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PLAN OF ACTION FOR STRENGTHENING INFORMATION SYSTEMS FOR HEALTH 2019–2023: FINAL REPORT

Background

1.   This final report on the Plan of Action for Strengthening Information Systems for Health 2019–2023 (Document CD57/9, Rev. 1 and Resolution CD57.R9) *(1, 2)* reviews the plan's achievements and challenges over its 4-year implementation. Examining the plan's 4 strategic lines of action, the report evaluates progress toward targets, assesses effective strategies and methodologies, and identifies unmet objectives. It also provides insights on lessons learned and best practices that can guide future initiatives on information systems for health (IS4H).

2.   A maturity assessment of IS4H, the first of its kind in the Region, was carried out by the Pan American Health Organization (PAHO) in all countries of the Americas between 2016 and 2023.[1] Using over 240 standardized indicators, the evaluation assessed national health information systems with respect to governance, strategy, laws, financial sustainability, human resources, data management and quality, analysis capabilities, information flows, project management, and information technology (IT) infrastructure. Information for the assessment was gathered through country visits, expert consultations, database and gap analyses, and reviews of policies, procedures, and technical documentation. Site visits allowed for direct observation of information platform use and interoperability, especially in primary care, and for data collection and interviews with frontline administrative and clinical staff. A comprehensive report on the regional IS4H maturity assessment will be published in late 2024.

3.   The regional maturity assessment of IS4H found that 42.8% of the countries are at level 1, "building awareness." These countries are characterized by early adoption of health information systems, with mostly analogue data and a growing recognition of the need for digitalization. With very limited capacity to generate health indicators data and guarantee the quality of data, they depend largely on international organizations in this regard. Investments in digital health have often not expanded infrastructure as expected due to gaps in access to electricity and connectivity as well as a lack of long-term planning and sustainable financing. A third of the countries, 34.7%, have reached level 2, "implementing best practices." They are developing their health information systems with data from various sources and managing health information effectively. However, they face challenges such as incomplete development of indicators, insufficient data exchange, and limited implementation of data standards and public health communication strategies. Another 18.4% have

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[1] The Maturity Assessment Levels: Information Systems for Health is available at: https://iris.paho.org/handle/10665.2/54962. Results of the recent Region-wide assessment are available in internal PAHO documents but have not been published.

reached level 3, "standardization and continuous improvement," reflecting advances in IS4H policies and strategies and the use of high-quality data for decision-making. Only 4.1% of countries are at level 4, "integration and alignment," marked by highly integrated information systems that are aligned with national and international standards. No country in the Region has reached level 5, the maximum maturity level in IS4H, implying a complete deployment of all components of the model and a constant search for innovation.

Analysis of Progress Achieved

4.   From 2019 to 2023, initiatives for improving IS4H across the 4 strategic lines of action have driven significant advances toward set targets. These efforts have focused on improving governance mechanisms, maturity assessments, regulatory frameworks, and health information architecture, and they have achieved substantial progress in enhancing data-driven health strategies regionally. The establishment of monitoring and evaluation frameworks, interinstitutional committees, and national policies for electronic health records with open data has been crucial. Significant advances include the adoption of governance mechanisms by 17 countries and territories, exceeding the target; use of the PAHO model for maturity assessment by 49 countries and territories; and the establishment of regulatory frameworks and health information architecture by numerous countries and territories. Initiatives in data management and information technologies include the adoption of Fast Healthcare Interoperability Resources (FHIR) and ICD-11 standards by 17 countries and territories, as well as progress in electronic health records implementation, moving toward a more unified and efficient health data management model. Additionally, engagement with academic and professional communities and networks has strengthened health analysis and knowledge management, while innovations such as the PAHO telehealth platform indicate a shift toward a more integrated approach for the co-creation of health-focused digital public goods. These advances reflect broad progress toward robust, data-informed public health strategies and policies, demonstrating an important commitment to improving health outcomes and operational efficiencies within all Member States.

5.   The following section reports on implementation of the IS4H plan of action in 2019–2023. The assessment of indicators for each strategic line of action follows the criteria for rating outcome and output indicators at regional level as presented in Annex B of Addendum I to the Report of the End of Biennium Assessment of the PAHO Program and Budget 2018–2019/Final Report on the Implementation of the PAHO Strategic Plan 2014–2019 (Document CD58/5, Add. I) *(3)*. Sources of information for this final report include the results of the maturity assessments conducted in all countries and territories, information from open government portals and datasets, and a compilation of research and available information from other sources.

Strategic Line of Action 1: Information system management and governance

6.   Collective efforts along this strategic line since 2019 have resulted in significant progress toward the 2023 targets. Governance mechanisms, maturity assessments, regulatory frameworks, and health information architecture have all seen substantial improvements. The establishment of monitoring and evaluation frameworks, interinstitutional committees, and national policies for electronic health record portals with open data has contributed to this success. The implementation of national strategies for health data governance and the introduction of methods for analyzing unstructured data underscore a global shift toward robust, data-driven health strategies.

This overarching progress reflects a strong commitment to fortifying governance mechanisms, which is essential for improving public health outcomes.

Objective 1.1: Strengthen the management and governance mechanisms of information systems for health	
Indicator, baseline, and target	**Status**
1.1.1 Number of countries and territories that have implemented a governance mechanism (policy, plan of action, or strategy) for information systems for health Baseline (2019): 5 Target (2023): 10	**Exceeded.** As of 2023, 17 countries and territories have met the indicator. For example, the Bahamas and Jamaica implemented national IS4H units as part of their ministry of health organizational structure. Brazil established an Information and Digital Health Secretariat at the Ministry of Health.
1.1.2 Number of countries and territories that have used the PAHO model to determine the maturity of their information systems Baseline (2019): 5 Target (2023): 15	**Exceeded.** As of 2023, 49 countries and territories have used the PAHO model to determine the maturity of their information systems. The model was also used by the Inter-American Development Bank and the World Bank in several national workshops.
1.1.3 Number of countries and territories that have a regulatory framework that supports the use, management, and exchange of data and information through electronic media and addresses the aspects of dissemination, access, privacy, ethics, interoperability, and domain or property Baseline (2019): 0 Target (2023): 10	**Achieved.** As of 2023, 9 countries and territories have a regulatory framework that supports information systems interoperability and digital health implementation. Countries are updating several normative instruments, with a focus on telehealth and artificial intelligence.
1.1.4 Number of countries and territories that have developed their health information architecture with emphasis on the flow and processing of relevant data for the health sector Baseline (2019): 0 Target (2023): 10	**Partially achieved.** As of 2023, 8 countries and territories have developed national health information architecture, including subsystems such as civil registration and vital statistics and mortality surveillance architecture. Special attention was given to the digital documentation of COVID-19 vaccine certificates.
1.1.5 Number of countries and territories with a monitoring and evaluation framework for their information systems for health Baseline (2019): 0 Target (2023): 10	**Exceeded.** As of 2023, 20 countries and territories are formally monitoring their information systems for health based on the PAHO IS4H maturity assessment tool and framework.

Objective 1.1: Strengthen the management and governance mechanisms of information systems for health	
Indicator, baseline, and target	**Status**
1.1.6 Number of countries and territories with an interinstitutional committee for implementation of information systems for health Baseline (2019): 2 Target (2023): 10	**Achieved.** As of 2023, 9 countries and territories have implemented a national committee for implementation of information systems for health and digital health.
1.1.7 Number of countries and territories that have adopted national policies and created government or private sector electronic health record (EHR) portals with open data for health Baseline (2019): 15 Target (2023): 19	**Exceeded.** As of 2023, 25 countries and territories are uploading health-related datasets within national open data portals.
1.1.8 Number of countries and territories that have implemented a national health data governance strategy or policy for continuous quality assurance, security, and confidentiality of data Baseline (2019): 0 Target (2023): 10	**Partially achieved.** As of 2023, 8 countries and territories have updated regulatory frameworks that consider quality assurance, security, and confidentiality of data.
1.1.9 Number of countries and territories that have introduced methods and tools for the analysis of unstructured data for the benefit of public health Baseline (2019): 0 Target (2023): 10	**Partially achieved.** As of 2023, 5 countries and territories report using methods and tools for the analysis of unstructured data. However, several universities in the Region are exploring artificial intelligence algorithms for big data analysis in relation to behavioral insights in public health.
1.1.10 Number of countries and territories that report data disaggregated by age group, sex, and ethnicity at the national and subnational levels Baseline (2019): 4 Target (2023): 15	**Exceeded.** As of 2023, 33 countries and territories report data disaggregated by age group and sex, and 16 countries and territories reported data disaggregated by ethnicity, at the national and subnational levels.

Strategic Line of Action 2: Data management and information technologies

7.   This strategic line, which promotes interconnected, interoperable information systems, has seen important progress. Three targets—for the introduction of standards for data exchange, the setting of standards for new information and communication technologies, and the development of tools to describe and manage health data more effectively—were exceeded. While the implementation of national electronic health records systems has not fully met the target, significant progress was made. These advances by Member States represent a strong move toward a more unified and efficient regional health data management system.

Objective 2.1: Promote the development of interconnected and interoperable information systems	
Indicator, baseline, and target	**Status**
2.1.1 Number of countries and territories that have introduced standards to facilitate the interoperable exchange of data (e.g., Fast Healthcare Interoperability Resources – FHIR) Baseline (2019): 10 Target (2023): 15	**Exceeded.** As of 2023, 17 countries and territories have introduced standards to facilitate the interoperable exchange of data (e.g., FHIR). Special attention was given to the SMART Guidelines —Standard-based, Machine-readable, Adaptive, Requirements-based and Testable—initiative and to the implementation of the Events Supposedly Attributable to Vaccination or Immunization (ESAVI) platform.
2.1.2 Number of countries and territories that have set standards for the introduction of new information and communication technologies Baseline (2019): 10 Target (2023): 15	**Exceeded.** As of 2023, 20 countries and territories have introduced standards for the introduction of new information and communication technologies.
2.1.3 Number of countries and territories with a national electronic health records system (for at least the public health sector) based on the use of unique identification numbers or patient matching utilizing health information technology Baseline (2019): 10 Target (2023): 18	**Partially achieved.** As of 2023, 13 countries and territories have implemented an electronic health records system (for at least the public health sector) based on the use of unique identification numbers.
2.1.4 Number of countries and territories that have developed or introduced a tool (data dictionary) to describe the type of data compiled in a database, their format and structure, and how they are used in the health system Baseline (2019): 2 Target (2023): 10	**Exceeded.** As of 2023, 30 countries and territories have described metadata for the management of core health indicators and other related data sources.
2.1.5 Number of countries and territories with formal standard operating procedures for secure access to data for health organizations (public and private) that allow patients to securely access their health data Baseline (2019): 2 Target (2023): 10	**Achieved.** As of 2023, 10 countries and territories report using standard operating procedures for secure access to data for health organizations.

Strategic Line of Action 3: Information and knowledge management

8.   This strategic line has seen significant progress. While the goal of documenting and sharing knowledge on information system implementation was met, the involvement of academic institutions

and professional associations in national committees has greatly exceeded expectations. Additionally, participation in communities of practice for creating inclusive information services has nearly reached the target, reflecting a strong commitment to integrating vulnerable populations into IS4H. On this objective, Member States are showing a commitment to data-driven policy- and decision-making.

Objective 3.1: Promote the production and exchange of technical and scientific information to support the operation of information systems	
Indicator, baseline, and target	**Status**
3.1.1 Number of countries and territories that have adopted methodologies to document lessons learned, experiences, and good practices, and to promote the sharing of knowledge about the implementation of information systems Baseline (2019): 5 Target (2023): 10	**Achieved.** As of 2023, 10 countries and territories are documenting lessons learned, experiences, and good practices related to implementation of IS4H. PAHO launched a new platform in 2023, and countries are starting to document good practices related to telehealth programs.
3.1.2 Number of countries and territories in which academic institutions or professional associations participate in national committees to support the implementation of information systems for health Baseline (2019): 2 Target (2023): 5	**Exceeded**. As of 2023, 15 countries and territories report that academic institutions or professional associations are participating in national committees to support the implementation of IS4H. Through the Technical Support Facility for the Caribbean, the University of the West Indies is actively participating in strategic discussions related to IS4H implementation.
3.1.3 Number of countries and territories that participate in communities of practice to create information services or resources, ensuring that populations in conditions of vulnerability are taken into consideration Baseline (2019): 0 Target (2023): 10	**Achieved.** As of 2023, 10 countries and territories have participated in the co-creation of policy briefs and tools for supporting information systems. A special focus was the development and adoption of the All-in-ONE telehealth platform at the first level of care. A community of practice on ICD-11 was established with 14 countries and territories in the Caribbean.

Strategic Line of Action 4: Innovation, integration, and convergence

9.   Actions by Member States under Objectives 4.1 and 4.2 have led to notable advances in the digital transformation of the health sector across the Region. A network of countries has been successfully established to promote the adoption of digital health solutions and information systems. This collaborative effort has resulted in the introduction of models and digital public goods that facilitate this transformation. Additionally, the health sector's active participation in e-government initiatives reflects a broader commitment to optimizing technology infrastructure and converging current initiatives for a more efficient and integrated approach to health information management. Highlights of this strategic line of action include adoption of emerging technologies for personalized patient care, partnerships with financial, technical, and academic institutions for technological

advances, and piloting of innovative digital health solutions like PAHO's telehealth platform and digital COVID-19 vaccine certificates.

Objective 4.1: Establish a network of institutions and experts to advise PAHO and the Member States on the introduction of innovative models for the development of information systems	
Indicator, baseline, and target	**Status**
4.1.1 The Member States have formed a network to ensure the introduction of models and technologies that facilitate digital transformation in the health sector Baseline (2019): 0 Target (2023): 1	**Exceeded.** As of 2023, 32 countries and territories are participating in the RELACSIS Network, which focuses on digital health solutions and information systems, and 29 countries and territories are part of the Family of International Classifications (FIC) regional network.
4.1.2 The Member States have a standardized monitoring and evaluation framework consisting of a set of key performance indicators (KPIs), as well as key objectives and outcomes for establishing, communicating, and periodically monitoring targets and outcomes in the implementation of information systems for health Baseline (2019): 0 Target (2023): 1	**Exceeded.** As of 2023, 17 countries and territories are using a standardized framework for monitoring and evaluation of key performance indicators. Special attention was given to KPIs on standards for interoperability.
4.1.3 Number of countries and territories in which the health sector formally participates in e-government initiatives, including the introduction of standards for national use and global use (e.g. SNOMED), the optimization of investments in technology infrastructure, and the convergence of current initiatives and investments Baseline (2019): 4 Target (2023): 10	**Exceeded.** As of 2023, the health sector in 20 countries and territories is formally participating in e-government initiatives or national projects within the scope of the digital transformation of the health sector. Another 33 have participated in training on ICD-11 implementation.
Objective 4.2: Improve human resource training in all aspects of information systems for health	
Indicator, baseline, and target	**Status**
4.2.1 Number of countries and territories with ongoing professional training strategies or digital literacy programs for the use of new technologies Baseline (2019): 4 Target (2023): 5	**Exceeded.** As of 2023, 27 countries and territories are participating in digital literacy programs, including training sessions led by PAHO and other academic or research institutions. Special interest was shown in the virtual course on telehealth for noncommunicable diseases, developed by PAHO and available through the PAHO Virtual Campus for Public Health.

Lessons Learned

10.   An after-action review with Member States identified key lessons across the 4 strategic lines of the IS4H plan:

a)   *Information system management and governance:* These processes need to be strengthened through the development of guiding principles, policies, and official governance mechanisms for policy-making and decision-making on information management.

b)   *Data management and information technologies:* Steps should be taken toward the rapid adoption of international standards for data management and interoperability.

c)   *Information and knowledge management:* There is a need to improve and promote these practices by implementing ongoing digital literacy programs to enhance human resource skills within the information society.

d)   *Innovation, integration, and convergence:* Efforts should focus on increasing the maturity level of countries' health information systems by identifying gaps and needs as well as on effectively integrating the health sector into initiatives on e-government and digital transformation of government.

Action Needed to Improve the Situation

11.   In light of the achievements and challenges described in the present report, the following actions are presented for consideration by Member States:

a)   Further strengthen health information systems across all care levels, continue to engage ministries of health within e-government initiatives. A multisectoral and interdisciplinary approach should be used to adopt international standards for data management and platform interoperability.

b)   Assess and develop data architecture as part of digital health implementation, incorporating the implementation of ICD-11 as part of interoperability. The first step is for each country and territory to conduct an assessment of its health information systems to evaluate readiness for ICD-11 implementation. They can then begin the process of building preparedness for a gradual transition to ICD-11, considering factors such as data migration, software adaptation, and workforce training.

c)   Ensure that the digital transformation of the health sector is aligned with national public health strategies to promote universal access, improve patient services, and advance health equity. To ensure multi-stakeholder engagement, Member States should create collaborative platforms that bring together government, health care professionals, patient advocacy groups, technology firms, and academia to develop a digital health infrastructure.

d)   Implement a comprehensive and holistic digital literacy program for public health workers, health providers, and IT professionals to improve digital skills and competencies, focusing on the use of information systems, platforms, emerging technologies, data privacy, and security practices.

e)   Implement data privacy and security protocols by adopting best cybersecurity practices in the health sector. This includes conducting routine health information and data system audits and setting clear guidelines for data access and sharing.

Action by the Executive Committee

12.   The Executive Committee is invited to take note of this report and provide any comments it deems pertinent.

References

1.   Pan American Health Organization. Plan of action for strengthening information systems for health 2019–2023 [Document CD57/9, Rev. 1]. 57th PAHO Directing Council, 71st Session of the Regional Committee of WHO for the Americas; 30 September – 4 October 2019. Washington, D.C.: PAHO; 2019. Available from: https://iris.paho.org/handle/10665.2/51617.

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