minimal. There is no comprehensive legal protection for health data. In addition, data security measures for patients’ medical information lack standardization at the national level.²¹

At the Financing Level

The fragmentation of the financing modalities of the Lebanese healthcare system has caused the disintegration of health data for the Lebanese population. Limited budgets for e-health, coupled with the minute budget allocations for the MoPH’s Department of Digital Health, have delayed digitalization, restricting activities to basic maintenance.¹¹

The ongoing crises—economic collapse, currency devaluation, and political instability—have driven much of the health workforce abroad, exacerbating a critical shortage in human resources that compromises health data quality.²² Financial constraints and outdated infrastructure hinder data sharing, leaving half of Lebanese hospitals unable to adopt e-health systems like HISs or EHRs.¹¹

17 MoPH. (2009). Towards a National Health Information System.

18 MoPH. (2017). MediTrack Project- Track and Trace System for Pharmaceuticals. Retrieved from <https://www.moph.gov.lb/en/Pages/6/15089/meditrack-project-track-trace-medicines-through-the-2d-barcode>

19 El Hage, S., Safi, S., Assouad, E., El Kareh, A., Mokled, E., & Salameh, P. (2022). Acute flaccid paralysis incidence rate and epidemiology in children in Lebanon: a rise in numbers in the post-vaccination and refugee crisis era. *African Health Sciences*, 22(2), 116-124. Retrieved from <https://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=med22&AN=36407402>

20 Barakat, C. & Diba, C. (2023). Access to Information in Lebanon: The Law and Its Implementation

21 Ghosn, N., Nasredine, A., Baddour, Y. M., Coulombier, D., & Nasseridine, S. (2008). Electronic surveillance of outbreaks in Lebanon. *BMC Proc*, 2 Suppl 3(Suppl 3), S2. doi:10.1186/1753-6561-2-s3-s2

22 Kawa, N., Abisaab, J., Abiad, F., Badr, K., El-Kak, F., Alameddine, M., & Balsari, S. (2022). The toll of cascading crises on Lebanon’s health workforce. *The Lancet Global Health*, 10(2), e177-e178. doi:10.1016/S2214-109X(21)00493-9

At the Delivery Level

Surveillance reporting in Lebanon initially relied on paper-based methods, causing delays in outbreak detection due to hierarchical data flow. In 2017 the MoPH initiated the transition to a web-based electronic platform, ensure the availability of real-time information for prompt detection of alerts and outbreaks.^{16,23,17} Over time, Lebanon’s surveillance system has evolved to play a pivotal role in supplying essential data to influential decision-makers and public health experts, particularly demonstrating its significance during emergencies, such as the Polio, COVID-19 pandemic, and Cholera outbreak. Despite the digitalization of the surveillance system in Lebanon, the absence of seamless data sharing and multisectoral collaboration hindered effective pandemic responses, particularly during COVID-19. These deficiencies significantly impact the adoption of AI in healthcare. AI systems rely on high-quality, timely, and integrated data to provide accurate forecasts, trend analysis, and decision support. The absence of unified data-sharing frameworks limits AI’s potential to model disease spread, predict future outbreaks, and optimize resource allocation.

The pandemic highlighted the need for data security experts, revealing a shortage of professionals skilled in cybersecurity. Current training efforts are limited to select institutions, leaving many to rely on self-education instead of formal programs to address potential threats.¹⁸

VI. RESEARCH TAKEAWAYS

The findings reveal significant gaps in Lebanon’s health data governance, which directly impede the effective adoption and utilization of AI in healthcare. The absence of unified national strategies and comprehensive legal frameworks undermines the quality, security, and interoperability of health data, making it difficult for AI systems to function accurately. Fragmented health data, caused by siloed financing systems and weak infrastructure, prevents AI from accessing consistent, high-quality datasets essential for analysis and decision-making. Delays in digitalization, insufficient budgets, and a shortage of cybersecurity and data management experts exacerbate these challenges. The lack of seamless data sharing and multisectoral collaboration, particularly evident during the COVID-19 pandemic, underscores the urgent need for robust governance systems to enable AI-driven forecasting and resource allocation during emergencies. Additionally, the absence of formal training

23 Solidarites International. (2023). Cholera Emergency in Lebanon. Retrieved from <https://www.solidarites.org/en/live-from-the-field/emergency-cholera-au-libanon/>

and education in health data governance and AI readiness limits the workforce's ability to effectively manage and utilize emerging technologies. Without addressing these gaps, Lebanon's healthcare system will struggle to leverage AI's potential to improve outcomes and resilience.

VII. POLICY RECOMMENDATIONS

To improve health data governance and AI deployment in Lebanon, an integrated approach is essential: enforce data governance laws, establish interoperable systems for efficient data sharing, and enhance workforce skills in healthcare and data management.

» RECOMMENDATION 1:

Strengthen health data management by implementing robust laws, policies, and legal frameworks at both the national and institutional levels

» RECOMMENDATION 1.1:

Enforce comprehensive nationwide data protection laws and regulations safeguarding individuals, groups, and communities against health data-related violations and harm

Four systematic reviews and **one scoping review** concluded that it is important to establish national explicit **data protection and data security laws** that are easily understandable and cover the handling of new data collection technologies, such as contact-tracing applications.^{24,25,26,27,28}

Four systematic reviews and **one experimental case review** emphasized the **critical need to adopt data protection legislation**, such as the General Data Protection Regulation (**EU GDPR**), Health Insurance Portability and Accountability Act (**HIPAA**), and the Health Information for Economic and Clinical Health (**HITECH**) Act, to enhance data governance.^{32,33,31,29} **One scoping**

review and one literature review highlighted that achieving successful governance and data utilization must be guided by a set of principles and regulations that set **collaboration** as a pillar and integral aspect along with **infrastructure, institutional standards, and monitoring and evaluation measures**.^{30,31}

In the context of Lebanon, building robust health data governance in the country starts by gaining political support. A united front from all political factions and governmental bodies is necessary to pave the way for comprehensive data governance initiatives. These legal frameworks will not only protect sensitive data but also ensure that individuals and organizations are held accountable for potential data breaches or misuse, providing a solid foundation for transparency, trust, and accountability. The way forward in this specific matter is either to **amend Law 81/2018** to account for the loopholes regarding data protection and security or to **create a new law** that specifically addresses the protection of personal data, including health-related data.

» RECOMMENDATION 1.2:

Establish Health Data Governance Policies, Guidelines, and Standard Operating Procedures at the Institutional Level to Ensure Quality, Protection, and AI-Readiness

Two systematic reviews and **one single study** highlighted the fundamental role of establishing **robust and standardized policies and guidelines at the level of hospitals and other healthcare institutions** to secure a seamless integration of Health Information Management Systems (HIMS) and ensure the quality and protection of health-related data.^{32,33,34} These reviews also emphasized how the establishment of policies and guidelines can ensure a **comprehensive understanding of other critical pillars of health data governance**, including workforce dynamics, and strategic deployment of licensed professionals. **One literature review** emphasized that the swift integration of principles, such as the World Bank Health Data Governance principles, into organizational policies and programs enhances

24 Carrión Señor, I., Fernández-Alemán, J. L., & Toval, A. (2012). Are personal health records safe? A review of free web-accessible personal health record privacy policies. *J Med Internet Res*, 14(4), e114. doi:10.2196/jmir.1904

25 Kruse, C. S., Frederick, B., Jacobson, T., & Monticone, D. K. (2017). Cybersecurity in healthcare: A systematic review of modern threats and trends. *Technology and Health Care*, 25, 1-10. doi:10.3233/THC-161263

26 Kruse, C. S., Smith, B., Vanderlinden, H., & Nealand, A. (2017). Security Techniques for the Electronic Health Records. *Journal of Medical Systems*, 41(8), 127. doi:10.1007/s10916-017-0778-4

27 Bardus, M., Al Daccache, M., Maalouf, N., Al Sarih, R., & Elhaji, I. H. (2022). Data Management and Privacy Policy of COVID-19 Contact-Tracing Apps: Systematic Review and Content Analysis. *JMIR Mhealth Uhealth*, 10(7), e35195. doi:10.2196/35195

28 Wongsin, U., Wannasri, A., Iqbal, U., & Chen, T. Y. (2022). Data Privacy, Regulations and Legal Issues on COVID-19 Tracking Apps: A Scoping Review. *Stud Health Technol Inform*, 289, 388-391. doi:10.3233/shti210940

29 Zandesh, Z., Ghazisaedi, M., Devarakonda, M. V., & Haghghi, M. S. (2019). Legal framework for health cloud: A systematic review. *International Journal of Medical Informatics*, 132, 103953. doi:<https://doi.org/10.1016/j.ijmedinf.2019.103953>

30 Fenton, S. H., Low, S., Abrams, K. J., & Butler-Henderson, K. (2017). Health Information Management: Changing with Time. *Yearb Med Inform*, 26(1), 72-77. doi:10.15265/iy-2017-021

31 O'Connell, J., Abbas, M., Beecham, S., Buckley, J., Chochlov, M., Fitzgerald, B., . . . O'Keefe, D. (2021). Best Practice Guidance for Digital Contact Tracing Apps: A Cross-disciplinary Review of the Literature. *JMIR Mhealth Uhealth*, 9(6), e27753. doi:10.2196/27753

32 Ndabarara, E., Chipps, J. A., & Uys, L. (2013). Systematic review of health data quality management and best practices at community and district levels in LMIC. *Information Development*, 30(2), 103-120. doi:10.1177/0266666913477430

33 Pavlenko, E., Strech, D., & Langhof, H. (2020). Implementation of data access and use procedures in clinical data warehouses. A systematic review of literature and publicly available policies. *BMC Medical Informatics and Decision Making*, 20(1), 157. doi:10.1186/s12911-020-01177-z

34 Were, V., & Moturi, C. (2017). Toward a data governance model for the Kenya health professional regulatory authorities. *The TQM Journal*, 29(4), 579-589. doi:10.1108/TQM-10-2016-0092

the effectiveness and impact of data management initiatives.³⁵ **One systematic review** and **one single study** underscored the critical importance of **implementing institutional-level standard operating procedures (SOPs) for health data**, rooted in global and evidence-based standards and/or data governance frameworks, to ensure the effective collection and integration of information.^{36,37} **One systematic review, one scoping review, and three single studies** underscored the importance of **implementing and altering institutional-level health data and cybersecurity policies** to allow the effective introduction of emerging innovations, such as AI technologies.^{38,39,40,41,42}

In Lebanon, it is crucial to standardize data governance practices across various organizations, such as healthcare centers and related institutions, to establish a clear and efficient system. This standardization helps eliminate confusion and inconsistencies, creating a solid foundation for the future integration of artificial intelligence (AI) in the health sector. The MoPH can facilitate this by creating evidence-based data management guidelines, checklists, or standards for institutions to adopt, ensuring consistent and effective data governance. These guidelines could also be integrated into accreditation standards for healthcare facilities to oversee their implementation.

By establishing standardized data governance, Lebanon would be better positioned to harness the potential of AI in healthcare. AI relies on high-quality, structured, and interoperable data to function effectively. A unified approach to data management would provide AI

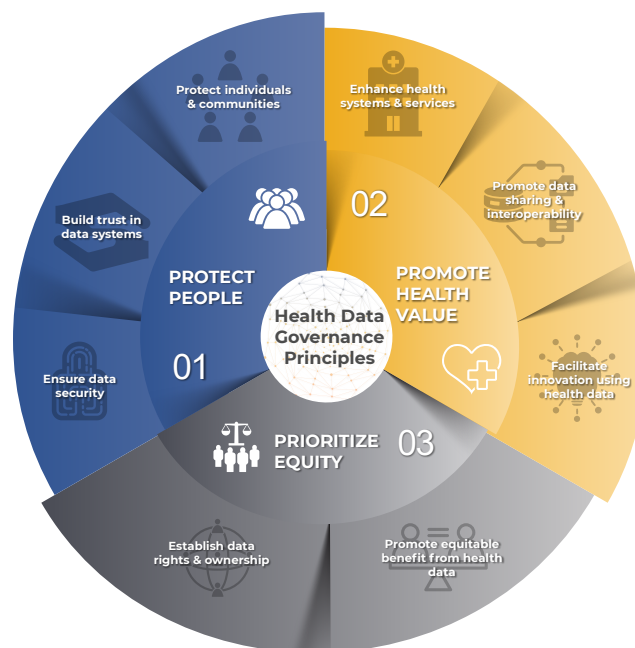


Figure 1: The Health Data Governance Principles framework.⁴³

systems with the reliable and consistent data necessary for accurate analysis, predictions, and decision-making. Moreover, standardized governance practices would enhance data security and privacy, addressing concerns around data breaches and building trust in AI-driven health solutions. Ultimately, this move towards a standardized data framework would lay the groundwork for Lebanon to integrate AI responsibly, boosting efficiency and innovation in its healthcare system.

» **RECOMMENDATION 2:**

Reinforce Data Sharing and Interoperability of Data Systems to Enhance Collaborative Healthcare Practices, Facilitate Seamless Exchange of Health Information, and enable effective AI deployment in healthcare

Four systematic reviews and **one single study** underscored the critical importance of **data interoperability in diverse contexts** emphasizing its role in decision-making, response coordination, enhancing healthcare delivery effectiveness,

35 Holly, L., Thom, S., Elzemety, M., Murage, B., Mathieson, K., & Iñigo Petralanda, M. I. (2023). Strengthening health data governance: new equity and rights-based principles. *International Journal of Health Governance*, 28(3), 225-237. doi:10.1108/IJHG-11-2022-0104

36 Alvarez-Romero, C., Martínez-García, A., Bernabeu-Wittel, M., & Parra-Calderón, C. L. (2023). Health data hubs: an analysis of existing data governance features for research. *Health Research Policy and Systems*, 21(1), 70. doi:10.1186/s12961-023-01026-1

37 van Panhuis, W. G., Paul, P., Emerson, C., Grefenstette, J., Wilder, R., Herbst, A. J., . . . Burke, D. S. (2014). A systematic review of barriers to data sharing in public health. *BMC Public Health*, 14(1), 1144. doi:10.1186/1471-2458-14-1144

38 Ali, O., Abdelbaki, W., Shrestha, A., Elbasi, E., Alryalat, M. A. A., & Dwivedi, Y. K. (2023). A systematic literature review of artificial intelligence in the healthcare sector: Benefits, challenges, methodologies, and functionalities. *Journal of Innovation & Knowledge*, 8(1), 100333. doi:<https://doi.org/10.1016/j.jik.2023.100333>

39 He, Y., Aliyu, A., Evans, M., & Luo, C. (2021). Health Care Cybersecurity Challenges and Solutions Under the Climate of COVID-19: Scoping Review. *J Med Internet Res*, 23(4), e21747. doi:10.2196/21747

40 Jalali, M. S., & Kaiser, J. P. (2018). Cybersecurity in Hospitals: A Systematic, Organizational Perspective. *J Med Internet Res*, 20(5), e10059. doi:10.2196/10059

41 LeRouge, C., & Garfield, M. J. (2013). Crossing the telemedicine chasm: have the U.S. barriers to widespread adoption of telemedicine been significantly reduced? *Int J Environ Res Public Health*, 10(12), 6472-6484. doi:10.3390/ijerph10126472

42 Tran, D. M., Thwaites, C. L., Van Nuil, J. I., McKnight, J., Luu, A. P., & Paton, C. (2022). Digital Health Policy and Programs for Hospital Care in Vietnam: Scoping Review. *J Med Internet Res*, 24(2), e32392. doi:10.2196/32392

43 The World Bank's Health Data Governance Principles (<https://healthdatagovernance.org/principles/>), revisualised

and fortifying health data governance.^{44,45,46,47,48} **One comparative health analysis** revealed that enhancing interoperability can **improve accessibility, continuity, and comprehensiveness of primary health care**, and hence, improve patient health and equity.⁴⁹ **One systematic review** and **one single study** discussed the increased **need for interoperability in supporting seamless health-care service processes**, particularly in sharing medical health data for disease monitoring and understanding health-related behaviors.^{50,55}

Adopting a unique identifier for every citizen in the health sector is a cornerstone for enhancing data sharing and interoperability across the different institutions in Lebanon. This approach not only streamlines data management and enhances public service delivery but also presents a significant opportunity for leveraging artificial intelligence (AI). AI systems thrive on high-quality, consistent, and interconnected data sources to generate insights, predict trends, and improve healthcare outcomes. A unique identifier system would provide AI with a unified and comprehensive dataset, enabling more accurate patient tracking, personalized healthcare recommendations, and efficient resource allocation. In this way, enhancing interoperability through unique identifiers would pave the way for more advanced AI applications, driving innovations in disease prediction, treatment optimization, and overall health system efficiency in Lebanon.

» **RECOMMENDATION 3:**

Enhance the knowledge, education, and capacities of healthcare providers, IT and analyst workforce, and data handling personnel to promote efficiency, integrity of health data management and effective AI utilization

Two systematic reviews and one scoping review presented the significance of **educational and behavioral change interventions targeting health data management and cybersecurity awareness**, such as training programs and capacity-building workshops for healthcare professionals, IT, and data handling personnel.^{47,51,52} **Two single studies** demonstrated that **robust capacity-strengthening and mentorship interventions** can transform staff's views and perceptions towards data governance, leading to enhanced health data quality which, in turn, holds the potential to elevate the standard of patient care.^{53,54} **Two single studies** emphasized that implementing **comprehensive and mandatory health data management training in health-care settings** can enhance motivation and confidence to use and properly handle health data, build a culture of information use, and promote efficient management of resources.^{55,56} **Four literature reviews and one single study** collectively revealed the necessity for **curriculum changes and program enhancements in university settings** to align with the evolving landscape of health data management and AI deployment in the health sector.^{57,58,59,60,61}

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In the context of Lebanon, continued professional development and awareness initiatives are imperative for strengthening data governance practices among the healthcare workforce. This could be achieved through training sessions, diplomas, and workshops. Additionally, integrating data governance topics into the curricula of medical and healthcare-related academic programs would ensure that new graduates are equipped with the necessary knowledge and skills from the outset of their careers. Furthermore, enhancing the capacity of the workforce will enable them to effectively leverage AI technologies. Strengthening these competencies will lead to improved healthcare delivery, better patient outcomes, and a more innovative healthcare system.



Implementation Considerations

Table 1. Implementation Considerations and Respective Counterstrategies

LEVEL	BARRIER	FACILITATOR	REC.
SYSTEM	Data governance is not viewed as a priority in the country	Strategic stakeholder collaboration to prioritize data governance. ⁶²	1, 2, 3
	Lack of harmonization in laws	Legal audits to align laws and regulations. ^{63,64,65}	1,2
	Poor collaboration among stakeholders.	Establish structured coordination mechanisms. ⁶⁶	1,2
	Absence of a unified identification system.	Implementing a standardized national identification system. ^{72,67,68}	2
	Limited standardized data formats and protocols for data sharing	Develop and enforce robust data interoperability standards and protocols. ^{69,70}	2
	Lack of clear delineation of responsibilities and communication channels.	Assigning a centralized body or committee to oversee, mediate, and facilitate data governance initiatives. ⁷¹	1, 2
ORGANIZATION	Insufficient awareness of the importance of health data governance.	Providing training and educational programs for healthcare professionals and data-handling staff. ^{72,73}	1, 3
	Resource constraints for capacity-building programs for data management in healthcare settings.	Integrate training into policies and seek external funding. ^{11,74,79}	3
	Healthcare institutions resistance to new data protection regulations and policies.	Offer incentives for compliance. ⁷⁵	1

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ORGANIZATION (CONTINUED)	Effective development and enforcement of institutional-level data governance policies.	Establishing a data governance council at the level of institutions. ⁷⁶	1
	Limited digitalization in healthcare centers.	Implement a phased national digitalization plan. ^{11,77}	2
	Poor implementation of data-related policies, guidelines, standards, and best practices.	Continuous monitoring and evaluation efforts. ⁷⁸	1
COMMUNITY	Lack of public awareness of health data governance .	Conduct awareness campaigns. ⁷⁹	1
	Public mistrust in data protection measures	Engage communities in developing laws to build trust. ⁸⁰	1

Next Steps

This Policy Report aims to foster dialogue informed by the best available evidence. Further actions will flow from the deliberations that the policy report is intended to inform. These may include:

- Deliberation amongst policymakers and stakeholders regarding the recommendations described
- Refining recommendations, for example by incorporating, removing, or modifying some components based on the results from the stakeholder dialogue.

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