Chapter

8

Health information and information systems

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Abbreviations

CHMIS..... Community Health Management Information System
DHIS2..... District Health Information System 2
DHPRS ..... Department of Health Planning, Research and Statistics
DHS..... demographic and health survey
DQA..... data quality assessment
DQR..... data quality review
DSNO ..... disease surveillance and notification officer
EMR ..... electronic medical record
FMOH..... Federal Ministry of Health
HDCC..... Health Data Consultative Committee
HDGC ..... Health Data Governance Council
HIS ..... health information system
HRH ..... human resources for health
HRHIS..... human resources for health information system
ICT ..... information and communications technology
IDSR..... Integrated Disease Surveillance and Response
ISS..... integrated supportive supervision
LGA..... local government area
LMIS ..... logistics management information system
M&E..... monitoring and evaluation
MDA..... ministry, department and agency
MICS..... multiple indicator cluster survey
MNCH ..... maternal, neonatal and child health
NACA..... National Agency for the Control of AIDS
NAFDAC..... National Agency for Food and Drug Administration and Control
NBS..... National Bureau of Statistics
NCH..... National Council on Health
NHA..... National Health Act
NHIS..... National Health Insurance Scheme
NHLMIS ..... Nigeria Health Logistics Management Information System
NHMIS ..... National Health Management Information System

NIMC ..... National Identity Management Commission
NIMR ..... Nigerian Institute of Medical Research
NMDR..... National Malaria Data Repository
NPC..... National Population Commission
NPHCDA ..... National Primary Health Care Development Agency
PHC..... primary health care
SOP..... standard operating procedure
SORMAS ..... Surveillance Outbreak Response Management and Analysis System
TB..... tuberculosis
UN..... United Nations
WHO..... World Health Organization

Chapter 8 key messages

- Nigeria has a well-crafted National Health Management Information System (NHMIS) policy, and most states have equivalent state-level policies. However, aspirational policy provisions are not reflected in practice, and there is no standardized mechanism for the real-time use of routinely collected data for decision-making.
- The implementation of NHMIS policies is constrained by underfunding, inadequate information and communications technology infrastructure, a limited capacity to collect data and a weak culture of using data. There are few dedicated health records officers, coordination is poor and clarity is lacking on health information system roles and activities.
- The NHMIS deploys District Health Information System 2 (DHIS2) software to effectively capture routine health data. However, the level of adoption of DHIS2 remains low at the health facility level. The achievement of objectives set out in the NHMIS policy is constrained by poor data integration, incomplete data from public facilities and private sector underreporting.
- Health information system governance structures at the subnational level need strengthening, to monitor and enforce data reporting from all sectors. The level of data reporting by the private sector could be increased by stipulating that data reporting requirements must be met for annual operating licences to be renewed. Scaling up the DHIS2 mobile phone client to include all primary health centres and private hospitals could help address data completeness and underreporting.
- Data use in decision-making could be strengthened by raising awareness of available Federal Ministry of Health information products, such as the monthly bulletin.

8.1 Governance and organization of health information

Health information system policies and strategic plans

Nigeria's National Health Management Information System (NHMIS) evolved from the Federal Ministry of Health's (FMOH's) medical statistics system of the 1960s and the first National Health Policy of 1988, which called for the establishment of health information systems (HISs) at all levels of government. The NHMIS became operational in 1999.

The policies and guidelines governing HISs in Nigeria are set out in Table 8.1.a. See Chapter 2 for further information on policies and guidelines governing the health system more broadly.

Table 8.1.a Policies and guidelines governing HISs in Nigeria

Policy	Date introduced	Objectives	Implementation challenges
National Health Management Information System policy (FMOH, 2020c)	2020	To enable data coordination, data security, data availability and data use	Persistent fragmentation and duplication
National Health Management Information System Strategic Plan (FMOH, 2022f)	2021–2025	To provide operational guidelines for the National Health Management Information System Policy	Weak HIS capacity at the subnational level
National Health Policy (FMOH, 2016b)	2016	To establish HISs at all levels of government	
National Strategic Health Development Plan II (NSHDP II) (FMOH, 2018c)	2018–2025	To strengthen NHMIS capacity at all levels; data integration; data repository and sharing	
National standard operating procedure (SOP) for the collection and management of integrated routine health data in Nigeria (FMOH, 2022f)	NA	To promote timeliness and set out responsibilities in relation to data management procedures	Adherence to the SOP is suboptimal and linked to resource constraints
National Health Act (NHA) 2014 (Part IV, Section 5, Subsections 1, 2 and 3) (FGN, 2014)	2014	To ensure data privacy and clarify under what circumstances data can be shared	NA
Standard operating procedure for Community Health Management Information System (FMOH, 2022f)	2022	To ensure an efficient monitoring and evaluation system for data collection and management within community health structures (FMOH, 2022f)	Not yet implemented

Note: NA = data not available.

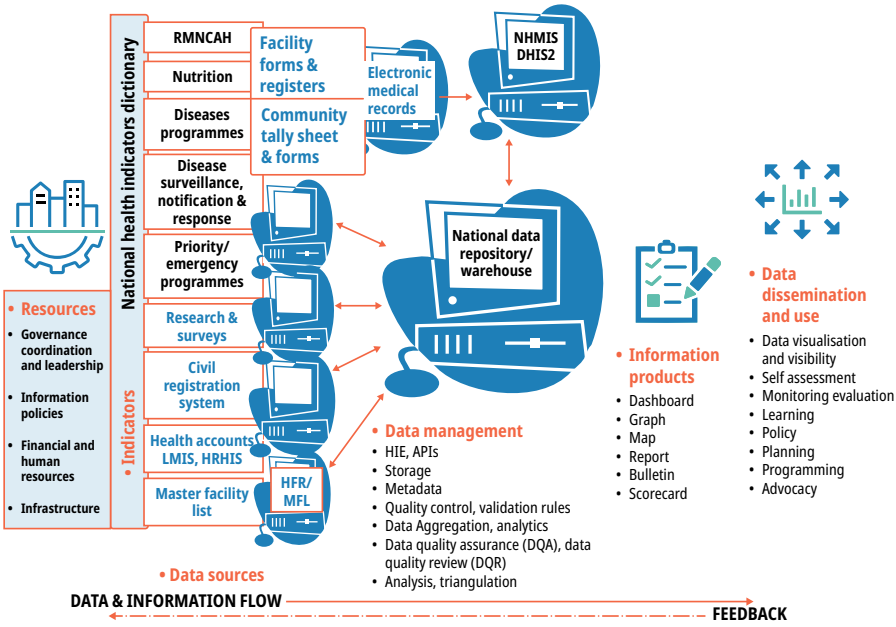
Health information system governance structure

Nigeria's HIS is summarized in Figure 8.1.a. The HIS governance structure provides direction on investments in HISs. It promotes the use of data for decision-making at the federal, state and local government area (LGA) levels, and includes the Health Sector Technical Working Group on Monitoring and Evaluation (M&E) and HIS coordination platforms, namely (i) the Health Data Governance Council (HDGC), (ii) the Health Data Consultative Committee (HDCC) and (iii) the Inter-ministerial Governing Body for Information and Communications Technology (ICT) for Health. The roles of these coordinating bodies are outlined below:

- The **Health Sector Technical Working Group on M&E** strengthens partnerships and collaboration among stakeholders involved in health sector M&E activities; provides technical guidance and oversight for the development and implementation of M&E components of strategic plans (such as the National Strategic Health Development Plan) and annual workplans; identifies and proffers solutions to M&E challenges; and makes recommendations to the Health Data Governance Council.
- The national **HDGC** is replicated at the state level. At the federal level, it is chaired by the Coordinating Minister of Health and provides oversight and governance for health data in Nigeria. The HDGC coordinates the different stakeholders at all tiers of government in the implementation of the HIS policy. At the state level, it is chaired by the Commissioner for Health (FMOH, 2020c).
- The HDGC is supported by the **HDCC** at the federal and state levels. The HDCC is a multisectoral technical advisory group to the HDGC and comprises experts from various departments, agencies and parastatals within the FMOH; HIS technical staff from the National Bureau of Statistics (NBS) and National Population Commission (NPC); and partners from multilateral and bilateral organizations (FMOH, 2020c).
- The **Inter-ministerial Governing Body for ICT for Health** operates nationally to ensure sustained partnership and linkages between all stakeholders. The body has representation from all health system levels and provides the sustained strategic alignment of health ICT activities for all stakeholders (FMOH, 2020c). It

maintains a list of stakeholders and publishes quarterly briefs on progress to foster communication among partners. However, there are no clear guidelines for engaging stakeholders and integrating data collection (FMOH, 2020c).

Figure 8.1.a The Nigerian health information system



Source: FMOH, 2020c

Notes: API = application programming interface; DHIS2 = District Health Information System 2; HFR = health facility registry; HIE = health information exchange; HRHIS = human resources for health information system; LMIS = logistics management information system; MFL = master facility list; RMNCAH = reproductive, maternal, newborn, child and adolescent health.

Although the current governance structure is designed to ensure that vertical disease control and health programmes contribute to the overall strengthening of the HIS, in practice the roles and responsibilities of stakeholders overlap, which signals poor coordination (FMOH, 2018c). Prior to the advent of disease-specific programmes in the 1990s, Nigeria had a functional medical statistics system, with data on mortality, morbidity, the labour force and hospital activities being routinely collected and published on a quarterly and an annual basis. The emergence of vertical disease programmes (e.g. on polio, malaria control and sentinel surveillance, an expanded programme on immunization and the

United States President's Emergency Plan for AIDS Relief) and the creation of health parastatals such as the National Primary Health Care Development Agency (NPHCDA) and the National Agency for the Control of AIDS (NACA) have severely weakened the overall HIS. Each of these structures has established their own separate information systems, with varying success.

Relevant actors and institutions in health information systems

The roles played by various federal ministries, departments and agencies are summarized in Table 8.1.b. The FMOH is the primary actor in health data governance, supported by its agencies and parastatals: the NPHCDA, NACA, the National Agency for Food and Drug Administration and Control (NAFDAC), the National Health Insurance Authority and the Nigeria Centre for Disease Control and Prevention. The M&E division of the FMOH's Department of Health Planning, Research and Statistics (DHPRS) synthesizes and validates health data.

The major contributors to health data include disease (malaria, tuberculosis (TB) and HIV) control programmes; the maternal, neonatal and child health (MNCH) programme; and family planning programmes. These programmes collate data from health facilities nationwide. Other government players outside the health sector include the Federal Ministry of Communications, Innovation and Digital Economy, the NBS, the National Institute for Pharmaceutical Research and Development, and the NPC, all of which collate data on vital statistics.

Health information architecture and data systems

The national health information architecture comprises a collection of digital tools and processes that cut across the three tiers of the Nigerian health system (FMOH, 2016b). As shown in Fig. 8.1.1, the national digital or e-health architecture, while still aspirational, aims to identify several capabilities of a digitally enabled health system, including the ability to capture and exchange patient-level health care information; exchange and report on aggregate health care information; enrol and pay for health insurance and verify coverage; send appointment and care reminders to patients and health workers; and support health care provision using telemedicine consultations and diagnostics.

Table 8.1.b Summary of key roles of federal ministries, departments and agencies within the context of ICT for health

Government agencies and departments	Key role
Department of Health Planning, Research and Statistics (DHPRS)	• Provides leadership for national HISs • Responsible for coordinating policies in conjunction with the Department of e-Government • Involved in reviewing and updating master plans and roadmaps in the ICT sector
National Primary Health Care Development Agency (NPHCDA)	• Provides oversight for primary health care policy and the Midwives Services Scheme; has its own M&E and ICT units
National Information Technology Development Agency (NITDA)	• Oversees the National ICT Policy and provides services through the NITDA Act (2007) • Tasked with entering into strategic alliances with the private sector and international organizations
National Agency for Food and Drug Administration and Control (NAFDAC)	• Provides oversight for food and drugs • Is mandated to provide the national Mobile Authentication Service • Oversees the drug and medicines database
Department of e-Government	• Leads the formulation and supervises the implementation of the national ICT policy • Coordinates and supervises ICT programmes across all ministries

Source: FMOH, 2020b

Health data in Nigeria are aggregated and managed using various systems and platforms including District Health Information System 2 (DHIS2), the National Malaria Data Repository (NMDR), HIV electronic medical records (EMRs) and the National Data Repository, the National Electronic TB Information Management System (including e-TB manager and GX-Alert) and the Stop Transmission of Polio Data Management system (Benke et al., 2017; Global Fund, 2022).

DHIS2 is the government-approved and government-adopted web-based platform for reporting aggregate health data from health facilities. DHIS2 is compliant with the digital enterprise architecture and allows for the import of patient-level data from EMRs (FMOH, 2016b). Aggregated data are transmitted electronically from LGAs to the state and federal levels using a

web-based platform. However, transmission from health facilities to LGAs is still largely paper based. Some health facilities have begun to adopt EMRs for patient-level data. However, only a few EMRs are interoperable with DHIS2 (eHealth4everyone, 2017).

To ensure the capture of health data at the community level, DHIS2 is supported by the Community Health Management Information System (CHMIS). The CHMIS compiles data on 218 indicators across the areas of maternal, newborn and child health care; communicable and noncommunicable diseases; strategic behaviour change communication activities; violence against health care workers; deaths; health commodity distribution and availability; and ward development committee (WDC) activities. The system relies on the voluntary service of community members, termed "ward focal persons". The CHMIS is being piloted in 11 states across the country. Although the pilot is ongoing, early data from implementation show that three states (Enugu, Cross River and Nasarawa) have had reporting rates of 100% over seven months. This success is attributed to the participation of community health influencers and promoters who facilitate data collection and/or reporting (FMOH&SW, 2023a).

The NMDR is mostly integrated into the DHIS2, while the integration and harmonization of HIV indicators from EMRs into the national DHIS2 is incomplete. Similarly, integration of the e-TB manager is incomplete (Global Fund, 2022).

Financial and human resources for health information systems

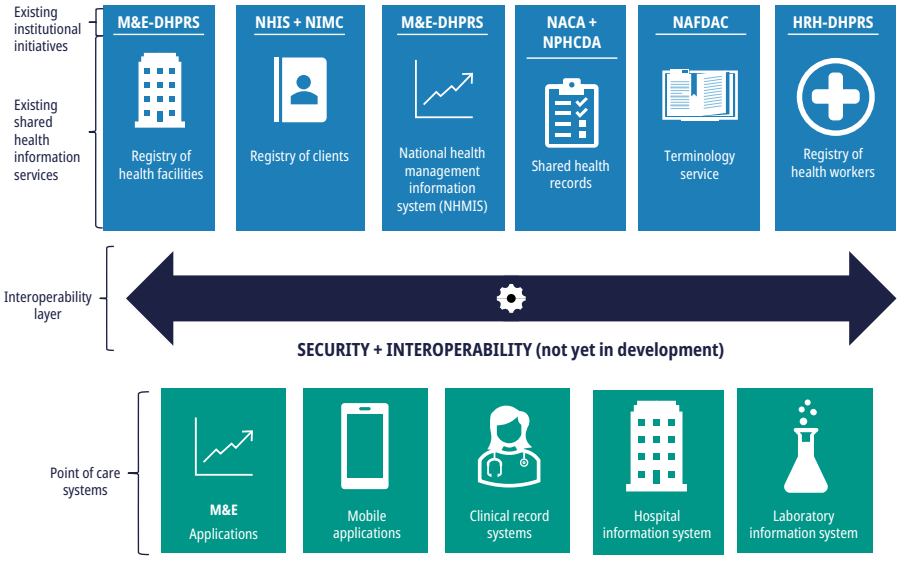
Significant infrastructure and human resource investments have been made by the government and donors to strengthen health data management and DHIS2 integration. In the 2020–2022 funding cycle of the Global Fund's new funding model for resilient and sustainable systems for health, grants of over US$ 20 million were allocated to strengthening HIS management and DHIS2 integration (Global Fund, 2022) (see Table 8.2.a). A total of 198 million Nigerian naira (US$ 436 880), approximately 0.05% of the Nigerian Capital Development Fund for the FMOH, was allocated for health data infrastructure in the 2023 Appropriation Bill (FGN, 2023). .

The NHMIS policy (2020) recommends that at least 2% and 1% of the annual budgets of health and health-related institutions at all levels be allocated to HISs and HIS data governance, respectively. This objective has not been achieved, thus contributing to Nigeria's huge dependence on donor funds for HIS activities.

Nigeria's health workforce has limited digital management skills and there are inadequate numbers of health records officers and statisticians (Adeleke et al., 2015b). As of 2022, there were 9512 licensed health information management officers, translating to 4 per 100 000 population, and there were 35 808 health information management technicians, translating to 15 per 100 000 population (FMOH, 2022d). The rates of staff turnover and attrition of these cadres of health workers are high at all levels of government.

Although some financial investments aimed at improving HISs have been used to train health records officers on using DHIS2, data analysis, and software and database maintenance, this has not translated into the optimal availability of human resources for health information systems (HRHISs) (FMOH, 2015b).

Figure 8.1.1 National digital or e-health architecture



Source: FMOH, 2016b

Notes: HRH = human resources for health; NHIS = National Health Insurance Scheme; NIMC = National Identity Management Commission.

8.2 Infrastructure and consolidation of systems

Policies on ICT development and connectivity

In addition to the policies listed in Section 8.1, health ICT development and use is governed by the National Health ICT Strategic Framework (2015–2020) that was developed in 2014 to fulfil the need for a coordinated ICT strategy. The framework aimed to build a digitized and integrated HIS infrastructure and contribute to achieving universal health coverage by 2030 through the establishment of a workable strategy for installing and maintaining ICT equipment (FMOH, 2016b). However, end-term evaluation of the framework indicated weak implementation due to challenges in the national digital health environment – including challenges pertaining to legislation, standards, infrastructure and architecture (FMOH, 2021a).

The current National Digital Health Policy (2021) and the National Digital Health Strategy (2021–2025) aim to roll out solutions to strengthen the digital health environment (FMOH, 2021c,d). A 20-member implementation committee, headed by the Minister of State for Health and Social Welfare, was inaugurated in March 2024, with a mandate to "midwife data policy, regulation, repository management and serve as an ombudsman to establish a national digital health environment that will support the scale-up of digital health interventions" (Anyanwu, 2024).

Governance of health ICT activities

The national HIS policy stipulates that the DHPRS of the FMOH is responsible for planning, coordinating, reviewing and updating the master plan and roadmaps for digital health (FMOH, 2014a). In addition, the National Health ICT Strategic Framework (2015–2020) clearly outlines the governance structures for health ICT (digital health) (FMOH, 2016b). The governance structures include (i) the National Council on Health (NCH), (ii) the National Digital Health Steering Committee, (iii) the Digital Health Technical Working Group, (iv) the Digital Health Project Management Team and (v) the National M&E Advisory Group.

The country's vision for digital health is owned by the NCH – the apex health policy-making body – the same body that also approves periodic updates from the National Digital Health Steering Committee (FMOH, 2016b).

The DHPRS of the FMOH chairs the steering committee, which comprises representatives from other departments, agencies and programmes. The steering committee oversees digital health planning, implementation and evaluation, and ensures that investments and activities align with the country's health system priorities (FMOH, 2016b).

The technical working group provides technical and operational guidance to the steering committee and the project management team. The M&E advisory group ensures that the M&E of health ICT activities are linked to the NHMIS (FMOH, 2016b). Poor functionality of both the steering and technical committees means that these structures have not matured as planned and have achieved limited advances in health ICT to date.

Standards and norms for ICT equipment and connectivity

National policies and plans recognize the need to set and enforce standards and interoperability (FMOH, 2020b,c). The Nigeria e-Government Interoperability Framework specifies tools and guidelines for supporting the interoperability of information systems. It aims to promote strategic alliances with the private sector and cross-collaboration of stakeholders in digital health (NITDA, 2019). A national implementation committee was set up in 2022 to govern and advise on digitization processes across ministries, departments and agencies (MDAs), and a 488-member technical working group was inaugurated comprising representatives from various MDAs.

Availability and distribution of ICT equipment and connectivity

Deploying basic ICT equipment and infrastructure in all states, LGAs and health facilities is a national priority that is routinely provided for in annual health budgets. The health sector has benefited from the procurement and deployment of computers, mobile phones, printers, modems and generators for state and LGA health information offices. The 2023 Appropriation Bill provides for more computers in phases across states (see Table 8.2.a).

Table 8.2.a Health data infrastructure provided for in the 2023 Appropriation Bill

Budget line	Amount appropriated (Nigerian naira)	Amount appropriated (US dollars)
Strengthen DHPRS at national and subnational levels to support the development of a responsive national health system	12 003 316	26 436.11
Scale up the use of telemedicine kiosks and other activities in the Federal Capital Territory	52 667 069	115 993.99
Strengthen the NHMIS (through improvements in DHIS2) to improve data quality and data use	10 002 763	22 030.09
Support the national health data governing structures at all levels	42 309 422	93 182.30
Support the production of annual health reports and state of the health of Nigerians as provided in the National Health Act (NHA)	12 397 327	27 303.88
Strengthen the national e-health management information system	4 732 375	10 422.59
Coordinate national surveys including the periodic HIS survey	30 985 615	68 242.74
Strengthen the routine health management information system including the architecture, enterprise and security system	38 000 000	83 691.22
Total	230 097 887	447 402.92
Nigerian Capital Development Fund	404 075 205 746	889 935 482.32
Multilateral aid and grants	2 501 350 000	5 508 974.78
Retained independent revenue	62 658 710 827	137 999 583.37

Source: FGN, 2022a

The most recent country-wide assessment of the availability of ICT infrastructure at all levels showed that, although basic ICT infrastructure was available at the federal, state and LGA levels, availability at the health facility level varied (FMOH, 2015b). Tertiary and secondary hospitals had basic ICT infrastructure, but most primary health care facilities lacked ICT infrastructure, including access to reliable electricity (FMOH, 2015b). As at 2018, only 6.45% of health facilities had internet connectivity (FMOH, 2015b).

Table 8.2.1 shows the trends in the availability of digital infrastructure for health across four indicators. The number of active mobile band subscriptions

increased from 6 subscriptions per 1000 population in 2010 to 417 in 2020, with a concomitant increase in mobile network coverage from 900 per 1000 in 2010 to 930 in 2021 (Gillwald et al., 2018). Data on the use of ICT show that, in urban areas, 51% of households have access to the internet, while 20.1% have access to the internet in the rural areas (NBS and UNICEF, 2021).

To fill the gap in ICT infrastructure at the primary health care (PHC) level, the DHIS2 mobile phone client, an application containing the harmonized NHMIS reporting form, was adopted and piloted in PHC facilities for HIV data reporting and contraceptive uptake monitoring. Although the mobile application was reported to be user-friendly, there were delays in data reporting due to lack of clarity of roles and responsibilities (NACA and FMOH, 2014).

Support for ICT equipment maintenance and repairs is lacking across the health system except at the federal level, where ICT staff within the FMOH and external consultants perform this function (FMOH, 2015b).

Availability and level of use of digital health

DHIS2 availability at the health facility level is extremely limited. Lack of adequate network coverage, unreliable power supply and high costs have a significant impact on the use of digital health data management across health facilities (FMOH, 2015b). The limited deployment of DHIS2 at the health facility level has necessitated the continued use of paper-based tools and the physical transmission of data from facilities to LGAs, which is not cost effective. Beyond data management, mobile health messaging is now commonly used in health facilities for communication with patients, providing reminders about facility visits and health promotion (Olajubu et al., 2020). The 2014 country-wide assessment of health ICT infrastructure showed that about 81% of health facilities reported using mobile health messaging to communicate with patients and communities (FMOH, 2015b). Digital tools are also utilized in logistics and supply chain management. The Nigeria Health Logistics Management Information System (NHLMIS) is an offline-capable, cloud-based application that collects, tracks and analyses logistics data in the pharmaceutical supply chain and supports decision-making management for public health programmes (Omo-Emmanuel et al., 2017). The NHLMIS is widely used for most donor-funded public health programmes. However, it is not utilized for routine patient care (Omo-Emmanuel et al., 2017).

Table 8.2.1 Indicators of digital infrastructure, selected years

Indicator	2010	2015	Latest available year	Source	African Region average
Active mobile broadband subscriptions per 1000 population	6	212.3	480(2023)	ITU,2023	407 (2021)
Population covered by a mobile network per 1000 population	900	927.1	930 (2023)	ITU,2023	896 (2021)
Proportion of facilities with a computer (%)	NA	NA	6.4 (2018)	ITU,2018	NA
Proportion of facilities that have internet connectivity (%)	NA	NA	7.5 (2017)	ITU, 2021	22.7 (2021)

Note: NA = data not available.

8.3 Data generation

Nigeria generates health data from various sources. Institution-based sources include public, private and faith-based health facilities at the federal, state and LGA levels, as well as government agencies and development partners involved in health programmes. Population-based sources include censuses, vital statistics and national surveys. Other health data sources include the National Health Accounts, HRHISs, logistics management information systems (LMISs) and the CHMIS.

8.3.1 Routine data sources and systems

Routine data from primary health facilities and private hospitals are summarized and submitted to the LGA at the end of the month using standardized tools. The data from the LGA are transmitted electronically to the state and the FMOH by the 15th day of the following month. Some secondary and tertiary facilities report data directly to the DHIS2 platform. However, data reporting from private hospitals, which account for 70% of health facilities in the country, and tertiary hospitals is incomplete (FMOH, 2018c). The 2023 Nigeria health system assessment shows that the proportion of public and private health facilities reporting on the DHIS2 is 93% and 47% respectively (FMOH&SW, 2023a). The NHMIS reporting rate was 87.4% in 2022 and 92.3% in 2023, while the on-time

reporting rate was 77.2% in 2022 and 84.8% in 2023 (DHIS2, 2024). Although the National Health Act (NHA) (2014) and NHMIS policy (2020) mandate private health facilities to report data, sanctions for defaulting are not enforced. This accounts for the persistence of incomplete reporting of health data by the private sector.

Although the FMOH has adopted DHIS2 software for health data management, the application has yet to be fully centralized as a data-collection tool. Health data are generated and stored in various repositories. Data from institution-based sources reside in the DHIS2 of the FMOH and the platforms of disease-specific programmes. Population-based data sources reside in various data archives and repositories of government and nongovernmental agencies. Efforts to warehouse these data sources and improve access to data for decision-making have not been successful (FMOH, 2020c).

Data from disease programmes are at various stages of integration into the NHMIS (see Section 8.1). Data for the malaria programme are reported on DHIS2. Moreover, data for reproductive health, maternal health, nutritional health and child health are also reported on DHIS2. However, indicators for mental health and epidemic-prone diseases (surveillance data) are not fully integrated into DHIS2.

8.3.2 Surveys and census data

Nigeria conducts census surveys, demographic and health surveys (DHSs), multiple indicator cluster surveys (MICSs) and several disease-specific or health programme-specific surveys. Verbal social autopsies have also been conducted to document neonatal and under-5 mortalities.

The last population census in Nigeria was carried out in 2006, and the NPC planned to conduct another census in 2023 (NPC, 2022) but post-election legalities prevented this. DHSs were conducted in 1990 and 1999 and have been every five years since 2003. MICSs, which collect data on MNCH indicators, have been conducted every four to five years since 1995, apart from an eight-year interval between 1999 and 2007, which was probably due to the election year 2003. Other health surveys are carried out irregularly.

In the past 10 years, Nigeria has conducted two DHSs (2018, 2023); two MICSs (2016, 2021); two verbal autopsy studies (2014, 2019); a malaria indicator survey (2021); three national nutrition and health surveys (2014, 2015, 2018); and the Nigeria HIV/AIDS indicator and impact survey (2018). The FMOH and

World Health Organization (WHO) are currently collaborating on a STEPwise survey to determine the country's prevalence and risk of noncommunicable diseases. All health surveys are coordinated by the FMOH through the Health Survey Coordination Branch of the DHPRS, and in collaboration with the NBS and NPC.

8.3.3 Vital statistics (birth, death and cause of death)

The NPC is mandated by law to collect vital statistics (on births, deaths, marriages and divorces) on Nigerians, non-citizens and refugees residing in the country, conduct censuses and establish vital registration systems nationwide. However, penalties for defaulting are not enforced.

The Civil Registration Act makes the registration of a child's birth within 60 days mandatory. The registration of a death should be done within 48 hours. The NPC works with the FMOH to ensure that all health facilities record vital events and report the data to the nearest local registration office of the NPC (FMOH, 2020b).

Local registration centres of the NPC are found across the 774 LGAs, with at least five per LGA. These report to the relevant state office and the national office. At local registration offices, the registration of births and deaths is done on paper and transmitted to the national electronic database from the state office. Death reporting typically emanates from health facilities, where a medical certificate of death is issued to the deceased's relatives to aid death registration at the nearest/local NPC registration centre. The cause of death is coded according to the International Statistical Classification of Diseases and Related Health Problems (ICD-10). A cross-sectional study in 2015 reported a national compliance rate of 88.2% (Adeleke et al., 2015a).

Birth registration rates stand at 43% (World Bank, 2022a). There are no data on the death registration rate in Nigeria on the World Bank database (World Bank, 2022b). However, a systematic review puts the death registration coverage in Nigeria at 10% in 2017 (Makinde et al., 2020). Nigeria depends on estimates for the determination of death rates, which sometimes leads to confusion, as estimates across several groups vary (Feyi-Waboso, 2016).

Most deaths occurring at the community level are not registered. However, plans are under way to scale up verbal autopsy to document probable causes of deaths in the CHMIS. This will also entail adapting maternal and perinatal

death surveillance and response to a community-based system that will capture maternal and perinatal deaths outside health facilities (Zewoldi, 2019).

8.3.4 Surveillance systems

Nigeria uses the Integrated Disease Surveillance and Response (IDSR) strategy prescribed by the WHO. Diseases under surveillance were selected based on morbidity and mortality, potential for outbreak, international listing, availability of simple case definition and control measures. These diseases are classified into epidemic-prone diseases, diseases targeted for eradication and elimination, and other diseases of public health importance (Isere et al., 2015). The epidemic-prone diseases and diseases targeted for eradication and elimination are immediately reported if a case is found.

The health facility is the basic operational unit of surveillance. However, surveillance occurs across the community, health facility (public and private), LGA, state and federal levels. Clinicians identify a notifiable disease using surveillance case definition, immediately notify the facility's surveillance focal person and fill in the IDSR forms. The LGA disease surveillance and notification officer (DSNO) promptly notifies the state epidemiologist and state DSNO, who relay the information to the FMOH. At the state level, data are entered electronically into the Surveillance Outbreak Response Management and Analysis System (SORMAS) and transmitted to the FMOH. SORMAS is a mobile and web-based software package for managing epidemic-prone diseases.

The LGA DSNO collects data weekly on cases and deaths resulting from notifiable diseases, and monthly for all other priority diseases. The scope of work of the DSNO extends to informal providers such as patent medicine vendors and traditional birth attendants. Routine reporting is accomplished through the abstraction of data from patient registers. The electronic mobile strengthening emergency and response system is used to transmit weekly reports to the state. However, because the transfer of information from the health facility to the LGA is paper based, the manual abstraction and physical transmission of data affects data quality, completeness and timeliness, causing possible delays in outbreak detection and response (FMOH, 2013b; Ibrahim et al., 2020).

8.3.5 Health systems and policy research and evidence-informed decision-making

Various policies, plans and structures support health systems and policy research, and evidence-informed decision-making. These include the NHA (2014), National Health Research Policy and Priorities (2014), National Health Policy (2016), National Malaria Operations Research Agenda (2015–2020) and the National Health Insurance Research Agenda (2021). The FMOH has developed a list of national health research priorities across all health programmes (FMOH, 2022b).

The NHA established the National Health Research Committee to promote health research in public and private institutions, ensuring that resources and the research agenda are directed at priority health issues (NIMR, 2022). The committee, which was inaugurated in 2020, comprises experts from various universities and research institutions nationwide. They are expected to "collate the research from the respective institutions and translate it to evidence-based health interventions" (Oyetomi, 2020).

The Nigerian Institute of Medical Research (NIMR) is a federal government institution mandated to generate research evidence for national health and development. The institute is structured into core research groups that reflect the research priorities of the country: malaria; HIV/TB; reproductive and population health; child and adolescent health; noncommunicable and metabolic diseases; neglected tropical diseases; communicable diseases; health system and policy; clinical trials; emergency preparedness and response; immunology and vaccinology; and traditional, complementary and alternative medicine (NIMR, 2022).

Apart from the NIMR, the FMOH and its health agencies play a role in health policy and systems research. The research and policy division of the DHPRS of the FMOH and supporting agencies are responsible for synthesizing research evidence from various sources and institutions and using it to inform policy and programme decisions or making it available to policy-makers at the subnational level. The DPHRS also uses state-level health data for evidence synthesis and use at the subnational level, and collaborates with academics, research institutions and non-state actors in research.

Most research in Nigeria is self-funded by the researchers and from external grants. The federal government funds researchers via the National Research Fund, managed by the Tertiary Education Trust Fund and accessible to researchers in tertiary institutions. Despite reviewing the National Health

Information System Policy to address collaboration and partnerships, including with academia, these areas still need to be improved for the effective implementation of NHMIS (Meribole et al., 2018).

8.4 Data validation and analysis

Opportunities abound for strengthening health data quality at the critical points of data generation (at the health facility level) and collation (at the LGA level). These include monthly supportive supervision of health facilities, monthly data validation meetings at the LGA level, quarterly data quality assessment (DQA) and integrated supportive supervision (ISS) conducted by state programme officers. Furthermore, there are plans for ward-level data validation, whereby data from facilities will be clustered at the ward level for validation purposes. Although data validation meetings and supportive supervision are being implemented across programmes integrated into DHIS2, they can be cumbersome for staff and cover only public health facilities.

In PHC facilities, the facility data management team (led by the facility manager) meets regularly to review health data before they are submitted to the LGA level. Control rooms are also operational at the state primary health care development agency level to improve data quality. These checks may need to be more consistent to be effective, even if they exist on paper.

Overall, poor data quality persists at all levels. Capacity for data analysis and use and feedback mechanisms could be stronger at all levels, and ISS remains suboptimal.

8.5 Dissemination and use of evidence

Although decision support tools have been embedded in DHIS2 software, NHMIS data are not systematically analysed and feedback is not provided to health institutions, limiting the use of NHMIS data for health planning and decision-making (Meribole et al., 2018). However, evidence from research and health programme reports is disseminated and does inform decision-making.

Various platforms exist for the dissemination and use of evidence for decision-making: (i) the FMOH website, where a monthly bulletin is published on NHMIS information; (ii) the prominent NCH, where policy decisions for the Nigerian health sector are made and reviewed annually following extensive

evidence-based deliberations; (iii) government advisory and technical working groups that meet regularly to synthesize evidence from the DHPRS and other sources and make recommendations to policy-makers; (iv) the convening of academic alliances, such as the Nigerian Academy of Science, which facilitates the formulation of evidence-based recommendations for policy-makers; and (v) consortia of disease-specific advisory groups, such as the Nigeria COVID-19 Research Coalition, which make recommendations to policy-makers based on syntheses and interpretations of research evidence (Onwujekwe et al., 2022).

8.6 Recent reforms

Nigeria adopted DHIS2 in 2010. Available evidence shows that the full-scale adoption of DHIS2 for HIV and TB control programmes in participating health facilities has improved the quality of health data reporting in relation to HIV/AIDS and TB in the country (Management Sciences for Health Nigeria, 2017). For these health programmes, the web-based software has helped promote data use for decision-making, by enabling access to electronic health data at all levels and through the provision of a dashboard display of summarized health information that can be customized to the specific needs of decision-makers (Shuaib et al., 2020).

The NHMIS policy (2020) provides the framework for integrated health data governance and sustainability, data architecture, indicators and data use, data security and guidance on how policy is to be implemented at the subnational level, including the CHMIS and M&E (FMOH, 2020b,c). External partners have contributed to establishing robust health data management tools and systems such as DHIS2, M&E frameworks and LMISs for MNCH and family planning. The United Nations Population Fund supported the FMOH in developing the NHMIS policy to improve health data management. Support has also increased from external partners for strengthening LMISs to provide supply and consumption data on health commodities.

The Nigeria Health Sector Renewal Initiative, formerly the Nigeria Health Sector Investment Programme (2023), envisages a digitized health system in which decision-making is backed by data (FMOH&SW, 2023b). However, the initiative has yet to be implemented.

Chapter summary

Chapter 8 describes the HISs that Nigeria has in place to collect and share data in order to guide policies, programme management and practice. Nigeria has an established NHMIS policy and most states have equivalent state-level policies. The NHMIS deploys DHIS2 software to capture routine health data effectively. DHIS2 harvests routine health facility data from 38 500 private and public primary and secondary facilities, excluding the informal private sector. However, the level of adoption of DHIS2 remains low, and the usefulness of NHMIS is constrained by poor integration of data, incomplete data from public facilities and persistent underreporting from the private sector. The average reporting rate through DHIS2 in 2023 was 92.3%, but timeliness was just 84.8%. Collecting complete data is also a challenge with significantly fewer data being reported at the health facility level than are collected from national sources.

The implementation of national HIS policies is constrained by chronic underfunding; inadequate basic ICT infrastructure; a weak culture of using data and limited capacity to collect and utilize health data; a lack of dedicated health records officers; and poor coordination of and lack of clarity on HIS roles and activities. The country's HISs are fragmented, with vertical disease-specific programmes, which are mostly donor driven, running parallel HISs. Despite significant past investments in improving the nation's HISs, subsector coordination remains challenging due to the diversity of data-collection tools used and the lack of harmonized data-reporting tools.

Although the 2020 HIS policy and accompanying strategic plan ignited and set the pace for improving health information management in the country, the need for better coordination and data governance remains. Intersectoral collaboration and data fragmentation must be addressed, to ensure better health outcomes. Ongoing structural reforms could strengthen national capacity in HISs and improve the quality of health data and their use in decision-making.

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