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## FRAMEWORK FOR INTEGRATING COUNTRY AND REGIONAL HEALTH DATA IN THE AFRICAN REGION: REGIONAL HEALTH DATA HUB 2024-2030

### EXECUTIVE SUMMARY

1.      The use of health data as the foundation for evidence-based decision-making has been central to WHO's mission at the three levels of the organization. Currently, there are more technological innovations to harness the power of data. In the past decade, remarkable efforts have been made by WHO, partners, and Members States to improve data tools/systems, and data utilization for evidence-based decision-making.

2.      Progress is however uneven, with disparities in country capacities for health data collection, integration, sharing, and access. The WHO triple billion targets and SDGs have underscored the need to have access to timely, integrated and reliable data for evidence-based decision-making and monitoring progress. Moreover, utilisation of data for health interventions remains suboptimal inadequate capacities, incomplete, fragmented or untimely data. These access and quality concerns hindering evidence-based decision-making.

3.      Furthermore, with the proliferation of siloed data management systems, has caused data to become more fragmented, with data collection, storage and analysis typically stored in different stand-alone formats and platforms that are not interoperable. This hinders the effective use of information and limits the understanding interrelated relationships among interventions, health outcomes, and impacts.

4.      Meanwhile, countries in Africa and elsewhere in the world are progressively adopting new technologies, digital tools and other emerging technologies such as cloud computing, web-based data management systems and other innovations. In addition, there is also a marked interest in the use and application of Artificial Intelligence (AI) tools big data and Machine Learning (ML) in the health sector. Whilst these developments to better understanding how health outcomes can be improved.

5.      There are immense opportunities to leverage and use new technologies and AI for early warning systems, predictive analyses, precision public health and other advanced analytics. Data use and increased application of AI tools however come with significant risks, including concerns about data security, data sharing, and privacy. Although, some countries in the region have developed guidelines and protocols on health data governance and regulations, regional and in country data governance systems are weak and need review with the technological advancements.

6.     This framework recognises the critical importance of these concerns and will develop; (i) a Regional Health Data Governance Protocol to address these risks and ensure the responsible use of health data (ii) the Regional Health Data Hub (RDHub) to address data fragmentation, and enable efficient, effective and convenient access to data, data systems and platforms by ensuring interoperability across data systems. Additionally, it will serve as a gateway to other data systems, platforms or hubs that can be accessed through a link in the RDHub.

7.     The Hub is designed to be house priority data sets in the region, and also designed to connect national data to the regional office, in accordance with agreed data sharing protocols. The Data Hub team at the Regional Office will support member states on request to further develop national repositories to enhance data accessibility, improve data management, and facilitate more effective analysis and decision-making across the region.

8.     This framework provides an overview of the WHO Regional Health Data Hub as a central repository for regional health data and analytics to better harness the power of Africa's data for improved health outcomes.

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## ABBREVIATIONS

| | |
|---|---|
| AI | Artificial Intelligence |
| API | Application Programming Interface |
| DHIS | District Health Information Software, version 2 |
| DLS | Diagnostic and Laboratory Services |
| EHR | Electronic Health Records |
| EMR | electronic medical records |
| ETL | extract, transform, and load |
| ELT | extract, load, and transform |
| EWS | early warning system |
| GS4DH | Global Strategy for Digital Health |
| iAHO | Integrated African Health Observatory |
| ICT | information and communications technology |
| IDSR | Integrated Disease Surveillance and Response |
| MoE | Ministry of Education |
| MoH | Ministry of Health |
| ML | machine learning |
| NHO | National Health Observatory |
| ODK | Open Data Kit |
| RDHub | Regional Health Data Hub |
| SDG | Sustainable Development Goal |
| UCN | Universal Health Coverage/Communicable and Noncommunicable Diseases Cluster |
| UHC | universal health coverage |
| WHA | World Health Assembly |
| WHO AFRO | WHO Regional Office for Africa |

**INTRODUCTION**

1.      COVID-19 highlighted limitations in data timeliness, completeness, quality, harmonization, access and sharing. Effective implementation of health programmes with the desired level of outcomes and impact requires the availability of health information for identifying gaps, monitoring progress and taking evidence-based action. WHO AFRO, in collaboration with Member States, has been providing information for evidence-based decision-making and building capacity of countries in information management. A key component of health data systems strengthening is integration, which includes harmonization of data management systems to minimize vertical and siloed approaches to promote sustainability, efficiency and effectiveness at national and subnational levels.

2.      However, fragmentation persists in health data due to the lack of integrated and harmonized systems for data collection and management and proper data governance. Fragmentation of data which sits in different programmes and areas of work with little connection to other health data also presents challenges for understanding health profiles.[1]

3.      Member States have endorsed Global and Regional level resolutions that propose mechanisms for addressing the challenges of fragmentation data integration and improved use of data for evidence-based decision-making (WHA71.7,[2] WHA66.24,[3] GS4DH,[4] AFR-RC71-10[5]). Some Member States, including Rwanda, Nigeria, Kenya, and Ethiopia have put mechanisms to address data fragmentation and integrate health data. In addition, the African Regional Office established the African Health Observatory (AHO) in 2010.[6]

4.      In addition to these efforts, a Regional Health Data Hub, developed using latest technological tools with interoperability and data exchange capability, promises to better address fragmentation and drive data integration in the Region. The Regional Health Data Hub will rely on cloud-based technology to house data, enabled by an interoperable data system that integrates different formats for data collection, storage and analytics. This will facilitate data use by countries and other stakeholders in the African Region. In addition, the Regional Health Data Hub will be interoperable with the Global Health Data Hub, which is currently in advanced stages of development by WHO Headquarters. Both platforms share the same vision of enhancing data accessibility and usage for evidence-based decision-making.[7]

5.      This framework provides an overview of the WHO Regional Health Data Hub as a central repository for regional health data and analytics to better harness the power of Africa's data for improved health outcomes. It aims to address the prevalent issues of data fragmentation, barriers to information access, and under-utilization of data. Further, the data governance framework

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[1]   World Health Organization. (2020). Digital health platform handbook: building a digital information infrastructure (infostructure) for health.
      (https://iris.who.int/bitstream/handle/10665/337449/9789240013728-eng.pdf, accessed 15 April 2024).
[2]   WHA71.7 - Seventy-First World Health Assembly – Digital Health, 26 May 2018
      (https://iris.who.int/bitstream/handle/10665/279505/A71_R7-en.pdf?sequence=1, accessed 15 April 2024).
[3]   World Health Organization. Sixty-sixth World Health Assembly wha66. 24. Agenda item 17.5 27 May 2013 eHealth standardization and interoperability.
      (https://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R24-en.pdf, accessed 15 April 2024).
[4]   World Health Organization. (2021). Global strategy on digital health 2020–2025. Global strategy on digital health 2020-2025 WHA73(28)
[5]   AFR/RC71/10 - Framework for implementing the Global strategy on digital health in the WHO African Region.
      (https://www.afro.who.int/sites/default/files/2021-11/AFR-RC71, accessed 15 April 2024)
[6]   WHO 2018. The African Health Observatory. (http://www.aho.afro.who.int/, accessed 15 April 2024).
[7]   Global Health Data Hub: (https://www.who.int/news-room/feature-stories/detail/who-releases-data.who.int, accessed 15 April 2024).

emphasizes data accessibility, data sharing, data security, and ethics in the use of the integrated data hub and advanced analytics, including AI.

**CURRENT SITUATION**

6.      Currently, many data management systems, technologies and platforms are being used by countries in the WHO African region for data collection, storage, analysis, and use. District Health Information Systems (DHIS2) is the most widely implemented data management system in the African Region that plays an important role towards bringing data together. However, not all countries are using DHIS2 as a single data management system. The country-level tools in this heterogeneous ecosystem range from stand-alone and off-line to centralized web-based systems, which make data harmonization and integration a daunting task.

7.      Moreover, in some programmes of work, there is a lack of dedicated systems for managing data, with heavy dependence on spreadsheets and manually generated situation reports. Some thematic areas have difficulty in generating data from Member States due to limited or unavailable systems. In several Member States, the current data collection practices at the national level are using different platforms that are fragmented. For instance, the data management systems for surveillance and other programmes are different and non-interoperable. Each programme reports/shares programme-specific data to the WHO AFRO independently, leading to a duplication of efforts and inefficiencies.

8.      At the regional level, each cluster therefore, has its own data management system to consolidate data from countries, analyse and provide programme-specific evidence for decision-making. These include data from laboratory diagnostics, as well as information on Antimicrobial Resistance (AMR) captured through systems like the Global Antimicrobial Resistance and Use Surveillance System (GLASS). Additionally, the regional office manages DHIS2 data, covering a broad spectrum from Neglected Tropical Diseases (NTDs) to malaria, tuberculosis (TB), HIV, and Non-Communicable Diseases (NCDs). It also contains data on vaccine-preventable diseases, emergencies, and the Expanded Programme on Immunization (EPI). Also, datasets on child and maternal health, Integrated Disease Surveillance and Response (IDSR), epidemiological intelligence services, and information regarding the health workforce and other health services are maintained. Geographical data are also included alongside numerous other datasets vital for informed decision-making in public health.

9.      There has been remarkable effort to integrate data at national and at the regional office and to support countries to automate their data management system. Since 2010, there has been an unprecedented harmonization of electronic health data management platforms, especially the DHIS2.[8] WHO AFRO, in collaboration with other partners, has supported most Member States in the use of DHIS2 and building capacity on its use.

10.     In addition, the integrated African Health Observatory (iAHO) a knowledge management platform which hosts National Health Observatories (NHOs),[9] consolidates indicator-based data from surveys, census, programmes, publications and other data sources. This platform has been instrumental in disseminating knowledge products and serves as a vital resource for sharing latest research, best practices, and factsheets on key health-related issues.

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[8]      (https://www.researchgate.net/publication/341872667_Routine_data_for_malaria_morbidity_estimation_in_Africa_Challenges_and_prospects/link/, accessed 15 April 2024).

[9]      https://www.afro.who.int/sites/default/files/sessions/resolutions/afr-rc62-r5-Opportunity-for-strengthening-health-information-systems-through-national-health-observatories.pdf, accessed 15 April 2024).

11.     Some data systems at the national level and within WHO AFRO currently lack essential tools for data discovery, such as metadata searching and data flow alerts. This hinders optimal information accessibility and ultimately restricts efficient data utilisation. This limitation stems from: (1) the reliance on legacy data systems in some areas of work; (2) the use of siloed and unstandardized local files and spreadsheets; and (3) the lack of a standardized metadata and versioning structure. Overall, the current data landscape within WHO AFRO and its Member States paints a clear picture of data fragmentation, limited sharing and accessibility, and limited utilisation of data for evidence-based decision-making. This fragmented data environment poses significant challenges to monitor health equity and improve health outcomes across the African region.

12.     Thus, there is a need at regional level to establish a data hub that integrates and harmonizes all data into one platform along with a data governance framework to harness the maximize the use of data at all levels while ensuring security of the data.

## ISSUES AND CHALLENGES

13.     **Lack of a coherent data governance structure:** the African region lacks robust and extensive data governance structures for regulating availability, usability, integrity, and security of data. In some countries, the data governance frameworks that do exist lack coherence in terms of principles, scope, and accountability. Thus, the absence of standardised rules to safeguard data access, sharing, use and security, contributes to the challenges of data availability, accessibility and use.

14.     **Lack of data standardization tools:** in the African region's Member States, standards and interoperability of data management systems are not consistently nurtured. There are distinct data management systems for different programmes that are not interoperable. This limits progress toward data integration and the maximum utilisation of data for triangulation.

15.     **Data acquisition and storage:** collecting data from Member States remains a hurdle. Use of different online and offline data reporting methods by countries create inconsistencies, making data integration and acquisition difficult for both routine and emergency programmes. Additionally, the lack of a single, interoperable data repository leads to fragmented datasets stored across various programmes.

16.     **Under-utilised data:** valuable data often goes unused or underused due to several factors. In many instances, for example, immunisation data is analysed independently and not triangulated with other data sets such as surveillance and outbreak data to assess the effectiveness of immunisation. This underutilisation weakens efforts to promote data-driven decision-making and hinders transforming of data into actionable insights. The scope of data being collected is also limited to health and as a result, useful socioeconomic and environmental data such as weather, education, agriculture, and animal data are not consistently integrated.

17.     **Inadequate capacity for data use and analysis:** low health data utilisation has been significantly hampered by inadequate capacity for conducting analytics. Strengthening personnel capacity through training and investing in analytical tools is crucial for effective generating insights and evidence-based information which is crucial for informed decision-making.

18.     **Silos and fragmentation:** the current fragmented approach to data collection and reporting leads to duplication of efforts and limited use of data. For example, health facilities in some countries receive separate data requests from the Ministry of Health, the National AIDS Control Council, and the Expanded Programme on Immunization for similar information. Additionally, using different systems for national reporting (e.g., DHIS2) and hospital records (e.g., EMRs)

creates additional work, as data need manual transfer between systems, increasing risk of error. This duplication results in conflicting data, wasted resources, and potentially divergent public health recommendations.

19.     **Limited data sharing and accessibility:** despite the availability of data, the absence of data governance protocols and an integrated data hub hinders access and sharing, limiting comprehensive analysis and informed decision-making. For example, a robust infectious disease data system in the Ministry of Health contrasts with the Ministry of Education's lack of similar data for school absenteeism.

20.     **Limited use of artificial intelligence tools (AI) and advanced analytics:** there is a gap between promoting advanced analytics (e.g., predictive/prognostic modelling, Machine Learning (ML), and AI, etc.) and its actual use in Africa. This gap can be attributed to factors like the low perceived usefulness of advanced analytics, limited accessibility to the integrated data sets, limited capacity and slow adaptation to a changing technological landscape.

## VISION, GOAL, OBJECTIVES, MILESTONES AND TARGETS

21.     **Vision**: transforming the African Region's data and digital landscape by providing integrated, timely, and high-quality access to regional data, thereby enhancing evidence-based decision-making.

22.     **Goal:** develop an integrated WHO Regional Health Data Hub that catalyses digital transformation, ensuring the availability of health data.

23.     **The objectives are to:**

(a)     Invest in scalable technical infrastructure and towards development of integrated regional data hub to house existing health data systems and platforms in the region.

(b)     Develop data governance and management including data standards for regulating data availability, accessibility, use, sharing, and security.

(c)     Promote the interoperability and information exchange of the Regional Health Data Hub with existing data systems of Member States for automated data exchange and timely evidence-based decision-making.

### Milestones and targets

24.     **Targets by end of 2030**:

(a)     Regional Health Data Hub will be fully operational. "Fully operational" refers to the Regional Health Data Hub having established its core functionalities, including data integration, sharing, and advanced analytics capabilities, drawing on data from all Member States. This means the hub will effectively support evidence-based decision-making and be adaptable to incorporate new tools and technologies as they emerge, ensuring ongoing enhancement and relevance in the ever-evolving landscape of health data management.

(b)     The African Region Health Data Governance Protocol is launched and endorsed by Member States.

(c)     All Member States' health data systems will be interoperable within Regional Health Data Hub for exchange of data.

25.     **Milestones by 2025:**

(a)     Stakeholders are engaged on the requirement of the integrated data hub, including Member States.

(b)     Regional working group with representation across Member States is established to develop data standards and a governance framework.

(c)     Launch alpha version of the Regional Health Data Hub with core functionality.

(d)     Test the hub interoperable capability and functioning pipeline with selected Member States and regional databases.

26.     **Milestones by 2027**

(a)     Beta version of the Regional Health Data Hub will be launched for public use.

(b)     Final version of the Regional Health Data Hub Governance protocol' produce.

27.     **Milestones by 2030**

(a)     Improved capacity in advanced analytics and modelling in the African Region.

(b)     Launch additional features in the Regional Health Data Hub to enhance its analytics' functionality.

(c)     All Member States' health data systems will be interoperable within the Regional Health Data Hub for exchange and analysis of data.

**GUIDING PRINCIPLES**

28.     The WHO AFRO, alongside Member States, commits to establishing a robust and harmonized health data ecosystem for Africa. These key principles will guide the achievement of goals:

29.     **Interoperability and information exchange:** promote information exchange and interoperability will be promoted within and across the three levels of the Organization (national, regional, and global).

30.     **Inclusivity and equity:** ensure equitable access to and utilisation of Regional Health Data Hub resources for all Member States, by fostering stakeholder participation (governments, communities, NGOs) in its Regional Health Data Hub development and operation, and prioritising the needs of vulnerable populations throughout the data lifecycle.

31.     **Data governance and strategy:** implement a robust data governance framework for standardizing data availability, accessibility, sharing, and security. Adhere to the WHO global data principles[10] and strategies in formulating the data governance.

32.     **Collaboration and partnership:** foster collaboration among Member States, partners, and the private sector to promote data integration and effective use of the Regional Health Data Hub.

33.     **Data-driven decision-making:** utilise data analytics and information generated for evidence-based policies and interventions. Empower decision-makers to utilize data for improved resource allocation, service delivery, and public health programmes.

34.     **Sustainability and scalability:** develop and implement solutions in a sustainable way, ensuring long-term financial and technical viability. Design data platforms to be adaptable and scalable, considering the diverse needs of Member States. Promote the use of open-source technologies and tools where possible.

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[10]   (https://www.who.int/data/principles, accessed 15 April 2024)

35. **Ethics and legal aspects:** establish and sustain ethics in data science, including consent, clarity, consistency, transparency, and consequences. Protect personal data, including subject identity, ensure information is kept confidential and secure, and ensure the issue of consent is considered appropriately. The legal aspect and legal framework of the data hub shall be governed uncer WHO rule.

36. **Multisectoral approach:** create multisectoral data integration and interoperability for data sharing from diverse sources including non-health sectors. This helps to seamlessly integrate data from diverse sources across multiple sectors, enabling more efficient and effective collaboration and decision-making processes.

## PRIORITY INTERVENTIONS AND ACTIONS

37. The priority interventions and actions have been categorized in five thematic areas with clear responsibilities for WHO AFRO and Member States.

38. **Development and Launch of the Regional Health Data Hub**

**(a) Responsibilities of WHO AFRO:**

(i) **Stakeholder Engagement and Planning:**
- Conduct workshops with Member States, WHO AFRO Clusters, and key stakeholders to define requirements and expectations.
- Form a regional working group with representation from all Member States to oversee development and implementation.
- Collaborate with Member States to define a minimum dataset.

(ii) **Technical Development:**
- Collaborate with a high-technology vendor to design and develop the Regional Health Data Hub using modern and scalable technologies.
- Ensure interoperability with existing national and international data systems.
- Embed links of all major health data systems, platforms and hubs in the RDHub for consolidation.
- Implement cloud-based solutions for data storage and processing to ensure scalability and security.

(iii) **Pilot Testing:**
- Launch an alpha version of the Data Hub with core functionalities.
- Pilot the system in selected Member States to test interoperability and gather feedback.
- Refine the system based on pilot results and stakeholder feedback.

(iv) **Full Implementation:**
- Roll out the fully operational Data Hub across all Member States by 2030.
- Provide ongoing technical support and training to ensure effective use and maintenance.

**(b) Member States Responsibilities:**

(i) **Support and Participation:**
- Actively participate in workshops and provide input for the development of the Data Hub.
- Engage with the regional working group and provide necessary resources for pilot testing.

(ii) **Implementation and Adoption:**
- Integrate the Data Hub into national health data systems.
- Ensure staff are trained and systems are maintained for effective use.

39. **Establishment Robust Data Governance and Standardisation**

(a) **WHO AFRO Responsibilities:**

(i) **Governance Framework:**
- Develop and disseminate a comprehensive data governance framework that includes standards for data availability, accessibility, sharing, and security.
- Ensure alignment with global data principles and strategies.

(ii) **Standardization Tools:**
- Develop standardized data dictionaries, coding systems, and metadata templates.
- Promote the use of these tools across Member States to ensure consistency and interoperability.

(b) **Member States Responsibilities:**

(i) **National Data Governance Bodies:**
- Establish or strengthen national data governance bodies to oversee data policies, standards, and compliance.
- Integrate data governance principles into national health policies and strategies.

(ii) **Adoption of Standards:**
- Implement the standardised data dictionaries, coding systems, and metadata templates provided by WHO AFRO.

40. **Promotion of Advanced Data Analytics and Utilisation**

(a) **Responsibilities of WHO AFRO:**

(i) **Capacity building:**
- Conduct training programs for public health professionals and data officers on data quality, data use, analysis, interpretation, and visualization.
- Establish a regional resource center for data sharing, analysis, and visualization.

(ii) **Advanced Analytics Implementation:**
- Partner with research institutions to conduct feasibility studies on using advanced analytics for public health interventions.
- Develop online resources and tools for capacity building and knowledge sharing on best practices in advanced analytics.

(b) **Member States Responsibilities:**

(i) **Integration into National Programs:**
- Integrate data analysis and interpretation into national health planning, budgeting, and program implementation.
- Regularly monitor and evaluate program impacts using data-driven approaches to improve effectiveness.

(ii) **Utilisation of Resources:**
- Utilise the training programs, resources, and tools provided by WHO AFRO to enhance national data analytics capabilities.

41. **Enhancement of Data Sharing and Accessibility**

**(a)** **WHO AFRO Responsibilities:**

(i) **Integrated Regional Health Data Hub:**
- Promote the adoption of data platforms that provide secure and interoperable data exchange between Member States and the Regional Data Hub.
- Ensure data is accessible to all relevant stakeholders for comprehensive analysis and informed decision-making.

**(a)** **Member States Responsibilities:**

(i) **Data Sharing Agreements:**
- Establish a coordination mechanism with partners and donors to integrate health data and data systems at the national level.
- Develop and update national data sharing agreements with WHO AFRO and partners, adhering to data security and privacy regulations.
- Raise awareness among stakeholders on the importance of data accessibility, sharing, and security.

42. **Continuous improvement and adaptation**

**(a)** **WHO AFRO Responsibilities:**

(i) **Feedback and Iteration:**
- Establish mechanisms for continuous feedback from users and stakeholders to identify areas for improvement.
- Regularly update the Data Hub to incorporate new tools, technologies, and best practices.

(ii) **Innovation and Research:**
- Foster a culture of innovation and continuous learning within WHO AFRO and Member States.
- Encourage research and development to explore new methodologies and technologies for data integration and analysis.

**(b)** **Member States Responsibilities:**

(i) **Implementation of Improvements:**
- Provide feedback on the Data Hub's performance and suggest improvements.
- Stay updated with new tools and technologies recommended by WHO AFRO and integrate them into national systems.

**PROGRESS REPORT**

43. Progress report will be presented to the Regional Committee on the implementation of this framework in 2025 and thereafter every year.

**ACTIONS PROPOSED**

44. The Regional Committee is invited to examine and adopt the actions proposed.