Human Resources for Health

Workforce Analytics for Design and Planning Report

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A full list of contributors is available in Appendix A.

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ABBREVIATIONS

ALIAS	Accès en Ligne aux Informations Administratives et Salariales (Online access to administrative and salary information)
API	Application Programming Interface
CAO	Chief Administrative Officer
CHW	Community Health Worker
CID	Circuit Integré de la Dépense (Expense Integrated Circuit)
DHIS2	District Health Information Software 2
DHO	District Health Office / Officer
DIAN	Dossier Individual des Archives Numérisées (Individual file of digital archives)
DPS	Direction de la Promotion et de l'Education Sanitaire (Health Promotion and Education Directorate)
DSIS	Direction des Systèmes d'Information en Santé (Health Information Systems Directory)
eCAF	Eletrônico Cadastro de Agentes e Funcionários do Estado (Mozambique's National State Employee Registry)
eFOLHA	National Payroll System
EMIS	Education Management Information System
ENDOS	Entrepôt de Données Sanitaires (DHIS2)
ERS	Electronic Registration System
eSIP	Personnel Information System
eSIP-SAUDE	Electronic Personnel Information System for Health
eSISTAFE	Financial Management Information System
eSNGRH	State Human Resources Management System
HCMS	Human Capital Management System
HIS	health information system
HR	Human Resources
HRH	Human Resources for Health
HRIS	Human Resource Information System
HWMF	Health Workforce Monitoring Framework
IFMIS	Integrated Financial Management Information System
IHMIS	Integrated Hospital Management Information System
IPPS	Integrated Personnel and Payroll System
IT	Information Technology
LMIC	Low- and Middle-income Countries
LogRH	Logiciel de Gestion des Ressources Humaines (Human Resources Management Software)
MEF	Ministério da Economia e Finanças (Ministry of Economy and Finance)
MISAU	Ministério da Saúde (Ministry of Health)
MNCH	Maternal and child health
MoF	Ministry of Finance
MoH	Ministry of Health
MOU	Memorandum of Understanding
MPS	Ministry of Public Service
NGO	Non-governmental Organization
NHWA	National Health Workforce Accounts
NIN	National Identity Number
NIRA	National Identification Registration Authority
PADS	Programme d'Appui au Dévelopement Sanitaire (Health Development Support Program)
PNDRH	National Plan of Development of Health Human Resources
PROSAUDE	Common Health Fund
PS	Permanent Secretary
SDG	Sustainable Development Goals
SIFn	Sistema de Informação da Formação Inicial (Pre-service information system)
SIFo	Sistema de Informação da Formação Continua (In-service Information System)
SIGASPE	Système Intégré de Gestion Administrative et Salariale de Personnel de l'Etat (Integrated System of Administrative and Salary Management of State personnel)
SIGEDAP	Sistema de Gestão de Desempenho na Administração Pública (Performance Management System in Public Administration)
SISMA	Sistema de Informação de Saúde para Monitoria e Avaliação (Health Management Information System)
SMS	short message service
SOP	standard operating procedures
TCO	total cost of ownership
UHC	Universal Health Coverage
UID	Unique Identifier
USAID	United States Agency for International Development
VHT	Village Health Team
WHO	World Health Organization
WISN	Workload Indicators of Staffing Need

EXECUTIVE SUMMARY

Health workers are at the heart of any health system. A year into the COVID-19 pandemic, the importance of the health workforce has never been more apparent. However, many countries do not have accurate counts of the workforce and their distribution by region, cadre, and sector. This data gap has hampered efficient pandemic response.

Despite advances made over the last twenty years, gaps in how countries manage their health workforce remain. Human resource information systems (HRIS) are critical for evidence-based human resources for health (HRH) policy and practices, but there is limited documentation about the capabilities of existing systems in different countries for the collection, analysis, and use of HRH data for planning and management. There is a need to understand these gaps and their underlying causes in further detail. The Bill and Melinda Gates Foundation engaged Vital Wave, IntraHealth International, and Cooper/Smith to identify concrete opportunities for low- and middle-income countries (LMIC) to better design, plan, and manage their health workforce.

BACKGROUND: TIMELINESS OF THIS WORK

This assessment involved looking at the HRH information ecosystem across 20 countries, with "deep-dives" in three countries. All twenty countries examined, including well-resourced contexts such as Oman, face health worker shortages. The WHO estimates a projected shortfall of 18 million health workers by 2030. Given this, it is important to examine how countries are strategically planning and managing their health workforce and the role of HRIS in this. While these issues have been present for many years, the onset of the COVID-19 pandemic gives extra salience and urgency to health workforce management. The pandemic illustrates the importance of knowing where health workers are so they can be deployed for COVID care and vaccinations, and so that appropriate Personal protective equipment(PPE) kits can be procured and distributed, all the while not disrupting mainstream health service delivery. The importance of the health workforce has been given visibility by the WHO, who have declared 2021 as the International Year of the Health Worker.

ASSESSMENT APPROACH

The initial focus of the assessment was a scoping across twenty countries globally to identify what is in place as well as the contextual factors that shape the health workforce information ecosystem environment. Subsequently, this information was used to select three countries that represented a variety of country scenarios for more in-depth research "deep dives." The selected countries were Burkina Faso, Mozambique, and Uganda. The deep dive research focused on how the health workforce information ecosystems were working. In each of the deep dive countries, the research and analysis methodology prioritized a systems-wide (macro) perspective alongside the perspectives of the different actors within the system (micro or individual perspective). To get a systems perspective, the assessment team mapped the administrative processes and data flows for three use cases: recruitment and deployment, salary payments, and performance management. The assessment team then mapped how information flowed across different levels of the health system to identify bottlenecks. While the methodology was focused on identifying bottlenecks through comparing different systems in different countries, many promising "bright spots" were revealed. These are as *important as the challenges*, providing an opportunity to build upon and replicate local successes.

KEY ASSESSMENT FINDINGS

Private sector and community health workers (CHW) data are frequently unavailable to governments, impeding decision making and planning.

Data on the CHWs and the private sector workforce are generally unavailable to governments. In both Mozambique and Burkina Faso, there are policies in place to allow for the Ministry of Health (MoH) to have oversight of the private sector, but they are not enacted at this time. In both countries, the private sector is nascent but growing. The data that are available are from labor force and facility surveys, but they are not up to date. A lack of data about CHWs and the private sector workforce means that Ministry of Health deployment decisions do not take these health workers into account. This may lead to suboptimal use of limited resources and impede referral planning.

Professional councils should be a strong source for health workforce data, but they are often under-resourced and lack the authority or capacity to enforce regular licensure, thus hindering their utility.

HRH management requires high levels of actor coordination as data are found across multiple sources.

HRH data sources come from multiple programs, ministries, departments, and levels of the heath system. In Oman; Mozambique; and Andhra Pradesh, India (with its education management information system), efforts to convene all stakeholders in system design and development were extensive. A cross-sectoral HRH unit, observatory, or taskforce could also address this need and provide oversight over time.

In Burkina Faso, a new, dedicated functional committee oversees donor and partner inputs into HRH to veto projects and ensures alignment with Ministry's goals (part of a broader network of oversight committees). There is a need to ensure that such oversight committees have membership with strong data and digital competencies, so they can oversee the HRIS ecosystem.

HRIS system design and implementation do not meet current user needs for routine HRH management.

There are several ways in which HRIS do not meet user needs. Systems are often not designed to meet the needs of subnational level actors, even though this is where many decisions are made and where problems can be identified and solved. This impacts system utility and engagement. Even at the national level, some users' needs are not met. In Mozambique, decision makers at the national level need reports about career progression (who is nearing retirement, who is due for pay increases), which are currently compiled manually. In Uganda and Burkina Faso, stakeholders report that they have a hard time accessing HRIS data, undermining system engagement and use.

A unique identifier (UID) is key to data quality and interoperability.

A UID is key to data quality and is a foundational element for interoperability. Mozambique has a routine biometric "proof-of-life" process to counter fraud, which is managed by the Ministry of Public Administration, involving an annual in-person visit during the birth month to confirm that the employee entry matches a real human. All three countries have unique IDs of some form in place, including employee ID, tax ID, national ID, or council registration.

Performance management has not been prioritized and is not aligned with health system goals and objectives.

Individual performance management systems are primarily paper based with no ties to performance outputs and service delivery data, making data difficult to review, use, and aggregate. In all three countries, performance appraisals are primarily based on subjective opinions of the supervisor. This means that they are not useful sources of data, nor does the process incentivize good work. In all three countries, there are anticipated system developments in this area.

There is an opportunity to align performance management processes with larger health systems goals and objectives and broader planning processes. Uganda has made some progress toward this with the performance appraisal process, including a goal setting and planning process. In many country contexts, individual performance processes may be occurring parallel to facility or team-based review approaches, which are more strategic in approach, presenting an opportunity for alignment.

Interoperability with payroll is a high-value goal but hard to achieve. Interoperability with other information systems is easier and provides efficiencies.

Multiple data systems and lack of interoperability result in systems fatigue by system users. To ensure data quality and integrity, interoperability between the health worker registry and payroll can have many data quality, cost saving, and efficiency benefits (e.g., eliminating ghost workers). In Uganda, interoperability between payroll and the health worker registry has long been called for, but concerns about compromising data integrity of payroll have been a major barrier. A new human capital management system that will integrate these data sources, including performance data, is currently under development.

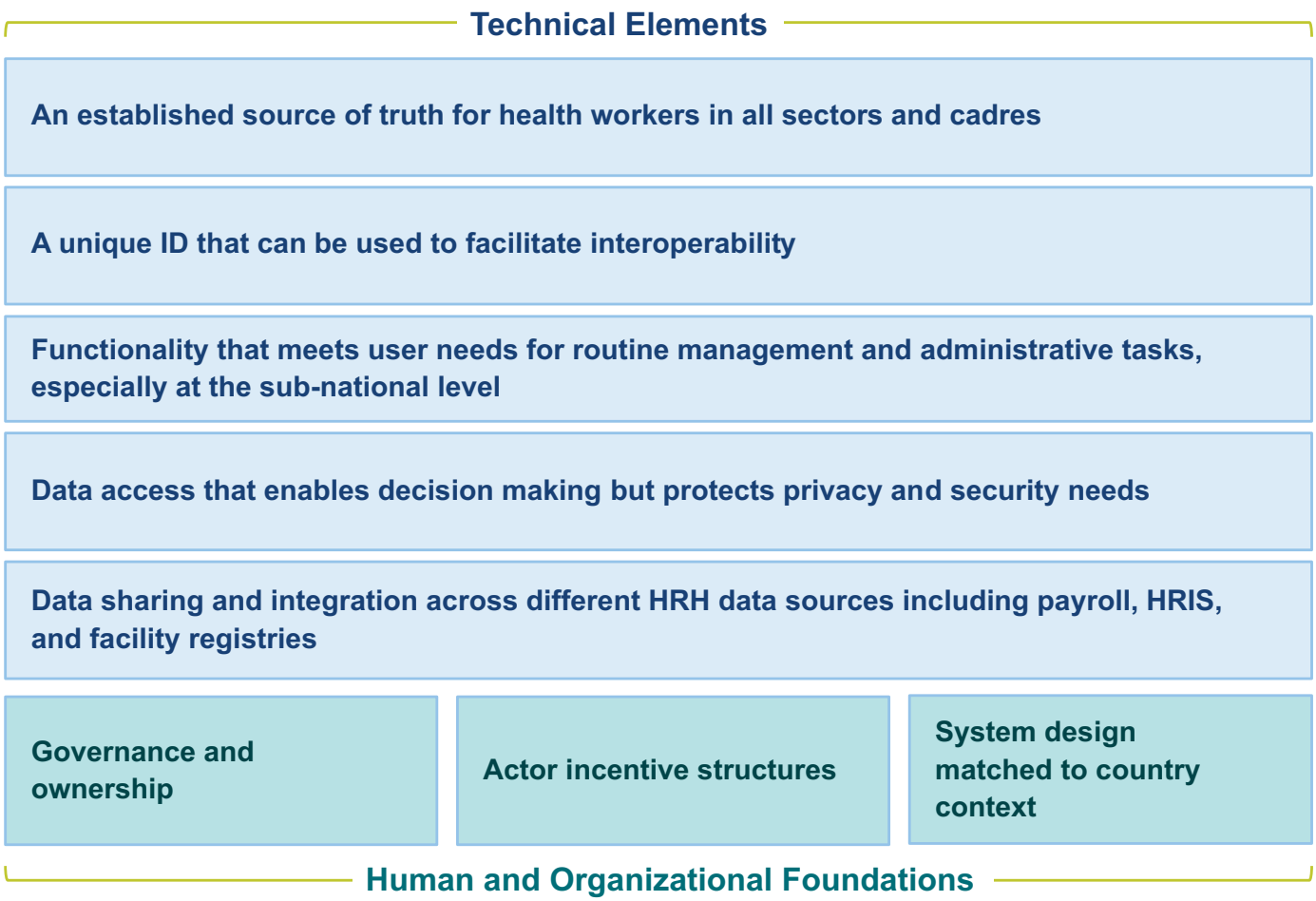
Across the public sector, health is perceived to be a leader in HRIS.

In Uganda, the education sector has replicated the HRIS success of the Ministry of Health by tracking attendance and digitizing workforce management systems. In Mozambique, the MoH provides a high level of leadership around HRIS system development. Overall, there is a low level of awareness around the HRIS work of other sectors, including the private sector. However, there are lessons to be learned here. An integrated EMIS in Andhra Pradesh, India has a number of features that are interesting for the health sector, including interoperability of nine different system components, mobile-based system access for teachers and headmasters for routine administrative tasks, success in attendance tracking, performance-based staff transfers, and generation of huge costs savings through identifying schools with low enrolments and merging them with other nearby schools.

ELEMENTS OF SUCCESSFUL HRIS

Analysis of data from both the multi-country review across 20 countries and the three deep dive countries provided a set of critical success factors that describe "what good looks like" in an HR information ecosystem. These are illustrated in Figure A below and include important technical elements that must be supported by good human and organizational foundations, specifically strong governance and ownership, the right incentive structures, and systems designed to match country contexts.

Figure A. Elements and Foundations of a Successful HRIS



The assessment mapped several different pathways towards achieving this state, and the diversity of experiences are captured in the findings. Associated pathways forward described in this report aim towards achieving this combination of key elements.

CAUSAL ISSUES AND PATHWAYS FORWARD

When looking to strengthen existing systems, it is insufficient to only examine and address the visible challenges that emerge. In order to identify more enduring solutions, it is important to examine the underlying factors that cause the challenges to exist in the first place. The assessment identified four causal issue areas and articulates suggested strategic approaches and interventions for each.

It is important to note that this assessment describes interventions in a complex ecosystem with many components and drivers. It is not intended for any of these solution approaches to be a stand-alone solution for the causal issues described; in all cases there is a requirement to also strengthen the broader ecosystem and to understand the interdependencies of the different system components.

Causal Issue: Insufficient Governance Structures (Public)

This assessment found an overall lack of governance mechanisms or structures such as taskforces, meeting platforms, committees, or functional administrative and technical units to oversee the public sector health workforce and support cross-sectoral coordination. Addressing this requires a focus on strengthening country governance structures and shifting focus from data collection to use for routine administrative and management functions (rather than reporting). Suggested interventions to realize this include:

- **Conduct a system audit covering indicators and processes and work toward a system development plan:** Many human resources (HR) administrative processes are not optimized for efficiency, increasing the burden on already-stretched health workers, and distracting them from core tasks. In addition, there are many system actors whose needs are simply not met by the system, representing a missed opportunity for increasing system utility. This intervention approach involves conducting audits to assess systems functionality and identify strengths, choke points, and unmet needs. The spirit behind this approach is to identify existing assets to build on in order to foster local ownership. It would lead to a system development plan that outlines a process to rationalize and optimize the system with streamlined workflows that capture relevant and usable data through routine administrative functions. It would also outline legislative requirements to define the role of data and who has access to it. The goal would be to create a system that meets a larger number of actor needs, at multiple system levels, to foster greater ownership. This would also include a process to institutionalize data standards and create a pathway toward an enterprise architecture.
- **Support the setup of robust governance structures to ensure alignment in HRH investments across vertical programs and donor programs:** In many country contexts covered by this assessment, the appropriate governance and oversight mechanisms for HRIS were absent. This can lead to misaligned investments that are not sustainable over time. This intervention approach would put in place a steering committee or unit that would ensure alignment of donor and vertical program efforts.
- **Support better tracking and management of CHWs:** In many country contexts, the role of the Ministry of Health in overseeing the community health workforce is not well defined. They are seen as a volunteer cadre that work locally and that are beyond the scope of the Ministry's HRH management and planning processes. Opportunities exist to better define the role of the CHWs, enumerate those working in the public sector in the HRIS registry, and encourage data sharing with other CHW programs.

Casual Issue: Insufficient Governance Structures (Private)

Oversight for the private sector is a gap across many countries. A lack of mandates, regulation, data sharing agreements, policy enforcement, and oversight mechanisms are at the heart of this. Governments also do not always see the value in making oversight a priority. Tackling this requires the creation of a common, cross-sector vision and plan for private sector health workforce tracking and regulatory oversight. Potential interventions to address this include:

- **Demonstrate the value of enumerating the private sector health workforce and define the highest value data types:** The assessment found that many stakeholders were not convinced about the need to enumerate and oversee the private sector health workforce, with a sense that it was beyond the management interest of the Ministry of Health. Frequently, this sense co-existed with a policy framework for private sector service delivery oversight – although not necessarily focused on the health workforce, specifically. To contribute to a common vision, this intervention approach would document use cases to illustrate the benefits of data sharing on specific data types.
- **Define data standards and design data sharing frameworks that provide incentives and protection for the private sector to report data (e.g., grants or tax breaks to help offset reporting costs):** The assessment documented anecdotes about the private sector being averse to sharing data because they did not want to provide information that could be used against them (through taxation, cutting off their labor supply by preventing dual practice, onerous regulation, etc.). This intervention approach supports data reporting and sharing by developing model

data sharing frameworks and memoranda of understanding (MOU) with built-in incentives for private sector health worker data reporting. This framework would position HRH data reporting as an attractive proposition and ease the burden to the extent possible.

- **Identify regulatory bodies most appropriate to conduct health worker oversight and build capabilities:** In most country contexts, professional councils play an active governance role in regulating the health workforce's scope, minimum entry to practice standards, and in some cases reaccreditation standards. Councils with this level of capacity and perceived legitimacy were not observed across all country contexts. Nevertheless, a health workers' regulatory function is required. In each country context, starting with the governance infrastructure that is in place, the appropriate regulatory mechanism can be established. This requires a supporting legislative framework and dedicated resource allocation.

Casual Issue: Misaligned System and Capabilities

Overall, this assessment finds that systems are not sufficiently fit for purpose or adapted to the local context including level of connectivity, the availability of electricity, and the skills and workload of the different health workers. Designing and supporting interventions that are tailored to country contexts and build on existing assets is critical for sustainable and effective HRIS implementation. Recommended interventions include:

- **Develop an interoperability playbook that describes a pathway to an enterprise architecture:** The assessment captured efforts to create HRIS system interoperability that had failed or stalled. It was clear that stakeholders underestimated the magnitude and cost of the tasks, specifically the required level of negotiation between relevant parties to create data standards and data sharing agreements. The intervention approach here is to create an interoperability playbook that can describe the human, organizational, financial, and technical elements required, in sequence and over time. This could also include a total cost of ownership (TCO) exercise.
- **Invest in system design for low-resource environments and infrastructural limitations, such as the support of an HRIS-lite tool for data capture and use:** The assessment found that systems were often designed with little regard for the broader systems context and local use cases, for example, low data literacy, low computer literacy, or the absence of regular connectivity or power supply. This intervention approach describes digital design appropriate to contexts with infrastructural and capacity constraints, using existing tools such as smartphones for scanning and biometric identification functions.
- **Integrate information technology (IT) and data skills for HRH into management and leadership trainings for subnational actors:** In many contexts, health workers and managers do not enter service with IT and data skills, putting them at a disadvantage to engage confidently with an HRIS. Ensuring that HRIS meet the needs of decision makers at the subnational level is key to maintaining system relevance overtime, but there is a complementary need to ensure that subnational actors have the data and IT skills required for system engagement and data demand. This intervention suggests working with partners like UNICEF on an HRIS training module focusing on the skills required to use data to make strategic HRH decisions.
- **Support registries and strive for interoperability between key HRH data sources:** Having one source of truth for health workers is critical to effective HRH management. Opportunities exist to support countries to develop one accurate, up to date, list of health workers, and implementing data sharing between key HRH data sources (e.g., HRIS, facility registries, payroll, and HMIS). The entry point for this will vary by country, according to the policy context. Data sources could include health professional council registries, the payroll, the Public Service Commission data base, the Ministry of Civil Service database, or provider network registries (such as faith-based organizations).

Causal Issue: Misaligned Motivations

Systems are not designed in alignment with the actor motivations and may lack the incentives needed to realize desired behavior when it comes to ensuring data quality, use, and reporting. Disincentives for private sector institutions and workers to report data, low motivation for sub-national levels to maintain up-to-date data, financial incentives to maintain ghostworkers, and the reality of health workers preferences' regarding deployment location and attendance tracking are some examples of this. Addressing this misalignment requires building the right incentivize structures for data use and reporting into the system. Recommended interventions to realize this include:

- **Incentivize for data reporting at the facility level:** Data reporting at the subnational and facility-level is often not timely. This approach creates incentives and sanctions for facilities to encourage high quality, timely data reporting. Actions could include allowing facilities to fill vacancies, provide training opportunities, and receive budget for equipment and supplies only once data are entered and reported.
- **Showcase HRH data:** The assessment found low priority given to data entry, aggregation, analysis, and use at the subnational level, and there is little motivation or engagement around these functions. Showcasing the use of data in routine meetings, where it is reviewed, feedback is provided, and decisions made, makes data-related tasks feel more tangible and increases motivation for engagement.

- **Track attendance, use data:** Health worker attendance is often tracked through paper-based registers, where it is difficult to aggregate and review. This makes it hard to use for performance reviews and for paying health workers for hours worked. This intervention approach suggests strengthening systems for health worker identification, tracking, and accountability by scaling up biometric attendance systems.

CONCLUSION

Getting HRIS right provides the Ministry of Health with an important tool for the improved design, planning, and management of the health workforce and helps give health workers the visibility and support required to do their work to the best of their abilities. Digital solutions are a necessary component in the suite of recommendations, but insufficient in and of themselves – governance oversight and ownership are critical to success. The recommendations provided in this report represent a step away from "silver bullet" novel solutions and towards the hard work of making systems work, to ensure health for all. This includes ensuring a level of robustness for the system to support pandemic response and equity in access to care.

This assessment has addressed an important gap in terms of understanding what good looks like in terms of HRIS functionality in LMIC contexts. While many countries lack an accurate sense of the composition, location, and performance of their health workforce, there are also various pathways to success described here. The recommendations build upon existing efforts at the global and country levels to strengthen HRIS, and to guide further investments towards stronger health systems.

INTRODUCTION

Health workers are at the heart of any health system. A year into the COVID-19 pandemic, the importance of the health workforce has never been more apparent. Yet many countries, including well- resourced countries such as Oman, face health worker shortages. Considering that these shortages are a given, it is important to examine how countries strategically plan and manage their health workforce, and the role HRIS can play in this.

Many countries do not have accurate counts of the workforce and its distribution by region, cadre, gender, and sector. This data gap has hampered efficient pandemic response – including rolling out vaccination programs, secondary prevention, and COVID care; sourcing supplies such as personal protective equipment (PPE); and maintaining non-COVID health services. This reflects the suboptimal ability of many countries to accurately plan and manage their health workforce, service delivery, and pandemic response.

Human resource information systems (HRIS) are critical to evidenced-based human resources for heath (HRH) policy and practices, but there is limited documentation about the capabilities of existing systems in different countries for the collection, analysis, and use HRH data for planning and management. For systems to become more functional, there is a need to understand these gaps and their underlying causes in further detail. To that end, the Bill and Melinda Gates Foundation engaged Vital Wave, IntraHealth International and Cooper/Smith, to identify concrete opportunities for low- and middle-income countries (LMIC) to better design, plan and manage their health workforce.

This assessment provides a description of the current state of LMIC country-level HRIS – including a description of key bottlenecks, identified through careful mapping of data flows and actor-level assessments, as well as the underlying causal issues for those bottlenecks.

Identifying these bottlenecks and gaps highlights opportunity areas for innovation and investment. While the methodology was focused on identifying bottlenecks, through comparing different systems in different countries, many country best practices were also revealed. These are as important as the challenges, providing an opportunity to build upon and replicate local successes. The assessment also draws upon best practices from other sectors – specifically Andhra Pradesh's Educational Management Information System - to identify lessons-learned that are applicable to HRIS development and investment. Finally, the report offers a set of recommendations on how the global community can maximize and support HRIS investments going forward.

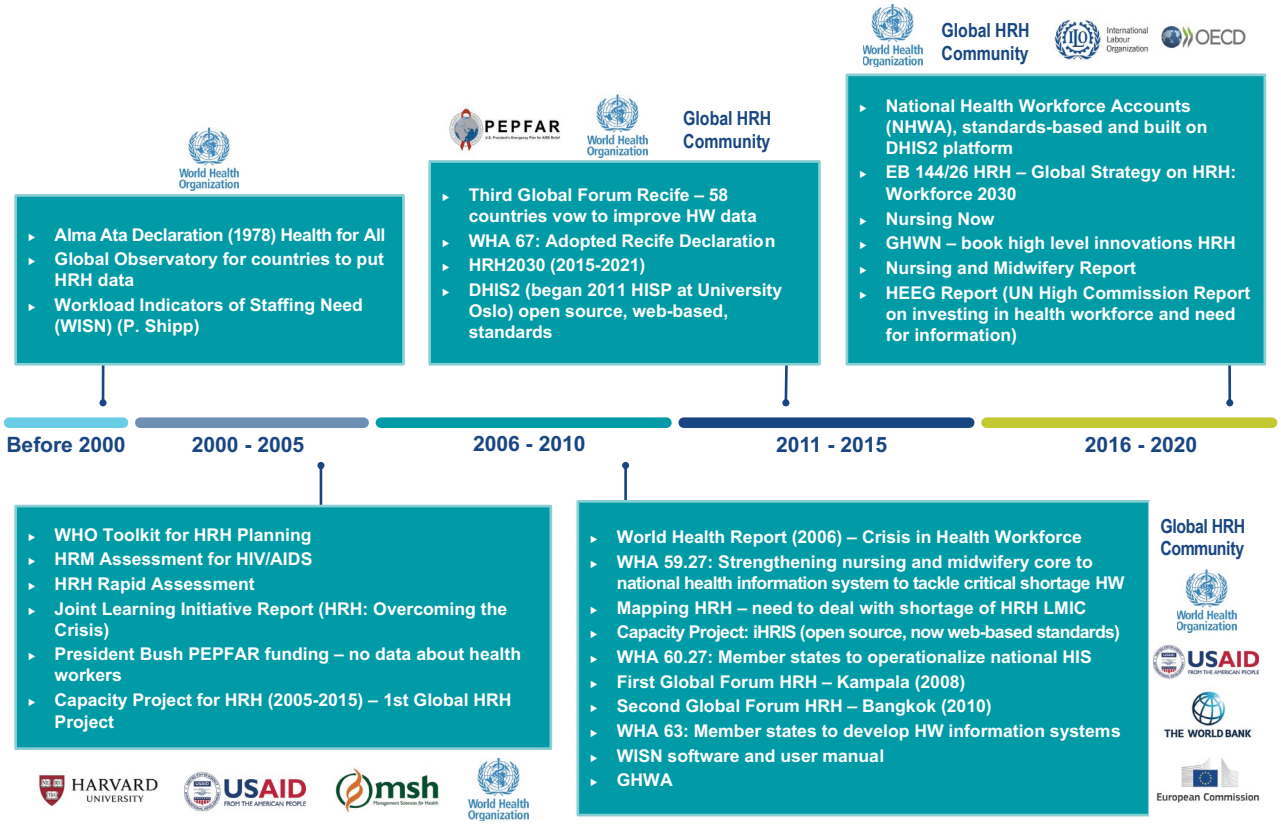
Elements of Successful HRIS

Analysis of data from both the multi-country review across 20 countries and the three deep dive countries provided a set of critical success factors that describe "what good looks like" in an HR information ecosystem. These are illustrated in Figure A below and include important technical elements that must be supported by good human and organizational foundations, specifically strong governance and ownership, the right incentive structures, and systems designed to match country contexts.

HRIS: A BACKGROUND

Over the last twenty years there has been an increased emphasis and investment in HRH and on the development and implementation of HRIS. The timeline in Figure 1 provides a historical overview of policies, interventions, and investments in HRH over the last 21 years.

Figure 1 - Timeframe of Key Milestones in the HRIS History



While investments were limited prior to 2000, several important HRH policies emerged, starting with the 1978 Alma Alta declaration, which emphasized "Health for All" and a focus on primary health care. The Alma Alta declaration pointed to the need to understand the health workforce available for primary care and initiated the Global Observatory for country level HRH data. Subsequently, the *Workload Indicators of Staffing Need* (WISN) publication by the World Health Organization (WHO) (Shipp, 1998) showed countries how to estimate health worker requirements at facility-level based on actual workload.

Beginning in 2004 with the President's Emergency Plan for AIDS Relief (PEPFAR), significant resources and tools were dedicated to support development of HRH at country-level, with the recognition that countries could not effectively improve services for HIV/AIDS if they did not understand their existing health workforce. The United States Agency for International Development (USAID) supported Capacity Project (2005) was dedicated to all aspects of HRH. Concurrently, the WHO and other global organizations launched digital tools (e.g., digital software to support WISN methodology and District Health Information System v2 [DHIS2] to track service statistics). WHO also developed the HRIS Minimum Data Set for Health Workforce Registry (WHO, 2015), and PEPFAR funded the development of the HRIS Assessment to support countries with the collection of standards- based data and assess what resources are required to strengthen their systems (USAID, 2017). From 2005 to 2015, these tools and methodology continued to be refined, enhanced by multiple international organizations and funding sources, and tested across many LMICs. The emphasis on HRH during those ten years generated energy around the topic, but limited coordination led to multiple vertical databases and fragmented, non-standardized data, undermining the utility of the data.

In 2015, the 193 countries at the United Nations General Assembly passed the Sustainable Development Goals (SDG) to ensure universal health coverage (UHC), with ambitious targets set out for 2030. The SDGs emphasized a "whole-of-government" approach, which stresses the importance of cross-sectoral coordination for achievement of goals (Cazarez-Grageda, 2019). This policy launched several other HRH strategies and initiatives, which then drove further development of HRH systems enabled by improvements in networks and infrastructure. Two important strategies that emerged in the subsequent year was the launch of

the National Health *Workforce Accounts* (NHWA) at the 2016 World Health Assembly and the *Global Strategy on HRH: Workforce 2030*. The NHWA provided a standards-based approach for health workforce indicators (planning, training, managing, distributing, and budgeting for health workforce), built on a DHIS2 platform, allowing web-based data entry across countries. Dashboards built into the software facilitated data analysis. Globally, the NHWA platform was used to collect data for the *State of the World's Nursing Report* (WHO, 2020), where 190 countries entered their current stock of nurses and midwives. The development of the WHO HRH Workforce Strategy gave countries a way to assess and achieve their workforce goals. These initiatives, launched between 2015-2020, offer a roadmap for countries to launch their HRH plans and for donor support to fit into an overarching HRH framework by identifying the supports countries need to achieve their UHC goals in the next fifteen years.

Investments made since 2005 in terms of digital and non-digital tools, governance, and infrastructure provide a strong foundation for strategic next steps, supporting the opportunity to develop a more integrated, coordinated, and locally driven approach that shapes improved HRH design, management, and planning.

METHODOLOGY

The overall assessment was guided by five core research questions (detailed below) and was conducted using a mix of secondary and in-country research, 161 global and in-country experts and stakeholder interviews, and resident knowledge of the consortium. The core questions were:

1. What do countries know about their workforce and how do they know it?
   - Do they know where their health workers are? How do they know?
   - Do they know how health workers perform?
   - Do they know if their health workers show up for work?
   - How are health workers getting paid?
2. What are the key success factors and challenges around making a HRIS effective and sustainable?
3. How do health workforce information systems support management and decision making for a stronger health workforce?
4. How do HRIS support management and decision making for a stronger health workforce?
5. What are opportunities to improve HRIS for better HRH deployment and planning?
6. What successful practices from other sectors could be adopted to strengthen HRIS?

Given the complex nature of HRH, the assessment focused on the use cases most appropriate to answering the research questions articulated above – these are:

- Recruitment and deployment
- Performance management and attendance tracking
- Salary payments and reconciliation

Table 1 depicts the various phases and activities described in detail in this section.

Table 1 – Summary of Assessment Phases, Activities and Outputs

PHASE	PURPOSE	ACTIVITIES
1	**Initial Research and Ecosystem Analysis**	Review of relevant assessments done to date and desk-based interviews with key stakeholders to identify initial hypotheses and refine research framework.
2	**Multi-Country Review**	Secondary research combined with targeted in-country interviews across 20 countries.
3	**Deep Dive Assessments**	Three-country deep dive to develop data flow mappings, conduct actor assessments, and identify systemic bottlenecks.
4	**Causal Issues and Solutions**	Identify causal issues and opportunities for addressing data-flow issues moving forward refined through country and global expert convenings.
5	**Pathway Forward**	Articulation of collaboratively developed and actionable opportunities for future investment.

This sequenced methodology ensured that work in each phase informed the next step. The findings have been validated through an advisory committee made up of global HRH experts as well as meetings with country Ministry of Health (MoH) representatives.

Assessment Phases

Phase 1: Initial Research and Ecosystem Analysis

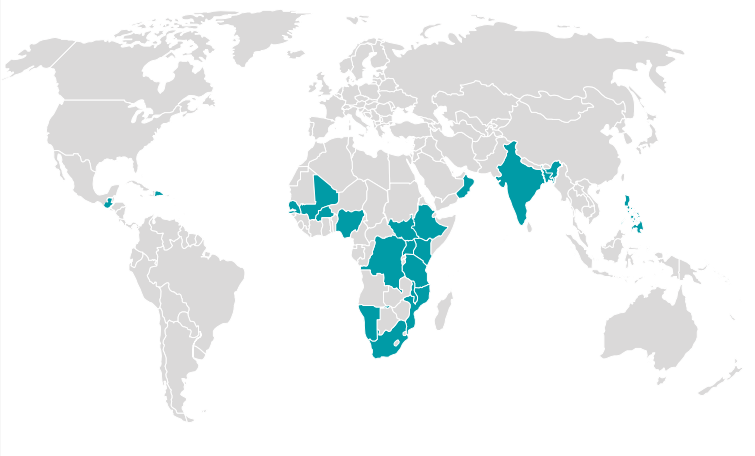
In the first phase, the consortium conducted a literature review and 21 interviews with subject matter experts to gather what is known about HRIS, the use of data for decision making, and barriers to access and use of HRIS data. The experts interviewed came from global organizations, implementing partners, and independent consultants and were purposely selected to cover a variety of geographies to better understand the state of HRIS development, data access, use and quality, data ownership, governance, and policy development across a range of environments.

In addition to being conducted by a consortium, the assessment was overseen by a committee of global experts in HRIS, representing WHO, USAID, the World Bank, the Global Fund, professional associations, academia, and national level government officials. This advisory committee provided strategic advice at key junctures in the project's progress to ensure that different perspectives were considered. A full list of contributors and advisory committee names can be found in Appendix A.

Phase 2: Multi-Country Review

In the second phase, the consortium conducted a rapid assessment across 20 countries (Figure 2) to locate and categorize them into a workforce information system continuum. Utilizing the early findings from Phase 1, resident knowledge, and a review of existing validated data collection methods (NHWA and PEPFAR HRIS Assessment tool), the consortium designed a semi-structured tool to guide in-country research across countries. The tool was designed to collect primary and secondary, qualitative, and quantitative data.

Figure 2 – Countries Selected for Phase 2



Twenty countries[1] were selected for Phase 2 based on the following criteria:

- Foundation priority countries
- Consortium partner presence
- Countries with notable HRH management systems or practices
- Diversity: geographic diversity; levels of decision making (centralized vs. decentralized); positions on the Human Development Index; inclusion of fragile and conflict-affected countries.

In-country research was conducted by HRH experts in each of the 20 countries and overseen by the core consortium research team. Data were collected from publicly available data sets (e.g., World Bank's World Development Indicators, the NHWAs), data available at the country level, and through interviews at the national and subnational levels in each country.

Phase 3: Deep Dive Assessments

After looking across the 20 countries to identify what was in place, the assessment shifted to a detailed assessment across three countries. This phase allowed for a more in-depth understanding of the actors and systems in place for HRH in each country. The three countries were selected based on the following criteria:

- Diversity in terms of geography, economic status, fragile/conflict-affected, representation across the 20-country assessment, donor- versus locally driven and developed HRIS and HRH investment, centralized/decentralized, and population size
- Practices or processes that were transferable and relevant to other contexts
- An HRIS that has been in place for some time and not in a state of transition to ensure findings speak to data use practices and hold true

[1] *Bangladesh; Burkina Faso; Dominican Republic; Democratic Republic of the Congo; Ethiopia; Guatemala; Kenya; Karnataka, India; Malawi; Mali; Mozambique; Namibia; Nigeria; Oman; Philippines; Senegal; South Africa; South Sudan; Tanzania; Uganda; Uttar Pradesh, India.*

Using these criteria, and in consultation with the advisory committee and The Bill and Melinda Gates Foundation, Burkina Faso, Mozambique, and Uganda were selected for the deep dive assessments. For each of the countries, a review of existing policy documents, operational guidelines, and HRIS job descriptions was conducted. This document review formed the basis of a stakeholder mapping to clarify the key organizations, actors, and data users within each of the selected countries' systems environments. The mapping was used to identify interview respondents as well as key themes to discuss with each key informant. It also formed the basis of a country actor assessment that examined stakeholder's key responsibilities, the data sources they use, and their specific challenges and perspectives.

In addition to the actor assessment, the consortium mapped country data flows for each of the three use cases. When possible, the use cases were anchored in key decisions (for example, promotion) to ensure a level of specificity and to illustrate the flow of data inputs for specific decisions. Each use case identified where interoperable data bases existed, which systems were electronic versus paper-based, the actors involved in these decisions, and the associated bottlenecks at different levels of the health system. The value of this approach is that it allows for a deeper analysis of not only what an issue is, but specifically where and how it manifests and at what level of the health system.

The deep dives results were validated across all three countries through meetings with their respective Ministries of Health and the advisory committee to ensure data accuracy prior to dissemination of results.

The consortium also developed a case study on Oman (through a review of publicly available literature and seven key-informant interviews with national HRH stakeholders) and on an Education Management Information System (EMIS) in Andhra Pradesh to showcase exemplary practices.

Phase 4: Causal Issues and Solutions

Following the deep dive assessments, the consortium held two virtual convenings to present findings, identify the causal issues behind the bottlenecks, and generate ideas for addressing casual issues. The first convening was a three-hour session with MoH and other HRH expert representatives across Phase 2 countries. The second convening with the Bill and Melinda Gates Foundation, advisory committee members, select implementing partners, and HRH experts was held over two days. Both convenings used a mix of plenary discussion and break-out groups.

Following the convenings, inputs were coded, analyzed, and grouped according to key themes. The results from each break-out session were shared back with the entire group for discussion and consensus building.

Phase 5: Pathway Forward

In the final phase, the work from Phases 1-4 was used to develop this final report and to identify concrete opportunities for how LMICs can collect and use data to better design, plan, and manage their health workforce.

LIMITATIONS

The findings in this assessment are subject to the following limitations:

- **Longevity of findings:** This assessment covered dynamic systems and can only expect to capture a point in time. However, while the exact configuration of the information systems may eventually change, many of the findings about the underlying causes of system challenges are likely to endure.
- **Breadth of stakeholders:** The stakeholder mapping and key informant interviews covered a range of actors across ministries and administrative levels. The large number of actors involved in the HRIS ecosystem required a focus on more senior-level decision makers. If time and resources had permitted, including the perspectives of health workers themselves, would have provided a perspective that is not captured here.
- **Logistical operations:** COVID-19 presented logistical challenges, curtailing travel and limiting the availability of key stakeholders for interviews.
- **Multi-country review sample size:** The data collection for the initial 20 country review relied on publicly available data and a select number of key informant interviews (2-5) for each country. COVID-19 meant that selection of informants needed to be opportunistic as many key decision makers were not available.

KEY FINDINGS AND IMPLICATIONS

The global HRH and HRIS landscapes are highly varied. Countries have a wide range of practices and ecosystems in place, with some countries maintaining advanced, integrated information systems that include multiple functions and are accessible to various key actors. Other countries have highly fragmented systems containing little data on the health workforce, or no functioning system at all other than a basic payroll system.

Through a deeper assessment of a subset of LMICs from a variety of contexts, it is possible to identify broad profiles and general trends, while gaining insights about specific country landscapes. Those findings can then be used to guide overall system strengthening efforts in global HRIS.

A VIEW INTO THE STATE OF HRIS IN LMICS

Through a literature review and early interviews with subject matter experts in the HRH space, it emerged that the most important elements of HRH planning, management, and decision making are **robust governance and leadership** and **interoperable information systems that support data use**. As such, these two factors have the greatest weight when determining where different countries sit on the HRIS continuum.

Governance and leadership are essential to building strong systems and to using data for management and decision making (Khan et al., 2017). HRH is a domain that involves various ministries and departments at multiple administrative levels, including Ministry of Finance (for payroll), Ministry of Public Administration (for actual employment), Ministry of Education (for pre-service education), Ministry of Labor (for industrial relations), and Ministry of Health (for core management). For this reason, it is important to take a "whole-of-government" approach, to be able to see past programmatic silos with a view across the larger sectoral ecosystem, from site to national level. This approach describes examining governance holistically, across all sectors (Cázarez-Grageda, 2019). In terms of governance, the literature review found that clear roles, responsibilities, and associated capabilities are key for sustained HRIS engagement. In addition, a long-term horizon helps build a system over time, including fostering a culture of data use (Cometto et al., 2019).

For this review, governance was assessed across the three domains described in Table 2.

Table 2 – Governance Domains Assessed

GOVERNANCE DOMAIN	VALUE	SELECTED INDICATORS
Overall Country Governance	Creates an overall enabling environment for transparency, accountability in decision making, and constructive employee relations for HRH planning and management	**Selected Indicators:** Worldwide Governance Indicators (WGI) on perceptions of governance for: • **Government effectiveness:** measures public perception of administration, policy development, budget management, and handling of basic services. • **Control of corruption:** reflects issues of ghost workers and skills-based, transparent hiring practices. An important factor in terms of ensuring quality of data (Kaufman 2010, World Bank 2019).
Digital Governance	Indicates a cohesive strategic architecture and coordination of digital interventions	**Selected Indicators:** • **Existence of a digital health strategy:** reflects the existence of governance practices around how to invest in and implement digital systems. • **Existence of a data protection policy:** reflects investment in data governance practices.
HRH Governance	Indicates investment and oversight into cohesive HRH and strong health systems	**Selected Indicators:** • **Existence of HRH unit or committee:** reflects the existence of specific governance mechanisms in place to manage HRH. • **HRH Planning Methodology:** reflects governance and leadership around HRH management practices.[2] • **Existence of health worker salary payment delays:** reflects inefficiencies in the health worker payment process.

[2] What constitutes a "planning methodology" was broadly interpreted by stakeholders interviewed in-country. The research team maintained a balance between deferring to local definitions and maintaining consistency in data collection across different contexts but prioritized local definitions.

Looking at **overall country governance**, all 20 countries placed fairly low as a percentile rank for **government effectiveness**, ranging from 5.77 in the Democratic Republic of Congo to 66.35 in South Africa. The same can be said for **control of corruption** (particularly pertinent to HRH as this assessment found a major reason for poor HRH data quality being ghost workers and personnel details deliberately listed incorrectly to increase eligibility for allowances). Across the twenty countries, the control of corruption range was 3.85 in the Democratic Republic of Congo to 65.38 in Namibia.[3]

In contrast, with regards to **digital governance**, many countries had the right governance elements in place; 11 out of 20 countries have adopted a **digital health strategy**, and seven had one at the draft stage. Only Mali and South Sudan do not have one in place. When it comes to **data privacy and protection**, only Tanzania and Guatemala did not have policies in place.

A varied picture emerges when looking at **HRH planning methodology**. Bangladesh and the Dominican Republic both reported not having an HRH planning methodology in place, while all other countries did. The type of methodology varies across countries and ranges from utilization of staffing norms counted as a planning methodology (Karnataka, India), to much more comprehensive processes, including using workload indicators to determine deployment, performance management, and retention (Mozambique). Of course, the presence of a methodology does not mean the process is followed. The assessment found that in many contexts where a methodology was in place, the process was nevertheless ad-hoc.

Lastly, 9 out of 20 countries reported regular health worker **salary payments**. The Dominican Republic, Guatemala, and the Philippines reported that delays predominantly only occur for the first few months after a new health worker is recruited, because of the time required to get the new worker registered in the payroll system, especially when there is a backlog to process paper-based documentation.

HRIS IS GOOD GOVERNANCE

In addition to understanding how an HRIS is shaped by different governance structures, the assessment demonstrated that the HRIS itself is a tool of governance. The assessment from Mali revealed that the HRIS has allowed the return of health staff after the political and security crisis in the north in 2014, contributing to post-conflict rebuilding efforts, a governance role. In recent years, the HRIS has made it possible to make decisions based on real, up-to-date data. Today, it provides a clear map of human resources (HR) in the country; dashboards make staffing visible across all the decentralized regions, and the HRIS helps officials manage the staff effectively to reach their goals.

In contrast, in the post-conflict situation in South Sudan, the HRIS no longer exists and has not been in place for six years. HRIS data were used last to plan recruitment of missing staff and promotion of the existing staff but current data is not up to date.

Information systems are critical to the access and use of data on the health workforce. Despite the many investments made into HRIS and the growing need for accurate and timely data, the suboptimal implementation of these systems has limited their usefulness for planning, management, and decision making at the national and subnational levels, resulting in a reliance on ad hoc practices in many countries (Qadir et al., 2017). Additionally, most HRIS investments have been focused on the public sector without integrating private sector data, impacting a country's ability to plan more holistically for future health service requirements and training needs. The COVID-19 pandemic has shone a new light on the importance of strong, comprehensive data systems, with countries that have better HRIS being able to use their data systems to make more informed national decisions about their health workforce and treatment needs and for health worker vaccine distribution, including those working outside of the public sector. For this review, information systems were assessed as described below (Table 3).

Table 3 – Information Systems Assessed

DOMAIN	VALUE	INDICATORS
HRIS Maturity	Indicates level of maturity of different HRIS across countries	**Type of HRIS for tracking public sector workers:** ▪ Level of interoperability ▪ Level of tracking for in-service training ▪ Level of performance management tracking (Adapted from the PEPFAR Rapid Site-Level Health Workforce Assessment Tool)

[3] *In Switzerland, the percentile rank for Control of Corruption is 96.2; for Government Effectiveness it is 99.5.*

In terms of the different functions covered by HRIS within each country, there was a high level of variation. In some contexts, **HRIS are seen as filing systems rather than management and planning tools, which limits their value as a health system strengthening tool.**

Overall, in terms of key functions, the **biggest gap identified was interoperability between HRIS systems**. In more than half the countries assessed (11 out of 20), there was no interoperability between at least two systems. This represents a significant gap as interoperability is key to relevant, quality, and useful data across HRH functions and actors.

While most countries did have some form of a digital HRIS for tracking public sector health workers, the biggest **gaps exist in the area of performance management**, with just over a quarter of the countries assessed (6 out of 20, respectively) having no system to track this information and another quarter (5 out of 20 for both) having only very basic systems in place. Understanding the performance of the health workers (if they turn up to work and the quality of their work) is a key HRH function and essential to ensuring quality care. Looking closer at specific functionality for performance management, **attendance monitoring was also a clear gap** with just under half (9 out of 20) countries having no system in place to track attendance. Other gaps in data availability and functionality included visibility into the private sector and the community health worker (CHW) workforce, with only 6 countries reporting that at least one core government system has data on private sector workers.

Some countries included in the review did not have functional HRIS in place at all. In **Guatemala**, HRH data quality and fragmentation are major challenges. Data are held in disparate Excel sheets, hindering data use. There are no clean records on the health workforce, and the databases from different health institutions are not compatible with each other, making it difficult to conduct a national health analysis and use data for planning or decision making. In the conflict-affected **DRC**, while significant investments have been made to ensure accurate HR data in six regions (including fingerprint verification), data is not available for the whole country, resulting in an inability to adequately plan and manage the health workforce.

A DEEPER VIEW INTO HRH SYSTEMS AND PRACTICES

Looking across the 20 countries detailed in the previous section helps form a better appreciation of *what* is in place. However, to design programs that better support countries, it is important to understand how systems work and are sustained, *where* information breaks down in the health system across a variety of contexts, and *whom* these breakdowns impact. Exploring system and actor perspectives in greater depth allows for identification of critical bottlenecks that prevent effective HRH management and decision making.

Table 4 shows the countries selected for deeper exploration and their defining characteristics as identified from the multi-country review findings. These countries represent different governance and information system contexts that speak to the broader relevance of this work's findings.

Table 4 – Overview of Deep Dive Country Contexts

	DECISION MAKING	REGION	LANGUAGE	CONTEXT AND HRH PRACTICES
Burkina Faso	Centralized	West Africa	Francophone	▪ Highly manual, and nascent system with aggregate data in Excel at national level. ▪ Low digital maturity. ▪ Good governance foundations in place with limited donor investments. ▪ A fragile and conflict-affected country.
Mozambique	In process of decentralizing	Southern Africa	Lusophone	▪ Home-grown HRIS that builds off the Ministry of Public Administration and Civil Services' HRIS (mainly designed to support payroll) with strong local ownership. ▪ Strong donor investments in the health sector.
Uganda	Decentralized	East Africa	Anglophone	▪ High level of donor investment over many years. ▪ A multiplicity of information systems but a lack of interoperability.

[4] *Use cases were selected based on their relevance to the core research questions. See page X in the methodology section for further detail.*

Overall Findings

A look across Burkina Faso, Mozambique, and Uganda revealed various successes as well as bottlenecks that impact accurate and timely HRH data. Interestingly, while these countries represent very different HRIS scenarios, there are surprising similarities in terms of the challenges they have faced. These are summarized by use case[4] in Table 5 below.

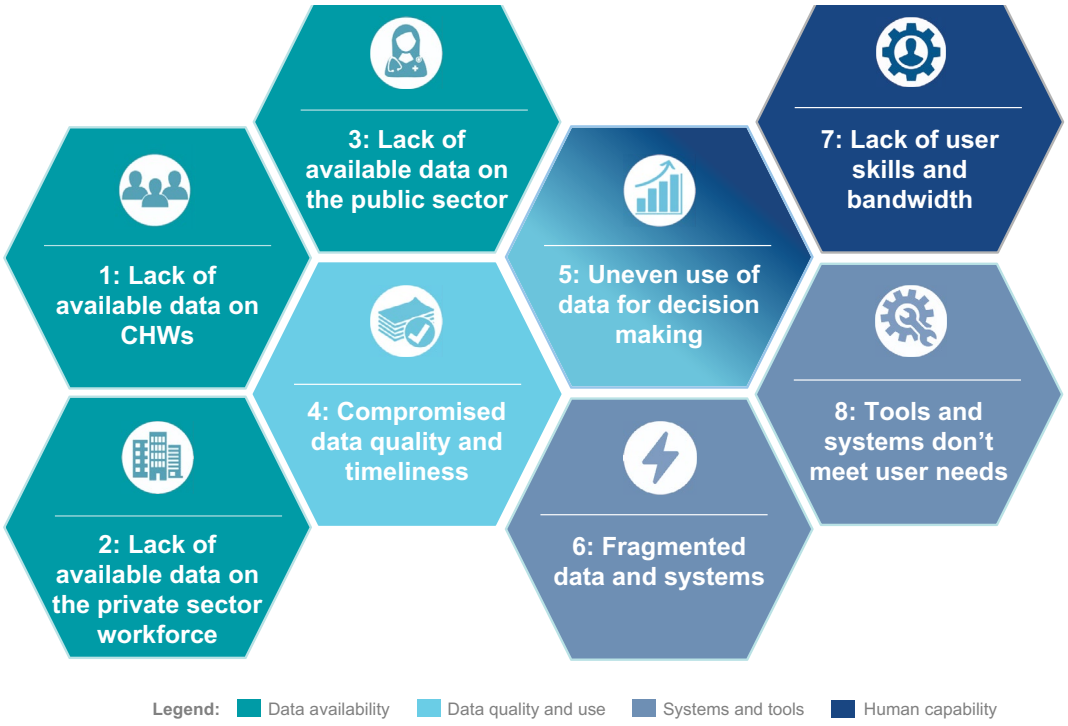
Table 5 – Bottlenecks by Use Case Across Burkina Faso, Mozambique, and Uganda

PRIORITY USE CASE	OVERALL FINDING
Recruitment and Deployment	▪ It is difficult to know where health workers are at any given time and what their profile is because HRH data are often found across multiple sources, including paper and information systems, and data are not always kept up to date. ▪ There is an overall lack of available data on the private sector and CHWs, which may lead to suboptimal use of limited resources and impede referral planning. ▪ National HRH managers' and district health officers' decisions on deployment are impacted by health worker preferences and political considerations that may not be aligned with deployment goals but cannot be excluded.
Performance Management and Attendance Tracking	▪ Performance and attendance monitoring is not prioritized. ▪ Individual performance management systems are primarily paper-based with no ties to performance outputs and service delivery data, making data difficult to review, use, and aggregate.
Salary Payments and Reconciliation	▪ Salary payment systems are robust in all countries, although salary delays are reported in Uganda. ▪ All countries have conducted payroll reconciliations, but not all do this routinely. ▪ Integration between payroll and a health worker registry is an opportunity area, but it is also accompanied by a high level of risk as some stakeholders strive to protect informal income sources.

The challenges identified across the priority uses cases and countries can be grouped into four overall categories (depicted in Figure 3 below):

- **Data availability:** This domain includes gaps in data around CHWs, private sector health workers, and missing data elements about public sector workers (performance, attendance, exact location).
- **Data quality and use:** Data quality is often compromised due to delays and errors in data entry at the subnational level. This also undermines the usability and use of the data.
- **Systems and tools:** Systems are not consistently designed to meet the needs of all the HRH actors. In addition, systems are often fragmented, leading to multiple duplicative information systems, high administrative burden, and parallel workflows.
- **Human Capability:** There is a lack of data and information technology (IT) literacy, including ability to understand and strategically use data.

Figure 3 – Common Identified Bottlenecks in HRIS



Stakeholder Assessment

A variety of stakeholders are involved in the HRH space, each with their own interests. However, not all stakeholder interests are visible or aligned with systems goals. An information system is more likely to succeed if resources and tasks are appropriately distributed across different actor-types (Andreasson et al., 2018), and for this reason it was important to map the existing roles, data sources, and challenges. As with the bottlenecks described above, there were many commonalities around stakeholder roles and responsibilities across the three different deep dive countries, the findings have been aggregated here.

Generally, stakeholders were identified through mapping key systems functions and then identifying who performed these functions in each country. In addition, because understanding the administrative and data processes at every administrative level is necessary for best practices to be identified and bottlenecks meaningfully mapped, there were country-specific considerations for identifying stakeholders. With Uganda and Mozambique both decentralized (the latter still in process), it became important to gather the perspective of data users at the subnational level. In Mozambique, the HRH data analysis functions of the WHO-supported HRH Observatory also became an important element in the HRIS landscape. In Burkina Faso, with aggregate information systems and manual processes, a large administrative burden is placed on the health workers, and so it became important to include them in this assessment.

There are different system actors depicted in Table 6 whose needs are not comprehensively being met by the current HRIS ecosystem. While these actors exist throughout the health system (for example, the national HR manager in Mozambique requires an automated report format indicating who is due for retirement or promotion, and the cost of manual compilation is high), there are fewer needs met at the subnational level. **Attendance tracking and performance management tools, which are key management functions at facility and district levels, are often missing.** These gaps result in decisions being made through a "common sense" understanding of the situation or a hunch (for example, which facilities have a higher patient load), as opposed to data.

The most challenging result of HRIS ecosystems not meeting the needs of actors at subnational levels is the low level of engagement in the system, which leads to delays around data entry, undermining the quality and usability of the data. This is one of the most commonly reported factors that threatens data quality and system sustainability in all three deep dive countries.

Table 6 – Cross-Country Stakeholder Map: Functions, Data Sources, and Bottlenecks

STAKEHOLDER	MAIN FUNCTIONS	HRH DATA SOURCES USED	KEY CHALLENGES
HR Manager	Oversees recruitment, deployment, performance management, and salary processes and procedures	DHIS2, health worker registry data, WISN	▪ Multiple data systems resulting in system fatigue and fragmented data ▪ Insufficient access to HRIS data and reports by key decision makers ▪ Lack of clarity on how to incorporate CHWs and private sector health workforce into systems and planning ▪ Slow manual processing of files ▪ Unreliable data ▪ No attendance data
Data Analyst	Produces evidence-based information for decision makers and triangulates available data	DHIS2, health worker registry data, facility surveys	▪ Analysis focused on needs of decision makers at the central level ▪ Poor data quality impacting ability to use data
Systems Administrator	Manages systems, oversees IT infrastructure	Various ministry stakeholders and users	▪ Lack of health worker registry and/or unique identifier (UID) and data standardization to facilitate interoperability or data exchange among different systems ▪ Lack of standard operating procedures (SOP) and guidelines for systems ▪ Limited IT capacity ▪ Unreliable connectivity and power
Professional Councils	Register and license qualified health workers; volunteer role	The council registry, paper files	▪ Registries typically held in Excel files with limited functionality ▪ Volunteer-led with no full-time staff ▪ Limited scope to ensure quality of workforce or enforce regulations around registration and licensing ▪ Maintenance of paper registers alongside electronic system is legally required
Payroll Manager	Manages the payroll, including pensions	Payroll, national identification system	▪ Costs of system license and maintenance ▪ Payroll not currently linked with digitized performance appraisals (will be done in Human Capital Management System (HCMS) ▪ Data not up to date, not reliable.
District Health Officer	Oversees all HR management functions at district level	Health worker registry, DHIS2, payroll, IPPS, facility & staff lists, attendance, performance appraisal reports	▪ Variable internet and network connectivity across districts, hampering updates to some systems ▪ Data on attendance can include false entries ▪ Manual performance monitoring and appraisal process; incomplete and difficult to analyze for decision making ▪ Data entry often not timely ▪ Decisions made with local knowledge, without data
Health Worker	Provides clinical services, but also carries burden to ensure that administrative data are current in national system	Pay slips, paper personnel files	▪ Deployment status and demographic changes must be reported in person at central level ▪ No data-based attendance or performance monitoring

BURKINA FASO

Health System Overview

Burkina Faso's national health system is centralized, with different administrative levels including the central, province, and district-levels (comprised of 70 health districts). Healthcare is provided by the public and private sectors. Public sector service delivery is organized into primary, secondary, and tertiary care, with 1,959 primary health clinics feeding to eight regional hospitals and a university hospital center.

Current State of Health Workforce Information Ecosystem

Figure 4 – Summary of HRH in Burkina Faso

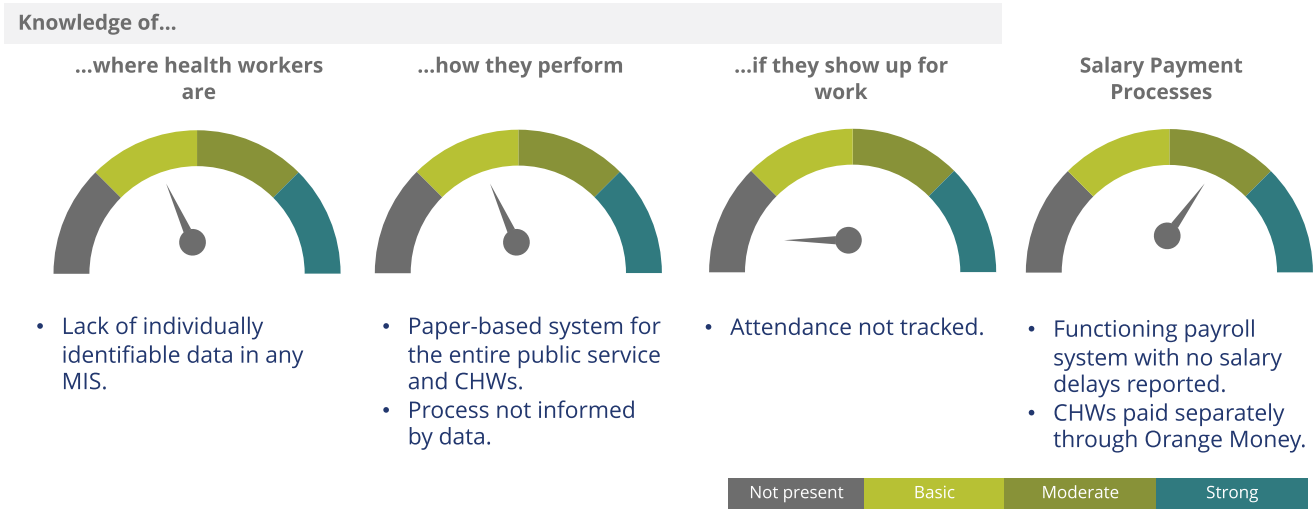
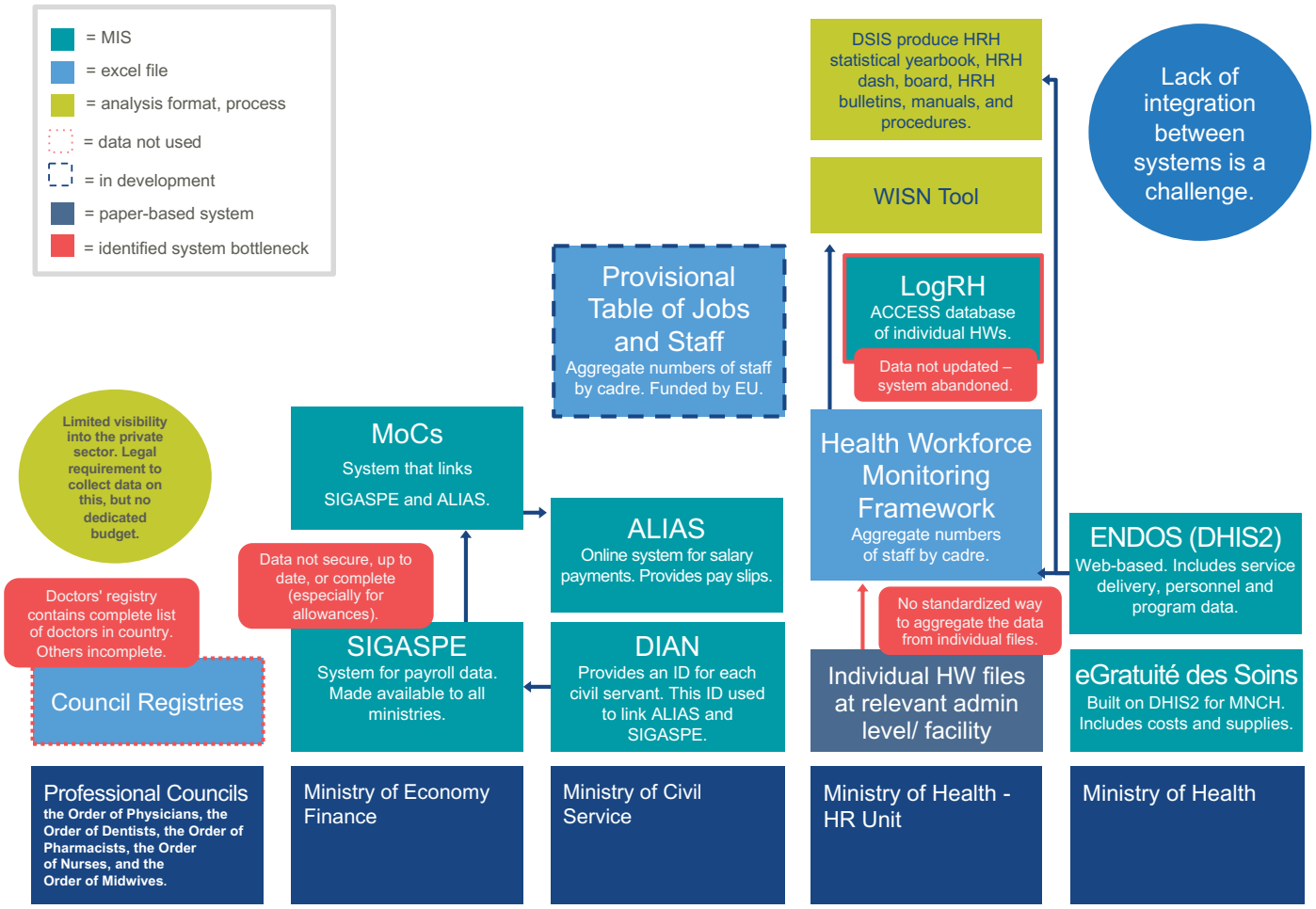


Figure 4 above provides an overview of the state of HRIS in Burkina Faso. Burkina Faso maintains several exemplary HRH practices, despite being a fragile state and receiving only modest health investments from donors.[5] The eHealth Strategy (Cyberstratégie Sectorielle eSanté), lays out several major government investments to improve the ability to plan, manage, and track the public-sector health workforce using digital tools and systems. The recent application of WISN in 2018 has rationalized deployment of health workers, often moving them from urban facilities to rural ones based on workload pressure. Additionally, a new, dedicated functional committee (Team 7) oversees donor and partner inputs into HRH to veto projects and ensure alignment with the MoH's goals.

That said, HRIS are at a nascent stage, with most HRH management functions not in place or dependent on highly manual or paper-based systems. Figure 5 shows a mapping of the different information sources and systems across different ministries and departments that create the health workforce information ecosystem.

[5] *External expenditure on health in Burkina Faso is only 18%, compared to 61% in Mozambique and 43% in Uganda.*

Figure 5 - Burkina Faso Information System Overview



As can be seen in the figure above, digital systems exist for payroll management; salary payments; and a vertical, program-specific Maternal, Newborn, and Child Health (MNCH) information system built for the eGratuité des Soins program. Aggregated service delivery data from DHIS2 is also used to calculate workload. Individual HR personnel files are found at the health worker work location, but only aggregate HRH data from these paper files are entered into the Health Workforce Monitoring Framework at the province level, making data difficult to validate and use at the national level. Additionally, each district and region keep individual level lists in various formats including Word and Excel for all health workers in their area, but these files are stand-alone and not linked to the paper-based individual file or the aggregated national HRH database. An HRH Access database (LogRH) was in place and used by the MoH from 2012-2018 but has since been abandoned. When functional, it only covered half the subnational units and was not web-based, located instead on a single computer. This resulted in the database not being regularly updated.

BEST PRACTICE: FUNCTIONAL TEAM 7 FOR HRH STRATEGIES

To ensure that development partners address key issues in the HRH Strategic Plan and other HRH policies, implementing partners need to identify how their proposed intervention supports the direction the MOH. Each intervention must have a sustainability plan and a capacity building strategy to ensure the intervention will continue after completion of the project. Team 7 monitors the partner to ensure compliance with this policy and can ask the partner to end their project if they are not compliant.

Data quality and availability was also reported as a challenge in Burkina. Data in the payroll system (SIGASPE) is not accurate or up to date, especially when it comes to data that impact health worker allowances (e.g., ages of children to determine child allowance eligibility). Meanwhile, Professional Councils are led by volunteers with no full-time staff and have limited scope to ensure quality of workforce or enforce regulations around registration and licensing. Only the medical council has a fairly complete registry for doctors. Registration is closely tied to graduation, meaning that foreign trained doctors are frequently missing. The Nursing Council and other councils do not have a full listing of their cadres at this time.

Visibility Outside Formal Public Sector

Comprehensive data on the private sector is not covered by existing systems even though it is prioritized as a policy requirement. Partial lists are available for CHWs are working in health facilities.

Findings Across Priority Use Cases

Looking across the priority use cases highlights the fact that decision making is supported by aggregate data from standalone systems that cannot be easily verified. Administrative functionaries and decision makers have poor access to data, most of which is in paper files. The processes and systems in place results in a high burden on health workers, data collection clerks, and limit HRH managers' ability to make decisions using data.

BEST PRACTICE: INCLUDING UNIONS

In some countries in the multi-country review, unions were a barrier to data use for equitable deployment and have worked to prevent payroll reconciliations removing ghost-workers. However, there are examples of successful union engagement in Burkina Faso. There, labor unions advocated for the special needs of hospital employees, for example, ensuring a higher salary for night shifts. Union representatives also sit on the deployment committee for hospital recruitment.

Recruitment and Deployment

Overall recruitment decisions are made by an assigned committee based on data from Burkina Faso's HIS (ENDOS/DHIS2), WISN, and the Health Workforce Monitoring Framework (the Excel-based aggregated information system of all health workers). A closer look at how recruitment and deployment is conducted in Burkina Faso identifies a fragmented information system that relies on paper files and Excel spreadsheets.

- Changes in deployment status require health workers to travel, in person and with their personnel file, to the Ministry of Health and the Ministry of Finance at the national level to have their official status changed in the SIGASPE payroll system. This can mean absences of several days from their health post.
- Individual health worker files are kept in the province or district offices for primary health care workers and at the hospital for hospital employees.
- Lists of health workers are compiled into Excel spreadsheets and aggregated to create the Health Workforce Management Framework, developed in 2017. Because the data are aggregated, the quality of this data cannot be easily verified. Each local district also keeps a separate list of their employees in Excel or Word which are not standardized or linked to any other data source.
- Service delivery data are collected in facility registers, compiled, and sent to the district level for entry into ENDOS (DHIS2). The overburdened data clerks are responsible for entering data into multiple information systems with limited data quality checks.
- Additionally, while there are policies in place governing HRH practices for recruitment, deployment, and rational distribution of staff, the assessment found that (as in many contexts) these are often not implemented.

Further details including the data flow for recruitment and deployment can be seen in Appendix B.

Salary Payments and Reconciliation

In Burkina Faso, the SIGASPE information system at the Ministry of Economy and Finance operates the national payroll system. SIGASPE is linked with two other databases at the Ministry of Civil Service. DIAN assigns an identification number for each employee, and ALIAS creates the pay slip with information from SIGASPE. Since 2018, public-sector employees receive salary payments every month through direct deposit into their bank account. The process varies for hospital and non-hospital staff:

- For **non-hospital health workers**, changes in status related to promotion, transfers, or family changes affecting allowances need to be made in person by the employee at national level with the paper-based employment record. Additionally, the information included in SIGASPE is not always updated to reflect allowances or job transfers that may result in a lower salary (e.g., family allowances not being lowered after children age-out of the benefit, or staff transfers not being reflected in a move from an insecure area giving a risk allowance to an area that not eligible for a risk allowance).
- **Hospital-based health workers** salary payment follows a similar process, with the exception that the Ministry of Finance transfers money to hospitals to pay employees. Labor unions advocated for a public hospital law that was established in 2017 to address employment conditions for hospital employees, including registration with the professional orders (councils), conditions for permanent salaried employees, benefits, and special salary for night shift workers. With this new law, employees are paid a salary based on the number of nights in a month they are scheduled to work. One challenge is that no one checks to ensure

the person actually showed up and worked those night shifts. In addition, Money generated by patients' fees at hospitals is used to pay contract workers and procure special hospital equipment.

- **CHWs** get paid monthly by the Health Development Support Program and Directorate of Health Education through a mobile payment system called Orange Money. While the process appears straightforward, payment requires monthly activity reports to be compiled and submitted as a requirement for generating payment. However, as CHWs do not perform a consistent package of services, it is challenging to compile their performance reports, making it difficult to review their performance and payments.

Further details including the data flow for salary payments for hospital staff, non-hospital staff, and CHWs can be seen in Appendix B.

BEST PRACTICE: EGRATUITÉ DES SOINS

The maternal and child health program, eGratuité des Soins, demonstrates a promising opportunity for HRIS integrating human resources, WISN, service statistics, and supply data for decision making and service delivery. The program captures data on costs, drugs, supplies, and human resources in a DHIS2-based platform and has incorporated a financial data entry incentive to encourage timely data entry (payments for medications and supplies are withheld if data are not entered within three months). eGratuité des Soins also includes an HR algorithm using WISN methodology that indicates whether health workers are rationally deployed.

Individual Performance Management and Attendance Tracking

Each year, province and district managers are asked to nominate staff from every level of the health systems for service awards based on longevity of service and excellence; however, performance management is not informed by data. The MoH sees that this is an important area for improvement and plans to have performance reviews based on objective criteria and job descriptions in the future.

Specific gaps identified are:

- The 10-point performance assessment is based on the subjective inputs of the supervisor, not on specific roles or job expectations.
- Paper-based performance reports are sent to the Ministry of Civil Service at the national level to be aggregated. If their scores are 6/10 or more, health workers will get moved up into the next salary band. However, these data are not easily accessible or verifiable.
- There are no job descriptions or performance targets for health workers.
- There is no attendance monitoring throughout the health system, and attendance can be irregular with some health workers drawing a salary but also working in the private sector or not showing up at their post.
- Policies are also in place for attendance, management of absences, and private sector reporting, these are not enforced.

Further details including the data flow for performance management and attendance tracking can be seen in Appendix B.

Bottleneck Identified

Data Availability

- Data are not standardized and found at multiple levels.
- Public sector health worker data only available in paper forms at health worker location or in aggregate at national level.
- Only partial data available on private sector workers and CHWs

Data Quality and Use

- Individual files are paper-based, making them hard to use and verify.
- Payroll managers have limited or outdated information.

Systems and Tools

- Health workers required to update deployment status in person.

Human Capability

- Professional councils led by volunteers.
- Data entry staff tasked with aggregate health worker data are overburdened at subnational levels.

MOZAMBIQUE

Health System Overview

The health system in Mozambique is structured along three levels: the central level (MISAU), the provincial level Directorates of Health (DPS), and the district level District Service of Health and Social Affairs (SDSMAS). It is based on decentralized management, where each level has its own authority to hire health workers. The National Health Services has 58,124 health workers, with 55% in service delivery related cadres and 45% in other supportive and administrative cadres. There are 18 health pre-service medical training facilities, with an average of 3,000 graduates total per year. As of December 2019, there were 1,643 public health facilities in Mozambique, 95% of which are primary health care facilities. There are also 1,672 private health facilities and approximately 50 private pre-service health training facilities, but MISAU does not currently capture private sector data.

Current State of Health Workforce Information Ecosystem

Figure 6 – Summary of HRH in Mozambique

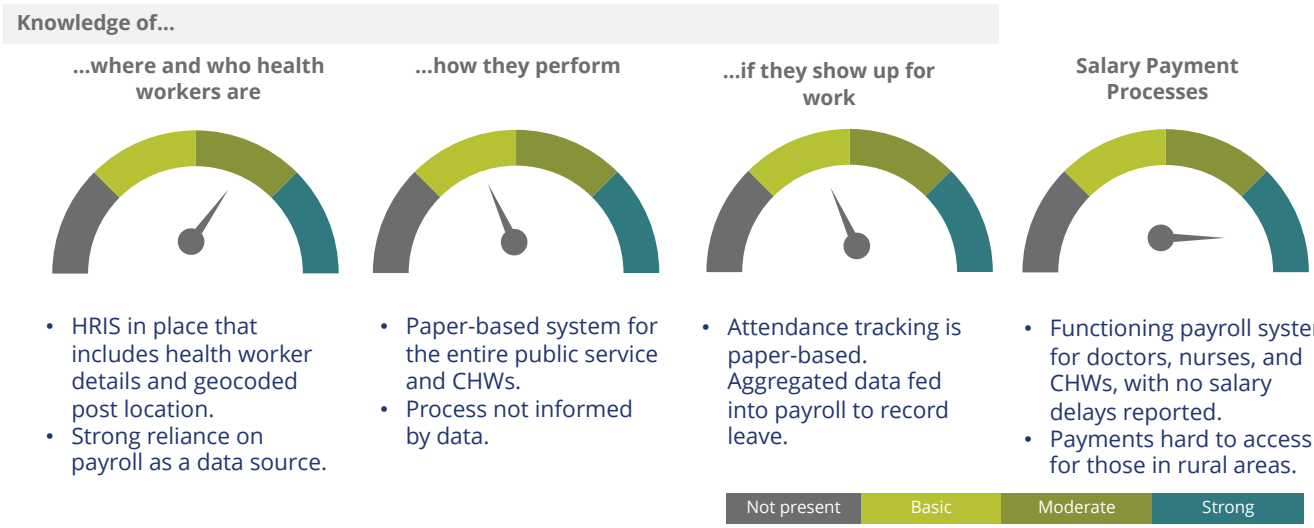
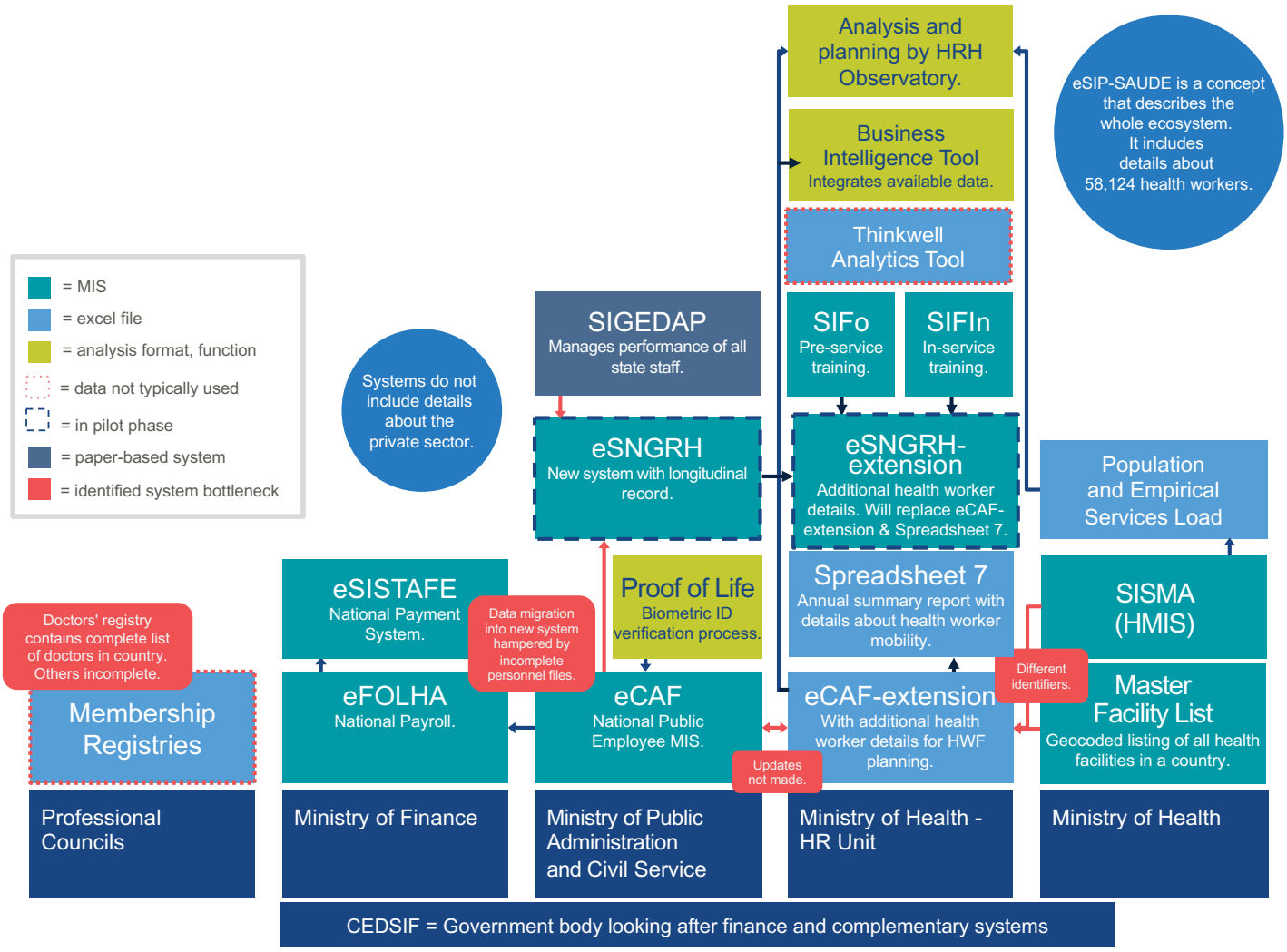


Figure 6 above provides an overview of the state of HRIS in Mozambique. The National Human Resources Development Plan for Health (PNDRH) 2016-2026 (Ministry of Health, Republic of Mozambique, 2016), which builds on a prior strategy from 2008-2015, outlines the objectives and strategic goals of the health sector, including the main objective of reducing the ratios of health personnel per 100,000 inhabitants. The current plan describes the needs of HRH per cadre and health facility level, and it also includes medical specialization requirements for the next ten years. Mozambique has much clearer and more specific policy guidance on HRIS than Burkina Faso and Uganda, possibly demonstrating a higher level of ownership over the HRIS development and data use. Despite an impressive policy landscape, there are still areas of policy ambiguity, for example the role of the MISAU in overseeing the growing private sector health workforce and the CHWs, including their enumeration.

The systems mapping identified nine different systems in place across five different ministries and departments that make up the health workforce information ecosystem, as depicted in Figure 7. However, the assessment found a high level of integration across systems, with a strong foundation to work toward interoperability and an "enterprise architecture."

The case of Mozambique is important as it takes a novel and cost-effective approach to fostering local ownership, a key factor in system adoption and sustainability. The lessons from Mozambique are applicable to countries that are eager to foster local ownership, lay the foundations for a more integrated approach, and work toward institutionalizing data use practices.

Figure 7 – Mozambique Information Systems Overview



Mozambique has taken a unique approach to its HRIS development, prioritizing local ownership through building on what is already in place, namely, the payroll information system. Building upon the Ministry of Public Administration and Civil Service's information, in 2007 they developed an HRIS to use within MISAU for planning and management decision making. The Ministry of Health's HRIS works by extracting all the health workers' details from the Ministry of Public Affairs and Civil Service's HRIS (eCAF) **which covers the entire public sector**, into a separate database (an eCAF extension, often called eSIP-SAUDE), with additional details relevant to MISAU's decision-making needs. Different system components (an in-service training database and a pre-service training database) were included with a view toward a more integrated HRIS ecosystem – remarkable in the absence of a digital health policy.[6] The system was a cost-effective mechanism to provide health worker numbers and locations. However, its design does not meet all decision makers' needs; for example, it does not provide a longitudinal record. A new more comprehensive system in development is expected to automate administrative functions and provide customized reports (SNGRH, at the pilot phase since 2017).

BEST PRACTICE: HRH OBSERVATORY

Mozambique was one of three countries to pilot the WHO (NHWA) supported by a national HRH Observatory consisting of a team of analysts who compile and analyze HRH data for decision making.

MISAU implements the HRIS at all administrative levels of the health system (e.g., health unit, district, province, and national levels). The existing HRIS (eCAF extension, or frequently called eSIP-SAUDE, describing the larger network of systems) can analyze available HRH, including location and total number of health workers. It can produce national statistics on human resources, including responses to WHO requests for data. Mozambique has also conducted a workload assessment and HRH profiles by province. An HRH retention strategy has been developed, and, in training for HRIS use, investments have been made in HRH management and planning, including data-quality and data-use trainings.

[6] *A public sector digital policy has been launched since the assessment was completed.*

Mozambique was one of the first countries to implement NHWA in 2016, and the system was able to provide almost half of the core indicators used at that time (42 out of 90).[7] Mozambique also has an HRH Observatory, a WHO-supported platform which consists of a team of analysts who provide analysis support on HRH to MISAU. However, despite a thoughtful system design, and an analytics support team, stakeholders report there is not a strong "culture of data use" in Mozambique, with other factors influencing decision making.

Along with the systems' strengths, some bottlenecks have been identified:

- Updates to eCAF are often not made in a timely fashion by data entry clerks at the provincial and district levels.
- Different facility identifiers – between the Master Facility List, the health information systems (HIS) – Sistema de Informação de Saúde para Monitoria e Avaliação - SISMA) and eCAF – undermine the ability to integrate data or make the systems interoperable.
- Efforts are under way to migrate data from paper files into the new SNGRH system to create a longitudinal digital record. This is a slow process due to both incomplete and paper files, which are housed in the filing cabinets of different facilities across the country.
- The registries of the professional councils are not typically used in human resource decision making.
- The information architecture, with its strong reliance on payroll as a data source, does not capture data on contract workers, CHWs, or the private sector health workforce.
- Thinkwell established a tool to calculate the workload of different facilities to rationalize deployment at the district level. The tool is similar to WISN but takes into account the time taken for each task; This tool has not been fully rolled out due to the COVID-19 pandemic.

Visibility Outside Formal Public Sector

The area where core functions are not comprehensively addressed is mapping the nascent but profitable private sector. There is a policy mandate to provide oversight of the private sector and the CHW cadre, projected to be 7,300 in 2020 (Community Health Roadmap, 2021), and manage the professional registrations of different cadres. The nursing and medical councils are undergoing efforts to strengthen their registries, which would fill the latter gap.

Findings Across Priority Use Cases

Looking across the priority use cases, good systems are in place, but actors at all levels conduct many administrative functions and reports manually, causing delays and speaking to a need for automation at national, provincial, and district levels. Despite impressive achievement in the HRIS space, uneven use of data for decision making due to political considerations, lack of incentives, and uneven capacity remain an issue, as does a lack of timeliness in data entry, impacting data quality.

BEST PRACTICE: eCAF - A HOME-GROWN, INCREMENTALLY DEVELOPED, HRIS

Policy makers in Mozambique listened to the MOH's desire to develop a HRIS to meet their country's needs using their own technology and resources. Building upon the Ministry of Public Administration and Civil Service's information they slowly and securely developed an HRIS to use within the MOH and inter-ministerially for planning and management decisions. Two decades of multi-sector and ministerial coordination has resulted in locally owned and incrementally developed HRIS systems to serve government needs.

Recruitment and Deployment

The hiring process in Mozambique is designed to be open and transparent, with publicly announced vacancies open to anyone meeting the requirements. While there is a strong policy framework in place for equitable deployment, uneven distribution of health workers across provinces and districts persists. A closer look at the recruitment and deployment data flow identifies why this is the case and where the bottlenecks lie:

- The Ministry of Health makes decisions about where to allocate health workers based on analysis from the HRH Observatory, guided by the National Human Resources Development Plan for Health. However, inequities persist, and stakeholder suggested that it is not politically expedient to send newly recruited health workers to all provinces, even if some provinces are chronically under-served.
- The province-level Ministry of Health office creates a proposal of staffing needs according to established staffing norms; however, the data used is not up to date, undermining the utility of the proposal.
- The exact facility location of health workers is sometimes obscured because changes to administrative boundaries or facility classifications are not always fully updated in the system; some new health units are not registered in the system so the health worker is listed as working in the district administration office; and some health workers' exact location is not updated if the update can mean that there is a loss of benefits.
- Doctors and nurses are deployed from the district to different facilities, sometimes in response to staffing norms (Quadro

[7] *There are now 78 core NHWA indicators with each country deciding which indicators to include.*

Tipo) and sometimes in response to community demand.

- The most reported concern about the HRH data was that data were not updated regularly due to a reported lack of appreciation for its importance.

Further details including the data flow for recruitment and deployment can be seen in Appendix B.

Salary Payments and Reconciliation

The salary payment system in Mozambique is backed up by a proof of life identification process, an attempt to eliminate fraud and ghost workers, thereby strengthening the quality of payroll data. When looking at salary payments the data flow and actor assessments identified the following bottlenecks:

- Changes to deployment status within eCAF must be confirmed by the administrative court. This is a slow process that can take months, but in the new system (SNGRH), this step will be automated.
- Decisions about promotions and salary increments are made at the national level, but there is a pending requirement for automated reports regarding who is due for promotion or retirement and when. This is currently compiled manually, resulting in a large administrative burden. It also often means actions are not taken in a timely manner.
- Digital financial services are at a nascent stage in Mozambique. Health workers are paid directly into their bank account, and for health workers in remote rural areas, this can require travel of up to 300 kilometers to access their salary.

Further details including the data flow for salary payments can be seen in Appendix B.

Individual Performance Management and Attendance Tracking

Low priority is given to performance data in decision making – a disincentive for refining and improving the system. This lack of attention has resulted in several challenges:

- Individual performance management is paper based and kept in the health workers' personnel files, which are not broadly accessible. Many decisions about increments and promotions are made at the national level without access to these files.
- Doctors and nurses in management roles need to complete a performance plan at the beginning of the year, but this is often not done.
- Performance reviews are supposed to occur every quarter but typically occur annually. Supervisors give staff a point score based on their subjective opinion. This represents a missed opportunity in terms of use of service delivery and attendance data.
- There are often delays in the verification of performance reviews.
- Performance reviews are a factor in decision making about training opportunities, promotions, and transfers but are not prioritized; other factors (if there is budget available, time served) take precedence.
- Health workers sign an attendance book to mark their attendance each day. Supervisors are responsible for checking the attendance book and verifying attendance; however, as this is paper based, the data are difficult to aggregate and review.
- For CHWs, performance is managed formally by a nurse at their most proximate facility and informally by community leaders within their community. There is no higher-level oversight from the district, province, or national levels.

Further details including the data flow for performance management and attendance tracking can be seen in Appendix B.

Overall, it appears that performance management and attendance tracking represent an important opportunity area for HRH management in Mozambique, and this is likely to be eventually addressed in the new SNGRH system – with the three most recent performance reviews visible in the health worker's record. It is likely that the data and the process will only improve if the data have more perceived use in decision making.

BEST PRACTICE: PROOF OF LIFE

Annual biometric proof of life check conducted to prevent ghost workers and fraudulent practices in eCAF. Health worker must present in person with ID to Ministry of Public Affairs and Civil Service during their birth month.

Bottleneck Identified

Data Availability

- Reliance on payroll as data sources means that contract staff and CHWs are not included in the HRIS.
- Lack of visibility into private sector health workforce, despite legislation in place.

Data Quality and Use

- Data not always up to date, especially for specialization codes and deployment location.
- Data not always used because of conflicting political demands.
- Data not entered in a timely way, impacting quality and usefulness.

Systems and Tools

- Many administrative functions and reports conducted manually, resulting in delays.
- Lack of data checks and standardized validation results in data quality issues.

Human Capability

- Professional councils led by volunteers.
- Despite good functionality, users do not engage with the system due to low digital literacy.

UGANDA

Health System Overview

Uganda's public health system has been decentralized since 1997 and delivers services alongside a robust private sector. The public sector, consisting of government health facilities and health services departments of various ministries, benefits from a high level of donor funding for the health sector at 42.5% (WHO Global Expenditure Database). It is the main provider of all health services, delivering at district level via hospitals, health centers, and CHWs. Over the years the private sector has become an increasingly important contributor to health service delivery at the primary level, and is estimated to provide between 60-70% of frontline health services (National Bureau of Statistics, Uganda, 2010).

Current State of Health Workforce Information Ecosystem

Figure 8 – Summary of HRH in Uganda

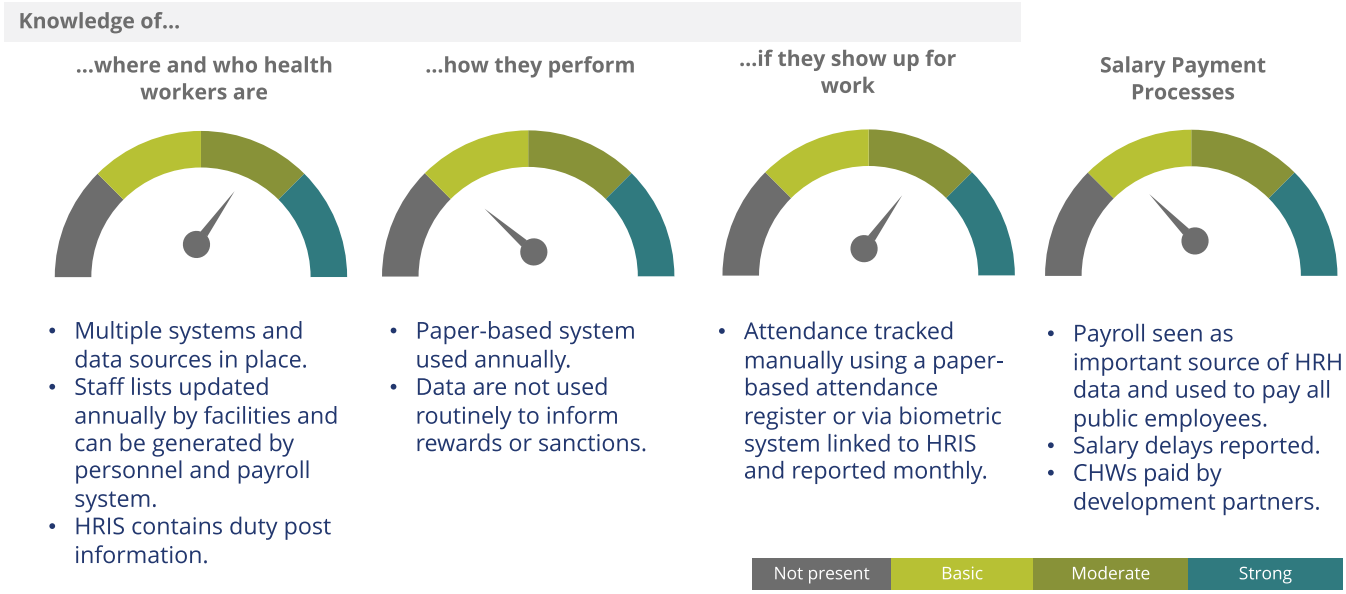


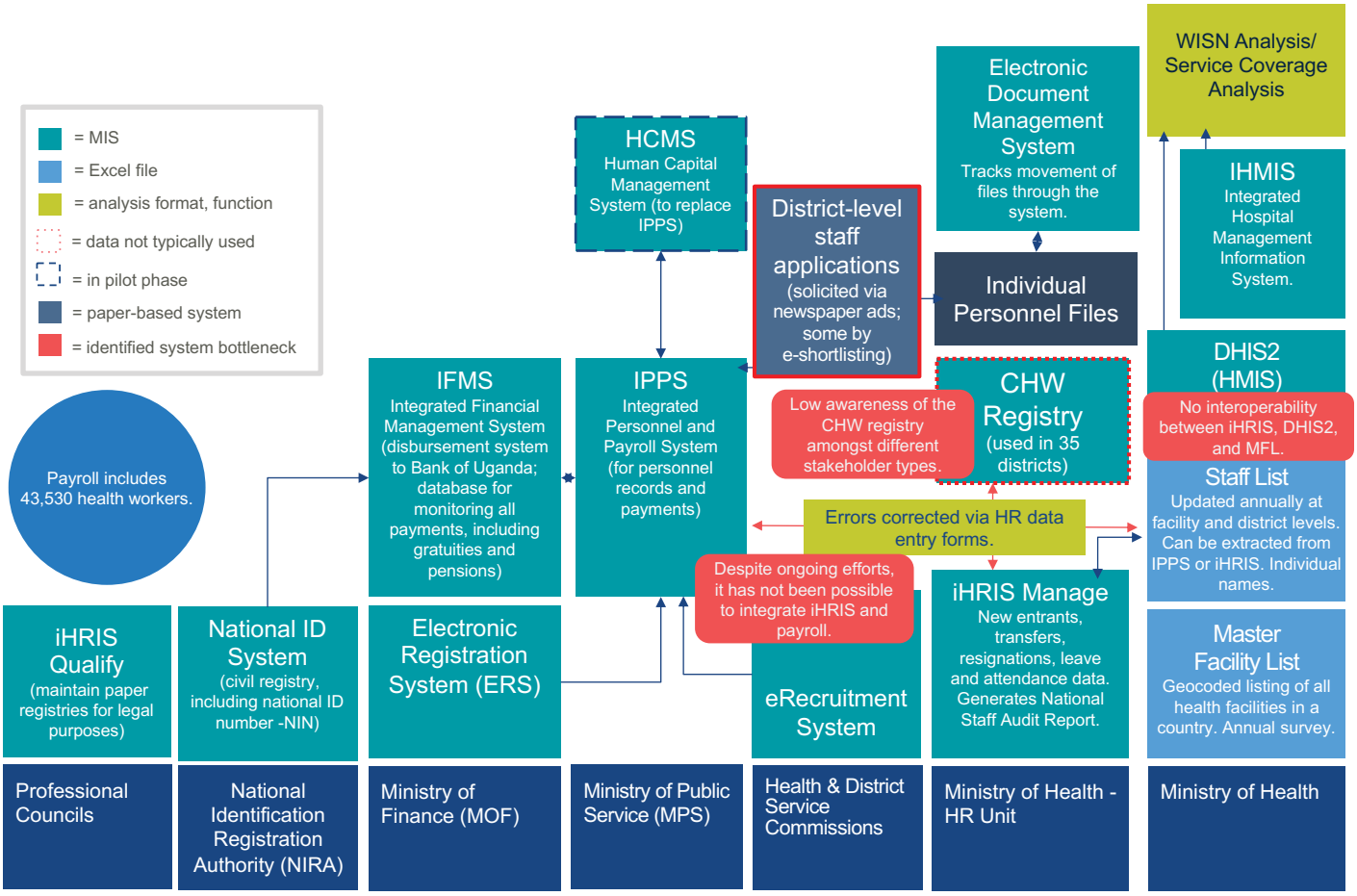
Figure 8 above provides an overview of the state of HRIS in Uganda. Uganda has seen many years of investment in HRIS since 2006, with support from several different donors, including USAID, the European Union, WHO and UNICEF, including IntraHealth's open source HRIS software – iHRIS – with both iHRIS Qualify and iHRIS Manage in place since 2006. Even considering this history, uneven adoption and engagement can be observed across subnational units and at the national level (Figure 9), with high levels of data fragmentation due to a lack of interoperability and data sharing practices, possibly reflecting the donor driven nature of the system development. The lessons learned from Uganda would suit country contexts that want to expand and scale their existing digital investments.

Several policies have been developed related to HRH planning and management, including the use of HRIS to guide these efforts, but according to key informants there is variable implementation. The broad range of applicable policies represents a complex policy context. In Uganda there are a high number of ministries involved in the health sector. For example, at recruitment, four ministries (Ministry of Health, Ministry of Local Government, Ministry of Civil Service, and Ministry of Finance) come together to approve new hires. The large number of different, relevant policies in place means there is no single reference document that could guide investments and implementation. This re-emphasizes the importance of a "whole-of-government" approach.

The graphic below (Figure 9) illustrates the different information sources pertaining to HRH in Uganda. There are 16 in all, across seven ministries and departments, along with analysis of service coverage conducted through the WISN methodology. The primary sources of HR data include:

- iHRIS Qualify which supports the health professional councils' information systems (established in 2006)
- iHRIS Manage, the HRIS (established in 2007), including a registry which compiles the HRIS information across all districts.
- The service's integrated personnel and payroll system (IPPS), introduced in 2007 and used by the Ministry of Public to manage payroll, which currently contains 43,530 workers.

Figure 9 – Uganda Information Systems Overview



Recent activities by the government to improve its ability to better plan, manage, and track the public-sector health workforce include the MoH's efforts to expand iHRIS Manage functionality by adding more modules (attendance, performance appraisal, file tracking, leave, accommodation and also iHRIS Train for pre-service data). The country is now in the process of introducing a new Human Capital Management System (HCMS) that will include performance management functions and replace IPPS, covering the entire public sector workforce. This has been underway since 2018, and respondents estimated it was 80% complete.

Despite the multiple systems in place, there is limited interoperability between them (specifically the payroll system – IPPS, the health workforce information system – iHRIS, DHIS2, the master facility list, and the staff list). This lack of information exchange or data sharing across systems leads to duplication of efforts and requires manual analysis to, for example, calculate staff workload. Furthermore, multiple systems in place require different login passwords and result in system fatigue, which acts as a barrier to data use.

Visibility Outside Formal Public Sector

Looking across the multiple information systems and the capabilities they provide, visibility into the private sector and the CHWs are major gaps.

Established in 2018, the CHW registry has not been kept up to date and is only used in 35 out of 135 districts. There is a newly established Department of Community Health that presents an opportunity to expand this further, but the assessment found a general lack of awareness of the CHW registry within the department and its leadership.

Unlike Mozambique and Burkina Faso, the medical and nursing professional councils in Uganda have a comprehensive listing of both public and private sector health workers that is routinely consulted at recruitment to ensure the health worker is in good standing with the council. Interoperability across systems, however, is lacking, resulting in duplicated efforts and siloed HRH data. Some public-salaried health workers are seconded into faith-based, non-governmental organization (NGO), or trust hospitals, and the iHRIS records their details. Private sector facilities also register with and report to local government (described below), but the assessment did not learn of this data being used for HRH decision making.

Findings Across Priority Use Cases

Looking across the priority use cases in Uganda, what emerges is an ecosystem with significant donor investment in HRIS over the years but that still sees uneven ownership and data use across the health system. System design has generally been driven by top leadership and has not necessarily kept up with user needs at subnational or facility levels, despite the decentralized structure of health system.

Recruitment and Deployment

iHRIS puts Uganda in a strong place for HRH recruitment and deployment, but engagement with the system is uneven across different districts depending on the strength of subnational leadership and HR governance and budget allocation. The CHW registry's limited use hampers its utility to track and manage these frontline workers.

Unique to Uganda across the deep dive countries, professional councils are consulted by service commissions during recruitment of health worker to check that applicants are in good standing. Councils consult comprehensive electronic registries for this (using iHRIS Qualify). However, a legal requirement to maintain paper registers alongside electronic systems is time consuming. The following bottlenecks were also identified:

- For both national and district level recruitment, there are often insufficient funds to cover salaries and the actual recruitment processes, which takes place across various ministries for a single health worker.
- At every level, while there are data sources available for equitable deployment, there are also strong preferences on the part of health workers about where they would like to be deployed that need to be considered.
- The identification of health workers is not assured. It is possible for health workers to be fired and then reapply, claiming not to have worked with government before.
- Updating data in IPPS and iHRIS is not always done in a timely manner, undermining the utility of the data.
- Not having visibility into CHW or private sector health workforce limits government's ability to deploy needed staff and make effective referrals and workforce plans with the 'big picture' perspective.

Further details including the data flow for recruitment and deployment can be seen in Appendix B.

Salary Payments and Reconciliation

Despite there being an HRIS in place, key respondents regarded IPPS (payroll data) as the most important source of HRH information, with many steps involved in ensuring its integrity; essentially, this data flow creates a valued and most often used data set for HRH decision making. Challenges identified include:

- Only Ministry of Public Service-contracted workers are paid through IPPS/IFMIS, limiting visibility into non-gratuity contract workers and project hires
- Administrative functions like pay change reports are not streamlined and can be time consuming for payroll managers to complete
- Salary delays have also been reported for health workers.

Further details including the data flow for salary payments can be seen in Appendix B.

CASE STUDY: PRIVATE SECTOR HEALTH WORKER DATA

Data about the private sector is typically captured through facility registries or the professional councils.

One private hospital administrator interviewed in Uganda described reporting requirements to both the government and the council. The facility registers with the Uganda Medical and Dental Practitioners Council and reports its service delivery data monthly to Kampala Capital City Authority (KCCA), under Nakawa Division where the hospital is located. The government ensures that the facility operates according to the law and health standards. Reporting is paper-based, manual, and requires a close to full-time person to complete. The facility risks losing its annual license if it does not report.

HR data management is conducted manually and used for staff management, deployment, emergency planning, staff tracing, and calculating salary and benefits. Payroll is manually calculated and processed.

BEST PRACTICE: ACTIVELY WORKING WITH PROFESSIONAL COUNCILS AND POPULATION ENGAGEMENT

Health Professions Council ensure that all data for registration and licensure of doctors and nurses is current using iHRIS Qualify. Before hiring a health worker, the District Service Commission checks with the councils to ensure they have an active practice license and have a good service record.

Citizen engagement is also supported - Ugandans can send an SMS text message to the medical council to ensure that their doctor is in good standing.

Individual Performance Management and Attendance Tracking

Performance appraisal is based on an annual plan but is out of sync with other systems planning processes. Health worker attendance tracking is biometrically enabled through mobile phone applications or manually tracked through attendance registries, with health worker absenteeism resulting in reductions to salary payments in some facilities. For the performance management and attendance tracking data flow, there were many bottlenecks identified, these are described below:

- Attendance data are tracked either through paper registers or a biometric system, which is not at national scale at this stage. Where attendance is tracked manually, the data can be difficult to aggregate. Health workers may also sign in on behalf of their friends, undermining the quality of the data.
- In some districts if there are absences, the district health office docks the salary of health workers manually. However, this link between attendance and salary payment is uneven across districts.
- Performance review meetings are scheduled to occur quarterly. Appraisals are scheduled to occur annually. There are no automated reminders; quarterly review meetings are often skipped, and the process only occurs annually. The performance review process is out of sync with other health system factors such as budgeting and procurement, undermining its utility as an aligned planning tool.
- Performance reports are kept in personnel files and are often missing or incomplete. The data are not easily accessible for management review. HR must verify all the reports, but this is often not done.
- The Rewards and Sanctions committee meets quarterly to review any performance issues. The committee relies on perceptions of performance by supervisors and others and not data, which are in hard copy and not available quarterly.
- While there are options to reward high-performing staff, the process is quicker to punish than reward.
- As of this year, performance-based financing will be implemented nationally, supported by the World Bank (Ministry of Health, Republic of Uganda, 2019). DHIS2 data are used to assess facility performance outputs.

BEST PRACTICE: TRACKING HEALTH WORKER ATTENDANCE

Biometric attendance tracking at large facilities in some districts has been integrated into iHRIS Manage. Docking of payments for unexcused absences has encouraged improved attendance. The education sector has replicated this practice and has started tracking attendance too.

While there are opportunities to strengthen this process, the fact that performance appraisals are based on annual plans for all health workers puts Uganda ahead of the other deep dive countries. In addition, plans for digitizing this process through HCMS for the entire public-sector workforce are promising. It is likely that the data and the process will improve if the data have more perceived use in decision making. Further details including the data flow for performance management and attendance tracking can be seen in Appendix B.

Bottleneck Identified

Data Availability

- Project and contract work hires not captured.
- CHW data not widely accessible or shared - registry only used in 35 out of 135 districts.
- Data on private sector workers available through council databases registrations for doctors and nurses.

Data Quality and Use

- Data on health worker post location not always up to date.
- Performance reports incomplete or missing; data not easily accessible for management review.
- Mismatch between number of graduates and registered HWs

Systems and Tools

- Multiple data systems result in systems fatigue and fragmented data.
- Insufficient access to HRIS reports by key decision makers.
- Councils must maintain parallel paper and electronic systems which is time consuming.

Human Capability

- Professional councils led by volunteers.
- Engagement with the system is uneven across different districts.

IDENTIFIED BOTTLENECKS ACROSS DEEP-DIVE COUNTRIES

The three country deep dives identified several bottlenecks across four areas; data availability; data quality and use; systems and tools, and human capabilities. Table 7 below provides an overview for each of these bottlenecks.

Table 7 – Common Identified Bottlenecks in HRIS for Deep Dive Countries

CATEGORY	BOTTLENECK	DISRUPTION TO HRH PLANNING AND MANAGEMENT
Data Availability	Lack of available data on CHWs	▪ Data about CHWs often not available or accessible. Even in countries with a strong HRIS, CHWs are typically not included (Smisha et al., 2019). ▪ CHWs are seen as volunteers rather than part of the health workforce. ▪ Lack of data means management and planning of cadre is beyond the ability of the MoH, remains ad hoc. ▪ Management of CHWs is localized; there are missed opportunities to strategize CHW deployment at the national and subnational levels.
	Lack of available data on private sector workforce	▪ HRIS investments have been mostly for public sector employees and not the private sector. ▪ Lack of data undermines the MoH's ability to optimize resources in deployment and to ensure that public sector health workers are addressing existing gaps rather than duplicating resources. It also undermines the ability to conduct referral planning for specialist care. ▪ Little demand for private sector data exists. Where council data or facility registry data were available, it was not widely used.
	Lack of available data on public sector workforce	▪ HRH Data can be incomplete, inaccurate, inaccessible, or may not exist at all. ▪ Specific gaps exist around performance, attendance, and health worker location. ▪ Lack of data creates blind spots in planning and management and uneven oversight.
Data Quality and Use	Compromised data quality and timeliness	▪ HRH data are not captured in a consistent, timely way, and hard to verify. ▪ Poor quality data are not useful for decision making, undermines confidence in the system.
	Uneven use of data for decision making	▪ HRH data are unevenly used across multiple level of the health system. ▪ Quality of data and system engagement are undermined when data are not used consistently across the system, as are equity in deployment, transparency, morale, and trust in the health system.
Systems and Tools	Fragmented data and systems	▪ Multiple duplicative information systems increase workload, undermine system engagement, and create confusion that limits the usability of the data (Akhlaq et al., 2016).
	Tools and systems do not meet user needs	▪ Tools do not support the most needed HRH functions at every level of the health system. ▪ Systems are often designed to meet the needs of users at the national level, as aggregators of data for reporting purposes. ▪ System engagement and sustainability are undermined when digital systems do not meet the needs of all users (Hotchkiss et al., 2006; Li et al., 2017). Key functions are completed manually, external to the information system, creating parallel workflows (e.g., performance management and attendance tracking).
Human Capabilities	Lack of user skills and bandwidth	▪ Mismatches exist between digital systems design and basic digital literacy or skills needed for analysis and application of data to make decisions. ▪ Workload, office space, or connectivity mean some health workers simply do not have capabilities to use and maintain a digital information system (Hasnain et al., 2019).

OMAN: AN HRIS SUCCESS STORY

Through the initial multi-country review Oman was identified for its exemplary investments in HRIS and data use, planning, and management practices.

Oman's investment in its health system was spearheaded by high-level leadership at the Ministerial level from the early 1970s; since independence, health system decision makers have relied on data for health system planning and development (Ben Halim, 2020). The foundation of the health system was a strong paper-based system and data use. Initially, all health information and HRH systems were manual and then databases were moved to Microsoft Excel and Access, with a gradual shift toward automation.

Systems in Place

There are currently three main information systems in Oman relevant to HRH: Mawred, Al-Shifa, and InfoBank. Work is currently underway to link Mawred and Al-Shifa and create interoperable systems, leading to a single, unified system for HRH. InfoBank will be abandoned once all data elements can be extracted from the integrated system. The unified system will eventually include data from other sectors relating to the health workforce, such as the private sector and universities (Elhadi, 2007).

Mawred was developed by the Ministry of Civil Service in 2007, designed for use across the whole public sector. The MoH (at the central level) began using the system in 2011. Mawred was developed to ensure that HR data are available in one database and organized by ministry. Each ministry implements Mawred according to its needs, and there is a committee responsible for implementing Mawred in each governorate. A Health Committee in the MoH is working to further customize Mawred with the Ministry of Civil Service to ensure that health workers are accurately classified by occupational title. By 2030, the MoH plans to rely totally on Mawred for its HR management needs.

Al-Shifa is a comprehensive HIS developed by the MoH in 2000, primarily to capture service delivery statistics (Al-Garbi, 2015; Khan, 2017). It was created to replace the paper system previously used by the MoH to manage its facilities, including HR, equipment, and supplies. A variety of MoH staff and end users participated in an iterative process with the Directorate of IT to design and maintain the system. Implementation began in a tertiary hospital in Muscat, progressed to secondary care facilities, and then was expanded to primary care facilities. As the system continued to evolve and develop, implementing the WISN process highlighted data challenges with Al-Shifa and users documented needs and recommendations to improve Al-Shifa in official letters. Task forces were established to determine processes for implementing recommendations. It is currently in use across all facilities and includes fully integrated and accessible electronic medical records (EMR) for patients, e-referrals, and e-notification for disease surveillance. An IT Committee, comprised of secondary and tertiary care providers, provides feedback on all new requirements (e.g., forms, modules) and priorities for Al-Shifa.

An overview of Mawred and Al-Shifa is summarized in Table 8 on the following page.

BEST PRACTICE: COVID RESPONSE

During COVID-19 the Minister of Health, via his phone, knows where all staff are working, where each COVID patient is hospitalized, and how many beds and supplies are available.

NOTES ON REPLICABILITY

While the drivers of system development in Oman are unique, the technical progression of the system is potentially replicable (from a paper-based system toward an integrated system). Tracking the system development provides a sense of direction for other countries with different HRIS maturity levels.

Table 8 – System Overview

SYSTEM	MAWRED	AL-SHIFA
Year Developed	2007, used by MoH since 2011	2000
Lead Ministry	Ministry of Civil Service	Ministry of Health (run by Health Information and Technology Department)
Users	Multiple ministries in Oman (including MoH). At MoH, the Directorate of Administration is the main user	MoH users (e.g., healthcare providers)
HRH Functions Supported	Pre-service education, registration and licensure, payroll information, personnel actions, in-service training, attendance, performance	Registration and licensure, staffing gaps and needs, in-service training, workforce exit/attrition, attendance (in addition to electronic patient, supply, and equipment management functions)
HRH Data Elements	Staff name, staff ID number, specialty, nationality, gender, age, education details, types of training received, emergency leaves, annual leave, supporting documents (e.g., curriculum vitae), payroll, evaluation, exit/attrition	Each healthcare worker has an account in Al-Shifa (captures all administrative data from interview to retirement), workload, all data on patient care (e.g., case files)
Decisions Supported	Establish the number of health workers in a health facility (e.g., total number of cardiologists in a hospital)	To determine the workload (e.g., number of surgeries performed in a hospital)

The MoH Information and Statistics Department also has maintained a parallel mechanism for HRH data collection via standalone Excel sheets, referred to as the Infobank, since 2000. HRH data are manually collected from each health institution every month for the **Infobank** (the data in Mawred and Al-Shifa are updated less frequently). These data are reviewed at the central level and reported in the Annual Health Report, which is then used for workforce planning and decision making. The MoH will shift entirely to using Mawred once the system's data are confirmed to completely align with the InfoBank database. The MoH is in the early stages of unifying data in Mawred and Al-Shifa, so that all data will be available in one system and in-depth analyses can more easily be conducted.

Governance

Oman provides an exemplary case study for HRIS governance. **Governance structures have been established to oversee HRH systems and ensure data are used to support decision making, providing a clear vision and ensuring sustainability.** A central steering committee of health services, chaired by the Minister of Health, meets several times a year to oversee health workforce issues and information systems. Quarterly reports highlighting HRH achievements, challenges, and solutions are presented to the central steering committee, with an emphasis on maintaining performance across all governorates.

Since Al-Shifa was established, a central committee chaired by the Director General for Specialized Medical Care approves all major changes to the system. Every hospital in Oman also has an IT committee responsible for regular updates and approving minor modifications. Oman's decentralized system of governance has been strengthened by local health managers using data for decision making, and the HIS was built to support this model.

There is engagement with HRH data at the highest levels of government for health systems development. Ministers and secretaries have been invested in planning and establishing health facilities in Oman using data to plan facility location and develop staffing plans. The MoH uses the WISN methodology to guide the establishment of staffing norms across all specialties in hospitals and health centers and monitors key HRH indicators to ensure that health workers are distributed according to the workload at a given health facility.

A major **driver of system development and data use is managing a dynamic expatriate health workforce** while at the same time building up a local health workforce. To address staff shortages and rationalize costs, country leadership allotted resources for building capacity of national staff by sending them abroad to train, reducing reliance on expatriate health workers. HRH data are used to determine the need for post-graduate specialty training and the number of fellowships required for health workers. These decisions are made in **collaboration with the Ministry of Higher Education and the Oman Medical Specialty Board** (Government of Oman). HRH data are also used to identify needs for creating local education programs (e.g., undergraduate programs for cardiology technicians) in collaboration with the Ministry of Higher Education.

LESSONS FROM THE EDUCATION SECTOR: THE EMIS IN ANDHRA PRADESH

In conversations across all twenty countries, stakeholders had a low level of awareness of what was happening in other sectors around human resource information systems.

This likely reflects the administrative and programmatic silos in which most donor and government officials work. Instead, there was a strong perception of the health sector being a leader in human resource information management. Nevertheless, the assessment team was able to document a success story from the education sector in India, where there is a robust integrated education management information system (EMIS) in place, including a teacher information system and a teacher attendance tracking system, among other components.

Like health, education is also an information-intensive sector. Looking at design process of the EMIS in Andhra Pradesh (AP) illustrates many lessons learned that are applicable to health, including achievement of interoperability, availability of data on private schools, ensuring the system meets the needs of multiple users, including data entry into job roles, institutionalizing capacity building, and making data available to parents and community members (Shoobridge, 2020; UNICEF, 2021).

Bringing an EMIS to the School-Level

In the recent past, considerable investment has gone into strengthening national education monitoring systems. These efforts have largely focused on creating EMISs at the national level, with little focus at subnational and school levels. From 2012-3 the national "UDISE" system in India required data reporting from states to the national level but didn't have the state's decision-making needs factored into the system design. This centralized approach is problematic for system engagement since it is at **subnational and school levels where data are entered, as well as where key decisions are made and problems addressed.**

The EMIS in Andhra Pradesh is unique in that it focuses on decision makers at multiple administrative levels, including the school. "Making the system useful for those who use it," is a key success factor (Government of India, Ministry of Human Resource Development, 2019). The AP EMIS system was designed in 2016 with a bigger range of data points collected to serve a larger range of data use cases for decision makers at all levels, and then all its features scaled up through incorporation into the national system in 2017 as "U-DISE+". Throughout the design and implementation, the process benefitted from the **strong interest and support from the Chief Minister, Chandrababu Naidu – especially regarding attendance tracking**. While this system now operates nationally, in this case study we are describing the design phase and the system impacts which are all captured at the state level in Andhra Pradesh.

HR Data Elements

The AP EMIS covers public and private primary, lower secondary, and upper secondary schools. Initially the private sector was reluctant to share data and the data that was reported wasn't necessarily trusted. However, once the private sector could see how the system benefitted them, they became more engaged with reporting. For example, it became easier for them to get their fire safety certification, and other routine approvals required to remain open as a business (seven different government departments are required to give approvals for the ongoing functioning of schools). However, most indicators are published for the public sector, for use in public sector planning, and reference the private sector when assessing the requirements of the public-sector provision of schooling.

In terms of the education workforce, **Andhra Pradesh emphasizes that teachers' data should be updated correctly and validated at respective levels**. To facilitate this, teachers can update their own details, subject to a digital approval process involving head teachers, cluster education officers, and Mandal or block (local administrative unit) education officers, via a mobile application.[8]

Mobile Access at the School Level

The AP EMIS employs mobile applications to engage teachers and headmasters in schools and is designed to easily meet their needs (e.g., they can file leave notifications or enter information on the class list). The Department of School Education ensured schools have a monthly allowance for mobile connectivity, so mobile applications were accessible to staff in schools with poor infrastructure, which lacked capacity to engage the desktop version of SIMS. The accessibility of the system at the school level is a key success factor.

Initially, teachers complained about the data entry requirements of the system but were quickly convinced once they were able to use the data for their work, for example tracking

[8] *Staff members can access and comment on their own file by logging in using their treasury ID and password sent to their mobile number.*

absenteeism. Estimates had suggested that absenteeism was as high as 20%, but once the biometric attendance system was in place it recorded absenteeism at around 5%, which was a relief to teachers. They could also apply for leave, get a "no objection certificate" for any travel, and have any grievances addressed all through their phone.

Capacity Building

At least one day a month is allocated to mentoring staff at all levels of education, from district headquarters down to the school level. This time is used for EMIS capacity building when new applications or functions are introduced. In addition, job roles have been rewritten to accommodate the system, to ensure data entry and use is sustained.

Interoperability

System design has focused on integration or interoperability between several systems including the teacher information system, the student information system, the student assessment system, student and teacher attendance, the GIS, the midday meal system, and the national U-DISE system, with the aim of each data point only needing to be collected once, creating efficiencies, and supporting the verifiability of data (Government of Andhra Pradesh, 2018). Robust data standards such as the use of unique codes for all entities and use of application programming interfaces (API) ensure that relevant data are shared between systems. This was achieved by convening meetings among several sections within the Ministry of Human Resource Development, led by the Commissioner for High School Education. There were 11 heads of department who all had unique data requirements. An NGO called Circle Square Foundation from Delhi helped facilitate these meetings to map the data requirements for planning and management decision making. Initial discussions were also conducted with treasury to be able to use Teachers' treasury ID as a unique identifier and ensure interoperability with payroll. The ability to facilitate this cross-sectoral coordination reflects a strong governance ecosystem, with clear leadership support.

Another factor that provided ongoing coordination and technical support across the different sections of the education department was the creation of a dedicated IT unit.

Access to the Information

The information from SIMS is broadly available to parent committees and the public. However, it is not easy for a layperson to locate or navigate the information. A program has been started to appoint resource persons to engage with parents and communities on data awareness.

System Impacts

Andhra Pradesh has undertaken significant transformative initiatives to modernize and improve the education system and ensure greater equality and quality of education. SIMS plays a vital role in the monitoring and evaluation of all initiatives. **The relevance of the system to the dynamic policy environment is a key success factor.** There are several successful impacts of the system, these are listed below:

- A biometric attendance tracking system (E-Hazar) has been attributed with **increasing teacher attendance from 27.5% in August 2017 to 97.2% in February 2018.**[9]
- Performance data is now factored into the transparent transfer process, which gives more weight to performance overall. Stakeholders suggest that the AP EMIS has i**mproved teacher and headmaster satisfaction by ensuring fairer, more transparent processes of decision making, such as in the case of transfer requests**. As 40,000 transfers happen at a time, managing this process through the system, in a transparent way, has provided a huge amount of administrative relief to the education department.
- A use case that generated the biggest cost savings was seeing which schools had low enrolments, and then merging 4,000 of them using that data.

[9] *Staff can access and comment on their file by logging in.*

CAUSAL ISSUES AND PATHWAYS FORWARD

The bottlenecks that emerged from the deep dive assessment are visible manifestations of the underlying causal issues embedded in the system.

When looking to strengthen existing systems, it is insufficient to only examine and address these bottlenecks – to identify more enduring solutions, it is important to examine the underlying factors that cause the bottlenecks to exist in the first place. A summary of these casual issues can be found in Figure 10 below.

Figure 10. Summary of Causal Issues for Identified Bottlenecks

INSUFFICIENT GOVERNANCE STRUCTURES (PUBLIC)

- Low levels of inter-ministerial, inter-sectoral, inter-donor, and regional coordination
- Ambiguity about status of CHW cadres and how to incorporate into HRHIS
- Low levels of system and data ownership at subnational levels
- Lack of consultation and involvement of system users
- Lack of vision on how performance reviews could be aligned to larger systems planning and review processes

MISALIGNED SYSTEM CAPABILITIES

- Data entry functions are under resourced
- Weak infrastructure insufficient for consistent digital data entry
- Dysfunctional or archaic human HR processes and workflows
- Underdeveloped enabling environment (policy, regulation, standards)
- IT and data skills not covered in preservice training
- Implementation budgets do not include ongoing training costs

INSUFFICIENT GOVERNANCE STRUCTURES (PRIVATE)

- Lack of mandates, regulation, data sharing agreements or mechanisms and policy enforcement for private sector
- Inadequate authority and resources for professional councils

MISALIGNED MOTIVATIONS

- Disincentives for private sector institutions and workers to report data
- Low motivation for sub-national levels to maintain up-to-date data
- Health workers preferences' regarding deployment location and attendance tracking
- Limited ability to act on performance management data creates no incentive to record data
- Financial benefit from inaccurate payroll data (ghost workers)
- Lack of forums where data is reported and showcased

The next section presents recommended strategic approaches and illustrative interventions for the global community to move toward addressing the causal issues.

NOTES ON ASSESSMENT

It is important to note that the assessment describes interventions to be made to a complex ecosystem with many components and drivers. It is not intended that any of these intervention approaches are a stand-alone solution to the causal issues described; in all cases there is a requirement to also strengthen the broader ecosystem and to understand the interdependencies of these different components.

INSUFFICIENT GOVERNANCE STRUCTURES (PUBLIC)

This assessment found an overall lack of governance mechanisms or structures such as functional administrative and technical units, taskforces, meeting platforms, or committees to oversee the public sector health workforce and support cross-sectoral coordination.

Strategic approach to addressing casual issue: Strengthen governance structures and ownership by expanding functionality for routine data collection and use for administration and management. This approach would involve supporting increased ownership by convening and coordinating across different stakeholders to contribute to the design of a system that is fit for purpose, making sure it works for the people who use it. There is also a need to create policy clarity for data requirements and use in areas such as performance data and data on CHWs. The illustrative interventions as part of this strategic approach are described below.

Illustrative Intervention Approaches

- **Conduct a system audit covering indicators and processes and work toward a system development plan:** Many HR administrative processes are not optimized for efficiency, increasing the burden on already-stretched health workers and distracting them from core tasks. In addition, there are many system actors whose needs are simply not met by the system, representing a missed opportunity for increasing system utility. This intervention approach involves conducting audits to assess systems functionality and identify strengths, choke points, and unmet needs. The spirit behind this approach is to identify existing assets to build on in order to foster local ownership. It will lead to a system development plan that outlines a process to rationalize and optimize the system with streamlined workflows that capture relevant and usable data through routine administrative functions. This will involve a shift from an information system to an administrative system. It will also outline legislative requirements to define the role of data and who has access to it. The goal would be to create a system that meets a larger number of actor needs, at multiple system levels, to foster greater ownership. This would also include a process to institutionalize data standards and create a pathway toward an enterprise architecture.
- **Support the setup of robust governance structures to ensure alignment and cooperation across HRH stakeholders:** In many country contexts covered by this assessment, the appropriate governance and oversight mechanisms for HRIS were absent. This can lead to misaligned investments that are not necessarily sustainable over time. A public sector wide HRIS needs to correspond with a whole of government approach. This requires strengthening existing governance structures such as functional administrative and technical units to oversee the public sector health workforce, encouraging collaboration across different ministries and sectors, and supporting the articulation of a common vision within government that sees HRIS being used for routine administrative and management functions by those stakeholders who need them. There is an important role to play in convening HRH stakeholders, helping to define memorandums of understanding (MOUs) between them, and in supporting the design of legislation on what role HRH data should have and who should have access to it. There is also the opportunity to conduct a total cost of ownership (TCO) exercise across countries, to better understand costs related to system ownership and maintenance and to advocate for the inclusion of an associated budget line item.
- **Support better tracking and management of CHWs:** In many country contexts the role of the Ministry of Health in overseeing the community health workforce is not well defined. CHWs are seen as a volunteer cadre that work locally and are beyond the scope of the Ministry's HRH management and planning processes. Opportunities exist to better define the role of the CHWs, enumerate those working in the public sector in the HRIS registry, and encourage data sharing with other CHW programs. Integrating CHW data with facility based HRIS data will help to provide a more comprehensive view of the health workforce.

LEGAL DRIVERS OF DATA USE

The state of **Karnataka, India** has massive intra-state disparities in health outcomes, with the southern portion of the state having fairly strong health outcomes, and the northern area of the state being much worse off. To address the disparity, **the state** has HRH data use mandated through legislation that requires all health transfers and promotions be managed through the HRIS to ensure equitable deployment. Candidates can select options through a system-generated list, to ensure equitable distribution of health workers throughout the state. This law was adapted from a similar law in the education sector. While it has contributed to equitable deployment, it has been fiercely contested in courts by union and labor groups.

There have been other examples of governance and policy measures that have shaped HRIS. For example, in **The Philippines**, a universal health coverage law has been a driving force in prioritizing equity in human resources for health deployment, as there are clear outcomes that need to be achieved under the law. However, the country's HRIS does not provide accurate workforce data at this time.

INSUFFICIENT GOVERNANCE STRUCTURES (PRIVATE)

This assessment found an overall lack of governance mechanisms or structures such as taskforces, meeting platforms, committees, or functional administrative and technical units to oversee the public sector health workforce and support cross-sectoral coordination.

Strategic approach to addressing casual issue: Strengthen governance structures and ownership by expanding functionality for routine data collection and use for administration and management. This approach would involve supporting increased ownership by convening and coordinating across different stakeholders to contribute to the design of a system that is better fit for purpose, making sure it works for the people who use it. There is also a need to create policy clarity for data requirements and use in areas such as performance data and data on CHWs. The illustrative interventions as part of this strategic approach are described below.

Illustrative Intervention Approaches

- **Demonstrate the value of enumerating the private sector health workforce and define the highest value data types:** The assessment found that governments also do not always see the value in making private sector oversight a priority. Nevertheless, this often co-existed with a policy framework for private sector service delivery oversight – although not necessarily focused on the health workforce, specifically. To contribute to a common vision, this intervention approach would document use cases to illustrate the benefits of data sharing; for example, cross-sectoral referral planning; ensuring deployment planning fills existing gaps in access to care; ensuring suitable supplies so all private sector health workers are vaccinated against COVID-19; and that health workers can be deployed for emergencies such as outbreaks or disasters.
- **Define data standards and design data sharing frameworks that provide incentives and protection for the private sector to report data (e.g., grants or tax breaks to help offset reporting costs):** The assessment documented anecdotes about the private sector being averse to sharing data because they did not want to provide information that could be used against them (through taxation, cutting off their labor supply by preventing dual practice, onerous regulation). This intervention approach supports data reporting and sharing by developing model data sharing frameworks and MOU with built-in incentives for private sector health worker data reporting. This framework would position HRH data reporting as an attractive proposition and ease the burden to the extent possible.
- **Identify regulatory bodies most appropriate to conduct health worker oversight and build capabilities:** : In most country contexts professional councils play an active governance role in regulating the health workforce's scope, minimum entry to practice standards, and in some cases reaccreditation standards, which protects the public from unqualified health workers. Through these processes, the councils have an accurate count of all health workers in the country. Data can also be shared with the government or other employers, to ensure that all new hires are appropriately qualified (this happens in Uganda, and plans are underway for this to occur in South Africa). Data can also be shared with members of the community to ensure that their provider is registered (this happens in Uganda; patients can short message service [SMS] the council to check if their doctor is registered). Councils with this level of capacity and perceived legitimacy were not observed across all country contexts. In addition, in several contexts where the councils had registries, there was low demand for council data by key MoH decision makers. Nevertheless, a health workers' regulatory function is required. In each country context, starting with the governance infrastructure that is in place, the appropriate regulatory mechanism can be established. This requires a supporting legislative framework and dedicated resource allocation. The WHO is looking to develop new global guidance to better design, reform, and implement effective and flexible regulatory bodies.

MISALIGNED SYSTEM CAPABILITIES

Overall, this assessment finds that systems are not sufficiently adapted to the local context, especially at subnational levels, including level of connectivity, the availability of electricity, and the skills and workload of the different health workers.

Strategic approach to addressing casual issue: Design and support HRIS interventions that are tailored to existing country needs and build on what is already in place. This approach requires bringing digital systems to a better level of agreement with broader system capabilities, including skills and infrastructure. This requires adjustment both to the system design (for example, offline data entry capability) and to the broader systems context (for example, having a backup router to ensure connectivity or building user data skills. The illustrative interventions as part of this strategic approach are described below.

Illustrative Intervention Approaches

- **Develop an interoperability playbook that describes a pathway to an enterprise architecture:** Multiple information systems with different logins create duplicative workflows and systems fatigue. This is a burden in contexts where data entry functions are already under-resourced. Multiple systems then also require extensive manual analysis to bring the data sources together, in, for example, a workload analysis such as WISN. The assessment captured efforts to create HRIS system interoperability that had failed or stalled. It was clear that stakeholders underestimated the magnitude and cost of the tasks, specifically the required level of negotiation between relevant parties to create data standards and data sharing agreements. An interoperability playbook that can describe the human, organizational, financial, and technical elements required, in sequence and over time would serve as a guide to countries and implementors. This playbook would include guidance on creating data sharing agreements, clarifying roles and responsibilities, and calculating the total cost of ownership for system interoperability within a specific context. It would also include details about a minimum data set, building upon existing efforts in this space.
- **Invest in system design for low-resource environments and infrastructural limitations, such as the support of an HRIS-lite tool for data capture and use:** The assessment found that systems were often designed with little regard for the broader systems context, for example, low data literacy, low computer literacy, or the absence of regular connectivity or power supply. This intervention approach describes digital design appropriate to contexts with infrastructural and capacity constraints, using existing tools such as smartphones for scanning and biometric identification functions. The Andhra Pradesh EMIS systems' use of mobile devices for routine data entry at the school level is a good example of this.
- **Include a module on IT and data skills for HRH in the UNICEF curriculum being developed for management and leadership skills for subnational actors:** In many contexts, health workers do not enter service with IT and data skills, putting them at a disadvantage to engage confidently with an HRIS. Ensuring that HRIS meet the needs of decision makers at the subnational level is key to maintaining system relevance overtime, but there is a complementary need to ensure that subnational actors have the data and IT skills required for system engagement and data demand. This intervention approach will include an HRIS module focusing on the skills required to use data to make strategic decisions.
- **Support registries and strive for interoperability between key HRH data sources:** Having one source of truth for HRH data is critical to effective HRH management. Supporting countries to develop one accurate, up to date, list of health workers that includes their location is an important intervention area. Building comprehensive facility and health worker registries and implementing data sharing between key HRH data sources (e.g., HRIS, facility registries, payroll, and HMIS) is a clear opportunity area to strengthen the HRH ecosystem. The entry point for building and expanding these registries will vary by country, according to the policy context. This intervention approach recommends identifying the appropriate existing data source(s) that are already trusted and building a health workforce registry from there. Data sources could include provider network registries (such as faith-based organizations), health professional council registries, the payroll, the Public Service Commission data base, or the Ministry of Civil Service database. The registry can be built and expanded with a view toward interoperability and an enterprise architecture to support local ownership and sustainability.

BEST BETS FOR INTEROPERABILITY

Both **Karnataka** and **Uttar Pradesh (UP) in India** have an API that creates a level of interoperability between the health worker registry and the payroll. This means that any routine adjustments to salary payments because of leave or changes in entitlements can easily be fed from the health worker registry into payroll, and salary payments can be made accordingly – this occurs monthly. The identifier that enables this is the staff ID. This interoperability is in accordance with the National Digital Health Blueprint. One of the stakeholders in UP, India said, "If you don't have interoperability with the payroll, forget it; the system will never work." Interoperability between the health worker registry and payroll will also make it easier to identify and eliminate ghost workers, a goal that the Ministry of Finance would ideally support.

The assessment identified payroll as a foundational building block in the HRH information ecosystem. Both **South Africa and Mozambique** currently use systems that were built to serve the needs of payroll (PERSAL and eCAF, respectively). This can lead to some data blind spots; for example, it often means there is not a longitudinal record in place, but both countries have new systems under development to address these gaps.

MISALIGNED MOTIVATIONS

Systems are not designed in alignment with actor motivations and may lack the incentives needed to realize desired behavior when it comes to ensuring data quality, reporting and use. Disincentives for private sector institutions and workers to report data, low motivation for sub-national levels to maintain up-to-date data, and the reality of health workers preferences' regarding deployment location and attendance tracking are some examples of this.

Strategic approach to addressing casual issue: Incentivize and enable data reporting and use while supporting routine meeting platforms where data can be showcased. This approach would include raising the profile of key HRH data functions (data capture, entry, aggregation, and use) throughout the health system, so system users are better incentivized to engage with data. It includes giving visibility to HRH data use in routine meetings at national and subnational level where decisions are made and reviewed and convening conferences where HRH data can be showcased. The illustrative interventions as part of this strategic approach are described below.

Illustrative Intervention Approaches

- **Incentives for data reporting at the facility level:** Data reporting at the subnational and facility-level is often not timely. This intervention approach creates incentives and sanctions for facilities to encourage high quality, timely data reporting. Actions could include allowing facilities to fill vacancies, provide training opportunities, and receive budget for equipment and supplies only once data are entered and reported. Efforts will need to be taken to avoid negative causal loops, whereby weaker facilities that are not able to report are then further weakened by deprioritization for required support.
- **Showcase HRH data:** The assessment found low priority given to data entry, aggregation, analysis and use at the subnational level, and little motivation or engagement around these functions. SShowcasing the use of data in routine meetings at national and subnational level, where it is reviewed, feedback is provided, and decisions made, makes data-related tasks feel more tangible and increases motivation for engagement. The assessment documented an example in Mozambique where dedicated HRH conferences were convened for showcasing decisions made with accurate and current data – raising the profile of the data and of the effort that went into collecting them.
- **Track health worker attendance and use data:** Health worker attendance is often tracked through paper-based registers, where it is difficult to aggregate and review. This makes it hard to use for performance review and for paying health workers for hours worked. There is also financial benefit associated with health workers "moonlighting" across multiple jobs and the existence of ghost workers on the payroll. In Uganda, some districts document attendance through biometric attendance and then dock salaries of those who are serially absent. This intervention approach suggests strengthening systems for health worker identification, tracking, and accountability by scaling up biometric attendance systems. This approach would be enabled by a national or council-led UID system covering different employers and sectors. These data will then be used to calculate salaries appropriately, and send a strong message that the health system takes health worker attendance seriously.

CONCLUSION

Human resources for health information systems are deeply embedded in the complex public sector governance ecosystem.

Not only do they require a cross-sectoral perspective, but they also represent a real need for a whole-of-government approach. A great example of this requirement is that in Uganda four ministries need to come together to hire a health worker at the district level (the Ministry of Health, the Ministry of Public Service, the Ministry of Finance, and the Ministry of Local Government). Across the many recommendations, one that abides across all country contexts is the requirement to bring together the many different ministries and departments involved and ensure ongoing coordination and oversight, to move towards the goal of more integrated and effective systems. While this seems like a straightforward requirement, the assessment found that this coordination was both rare and difficult to achieve.

The case study from Andhra Pradesh demonstrates what can be achieved from such a convening in terms of system design – interoperability between seven system components, reductions in absenteeism, and increased morale from transparent processes. Furthermore, Oman has achieved UHC in the context of enduring health worker shortages, demonstrating the benefit from ongoing inter-ministerial HRIS oversight. Burkina Faso's Team 7 has the role of overseeing development partner inputs in the area of HRH to ensure they are aligned with government policy and budgets, to ensure sustainability. This level of required engagement with an HRIS speaks to another abiding recommendation, the importance of local ownership. In Mozambique, this was achieved through building on what was there (the public sector personnel record system) and adapting for the Ministry of Health's needs. With ownership and active coordination, it is possible to create a system that meets the needs of users at all administrative levels, especially at subnational levels. This would ideally herald a shift from an information system focused on reporting to an administrative system that captures data through the completion of routine HRH tasks.

Getting HRIS right provides the Ministry of Health with an important tool for the improved design, planning, and management of the health workforce and helps give health workers the visibility and support required to do their work to the best of their abilities. Digital solutions are a necessary component in the suite of recommendations, but insufficient in and of themselves – governance oversight and ownership are critical to success. The recommendations provided in this report represent a step away from "silver bullet" novel solutions and towards the hard work of making systems work, to ensure health for all. This includes ensuring a level of robustness for the system to support pandemic response and equity in access to care.

This assessment has addressed an important gap in terms of understanding what good looks like in terms of HRIS functionality in LMIC contexts. While many countries lack an accurate sense of the composition, location, and performance of their health workforce, there are also various pathways to success described here. The recommendations build upon existing efforts at the global and country levels to strengthen HRIS, and to guide further investments towards stronger health systems.

APPENDIX A

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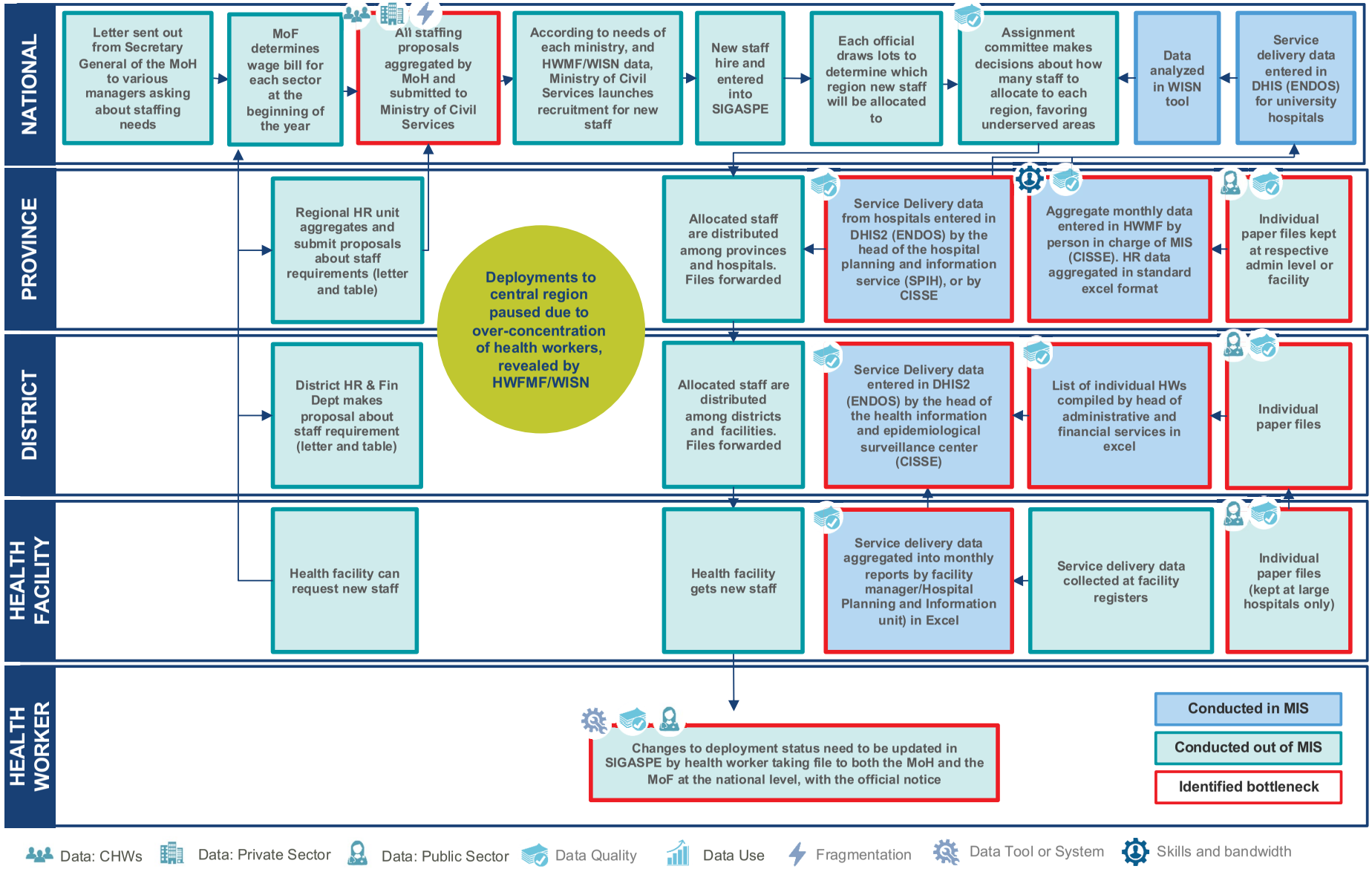
APPENDIX B

DEEP DIVE COUNTRY DATA FLOWS

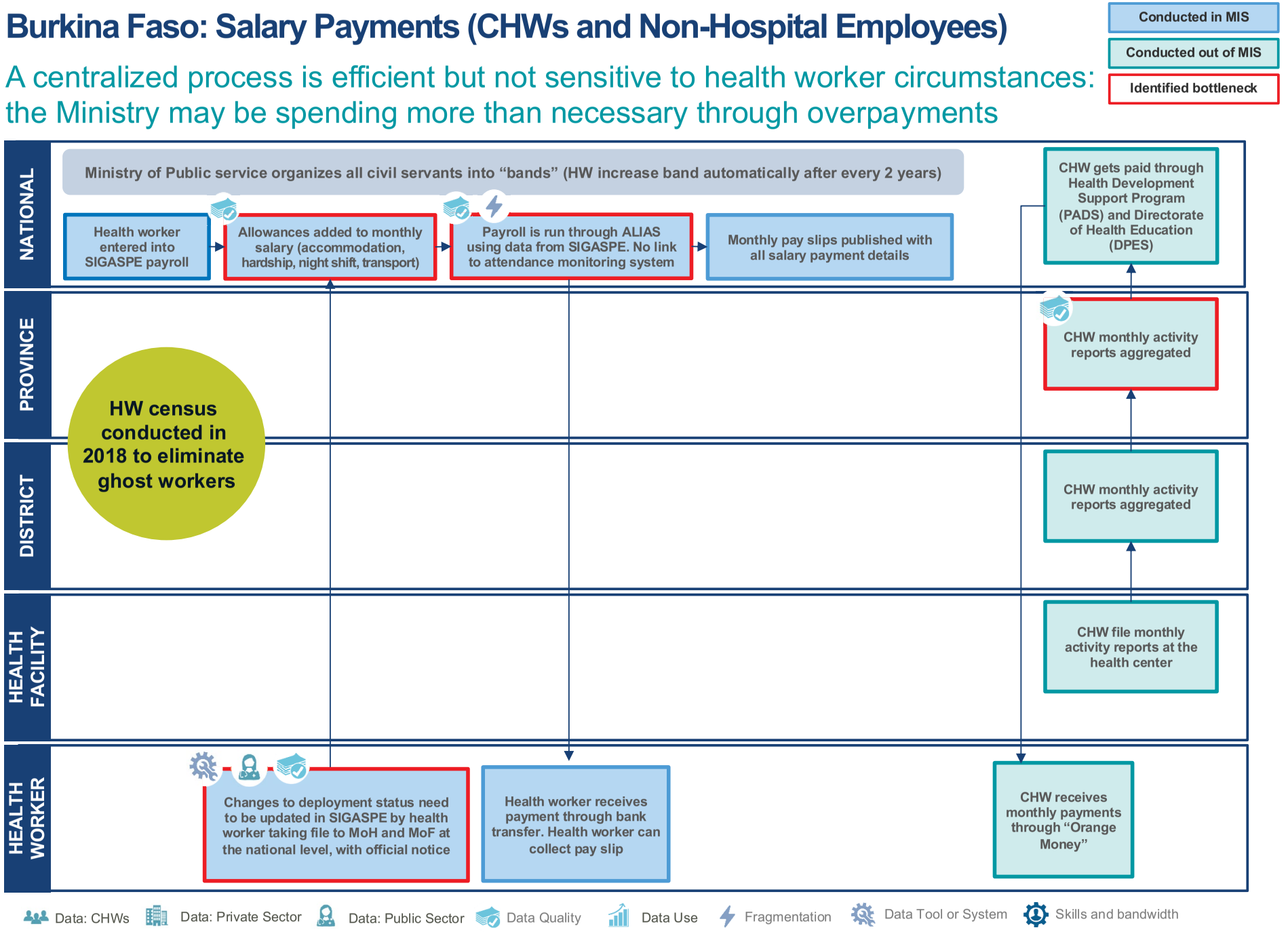
Burkina Faso: Recruitment and Deployment

Lack of individually identifiable data in any MIS. High burden on health worker to update status in SIGASPE in person, resulting in absenteeism



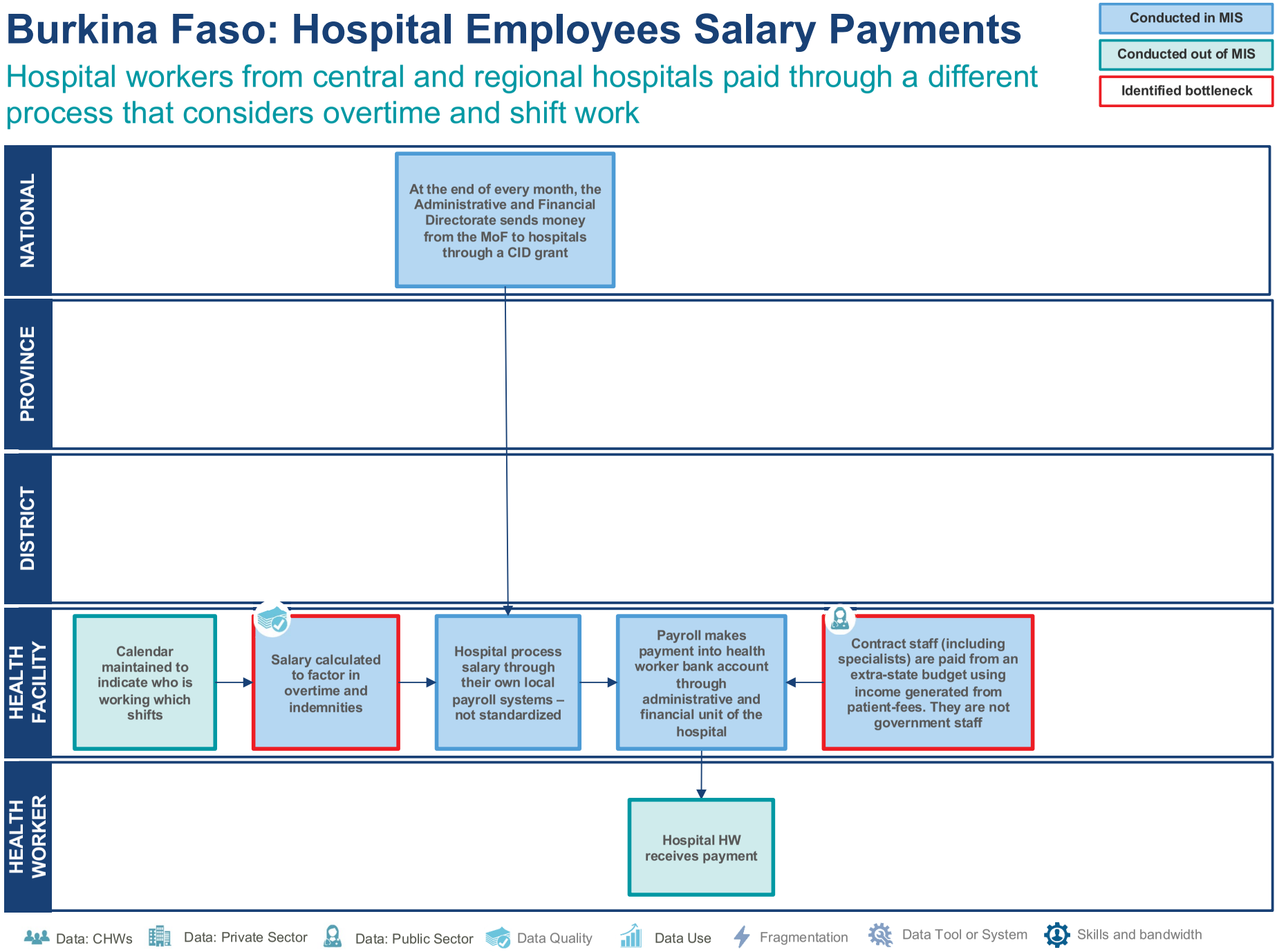
Burkina Faso: Salary Payments (CHWs and Non-Hospital Employees)

A centralized process is efficient but not sensitive to health worker circumstances: the Ministry may be spending more than necessary through overpayments



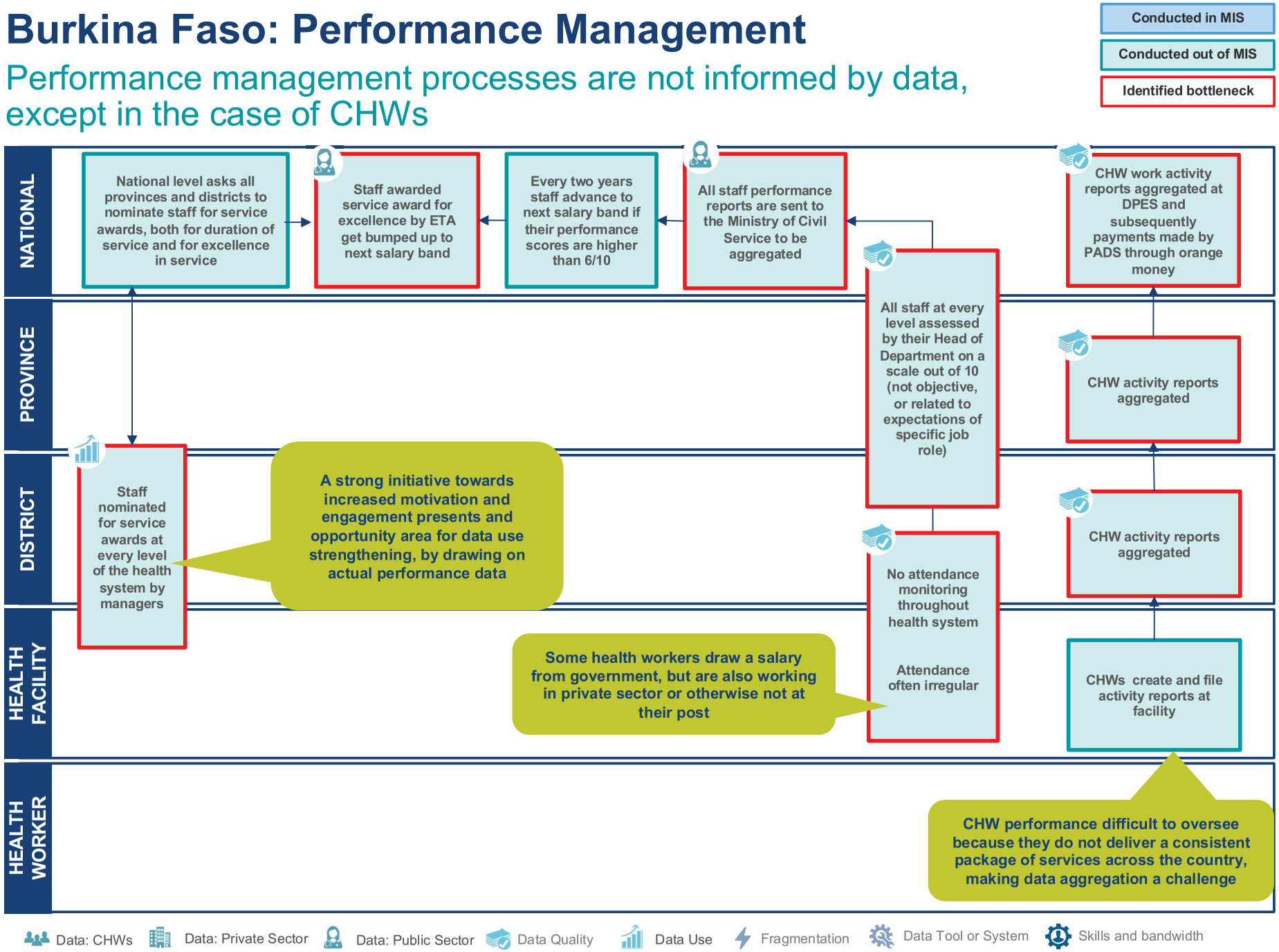
Burkina Faso: Hospital Employees Salary Payments

Hospital workers from central and regional hospitals paid through a different process that considers overtime and shift work



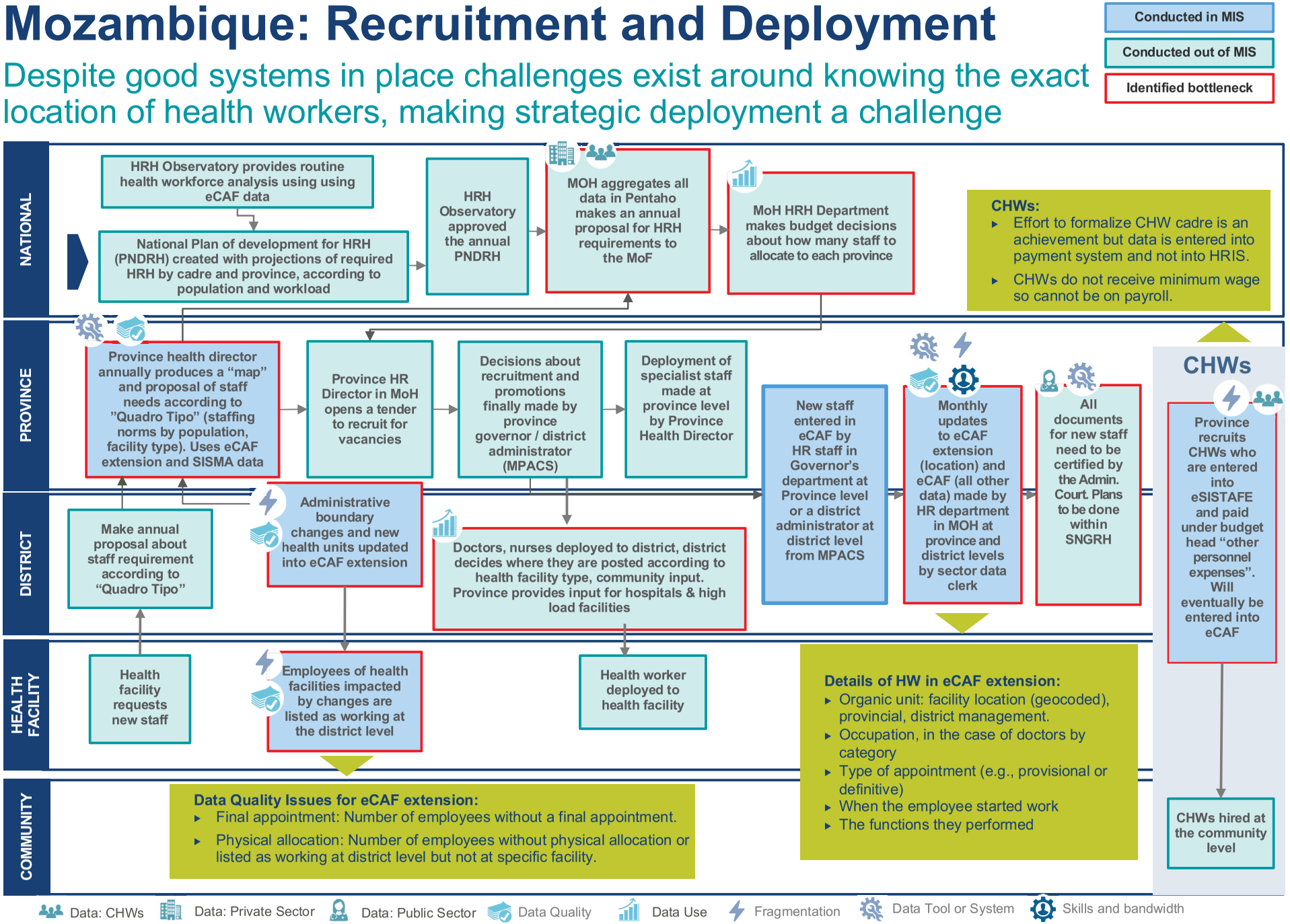
Burkina Faso: Performance Management

Performance management processes are not informed by data, except in the case of CHWs



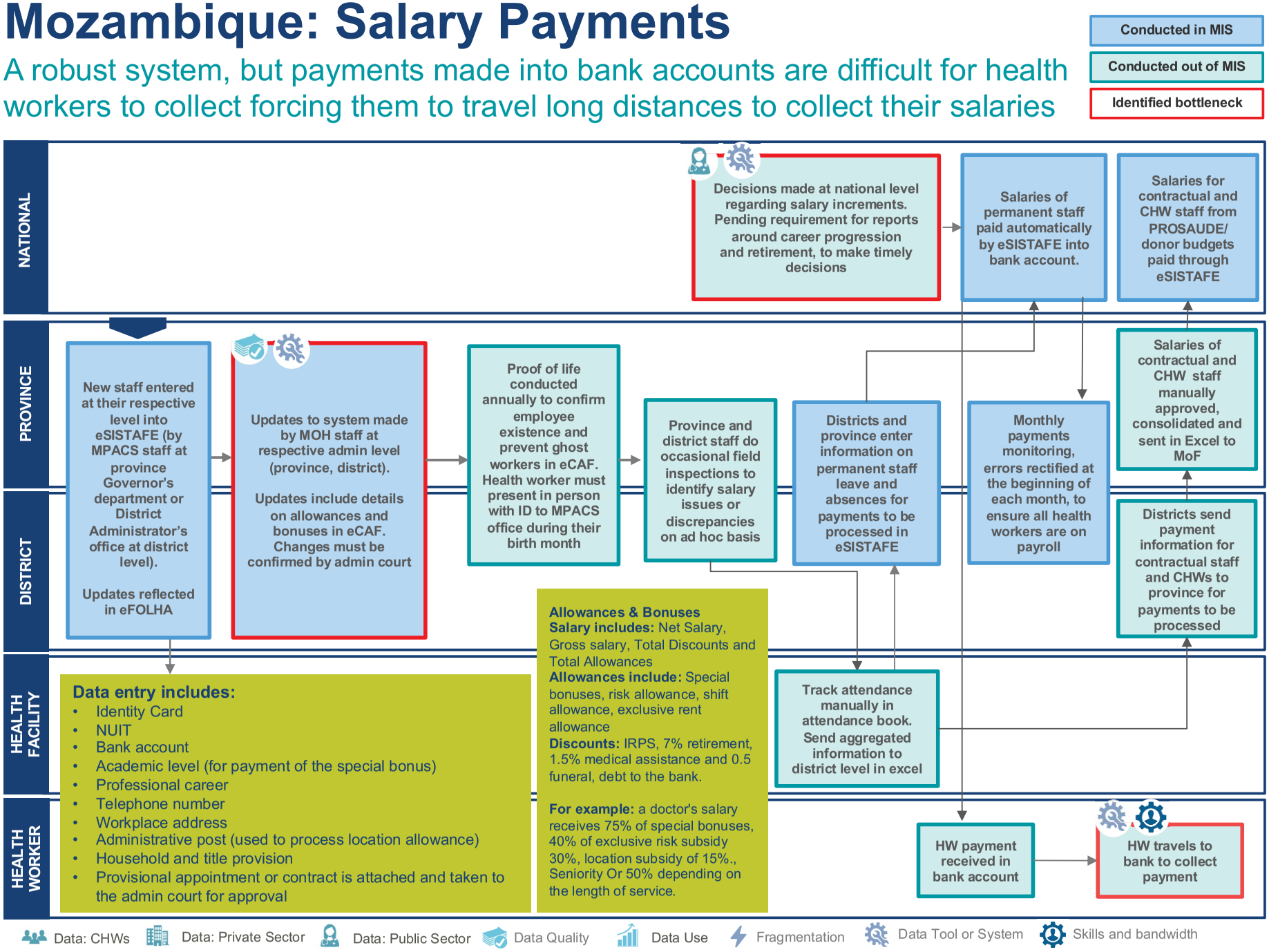
Mozambique: Recruitment and Deployment

Despite good systems in place challenges exist around knowing the exact location of health workers, making strategic deployment a challenge



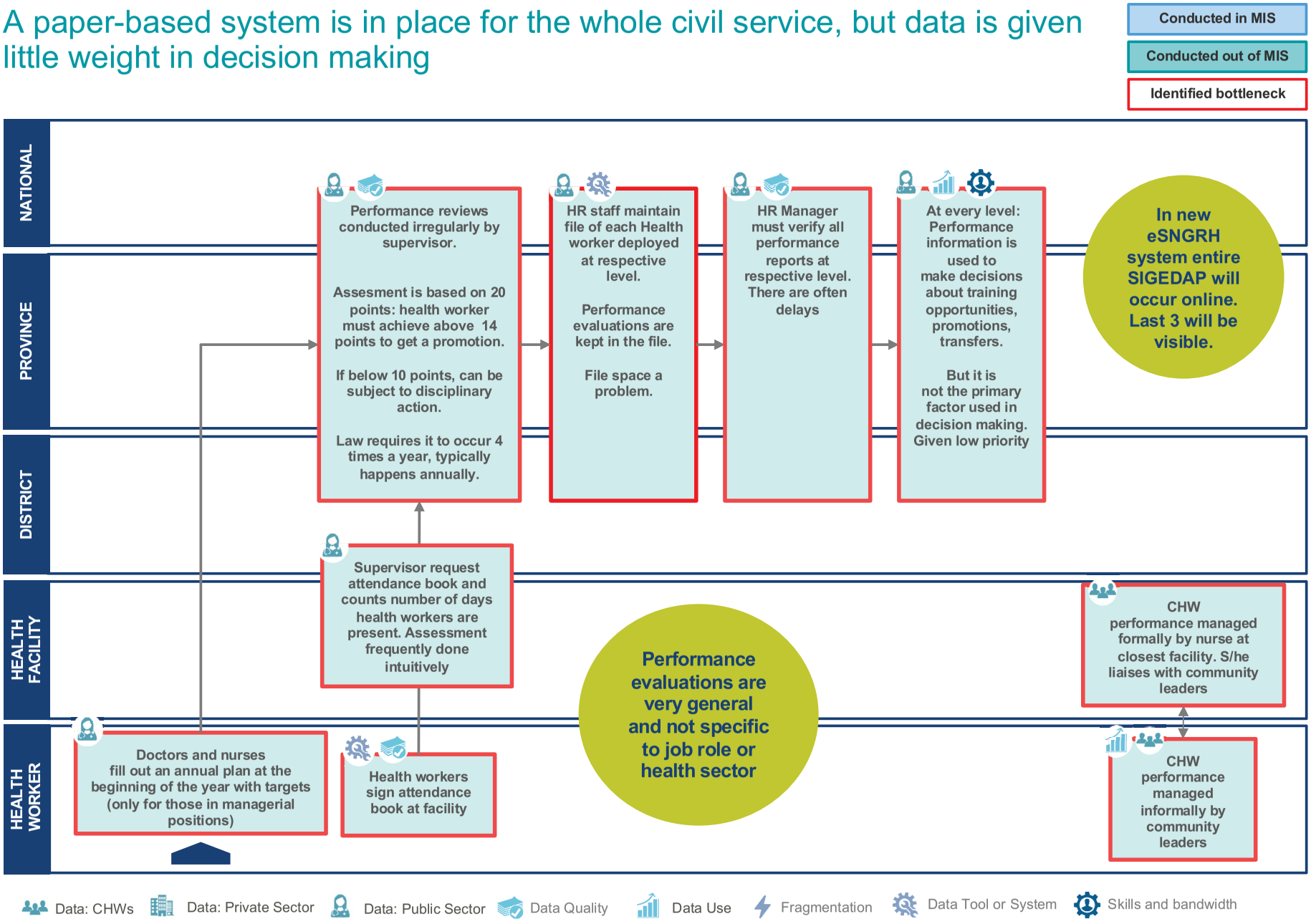
Mozambique: Salary Payments

A robust system, but payments made into bank accounts are difficult for health workers to collect forcing them to travel long distances to collect their salaries



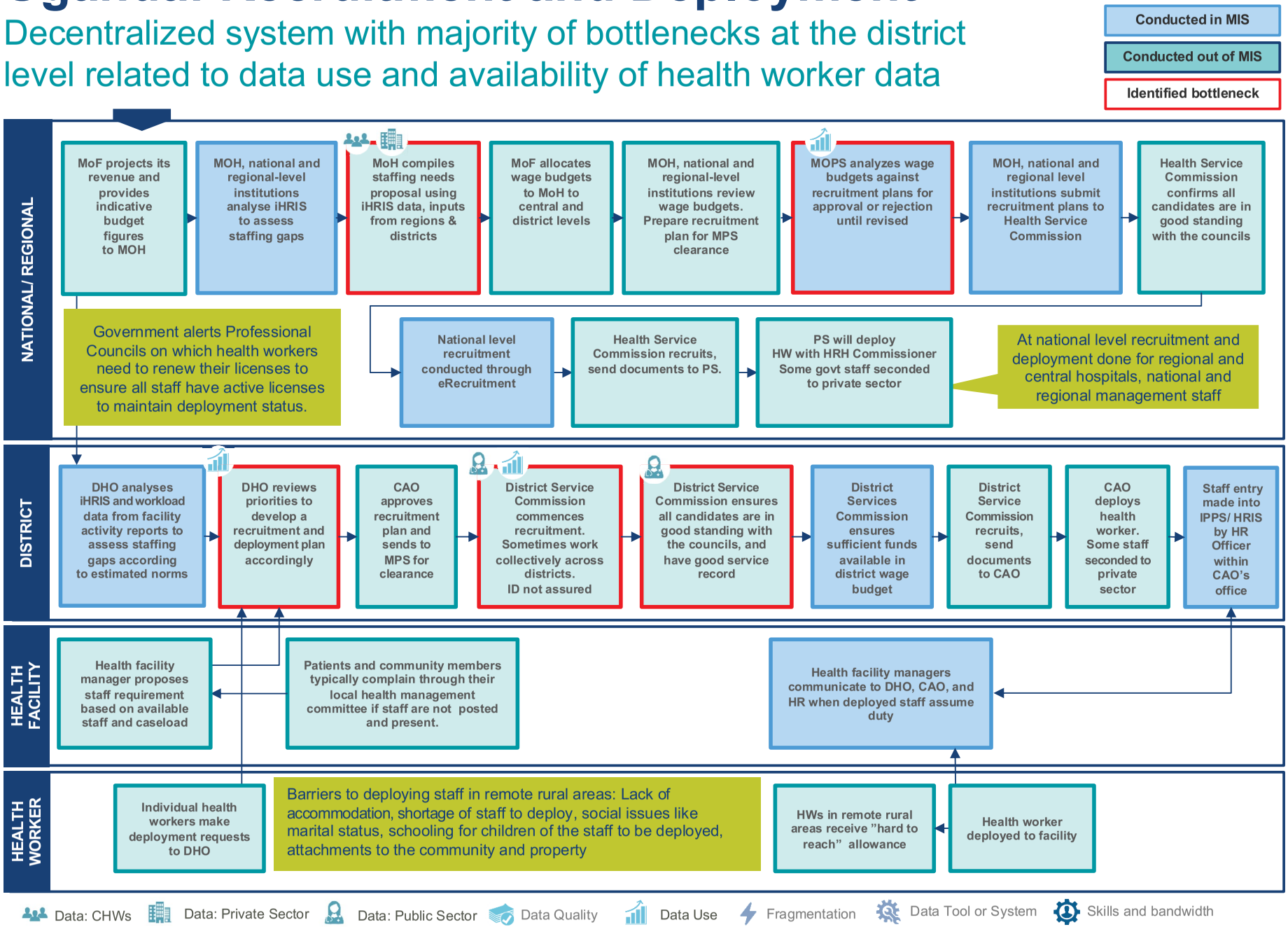
Mozambique: Individual Performance Management

A paper-based system is in place for the whole civil service, but data is given little weight in decision making



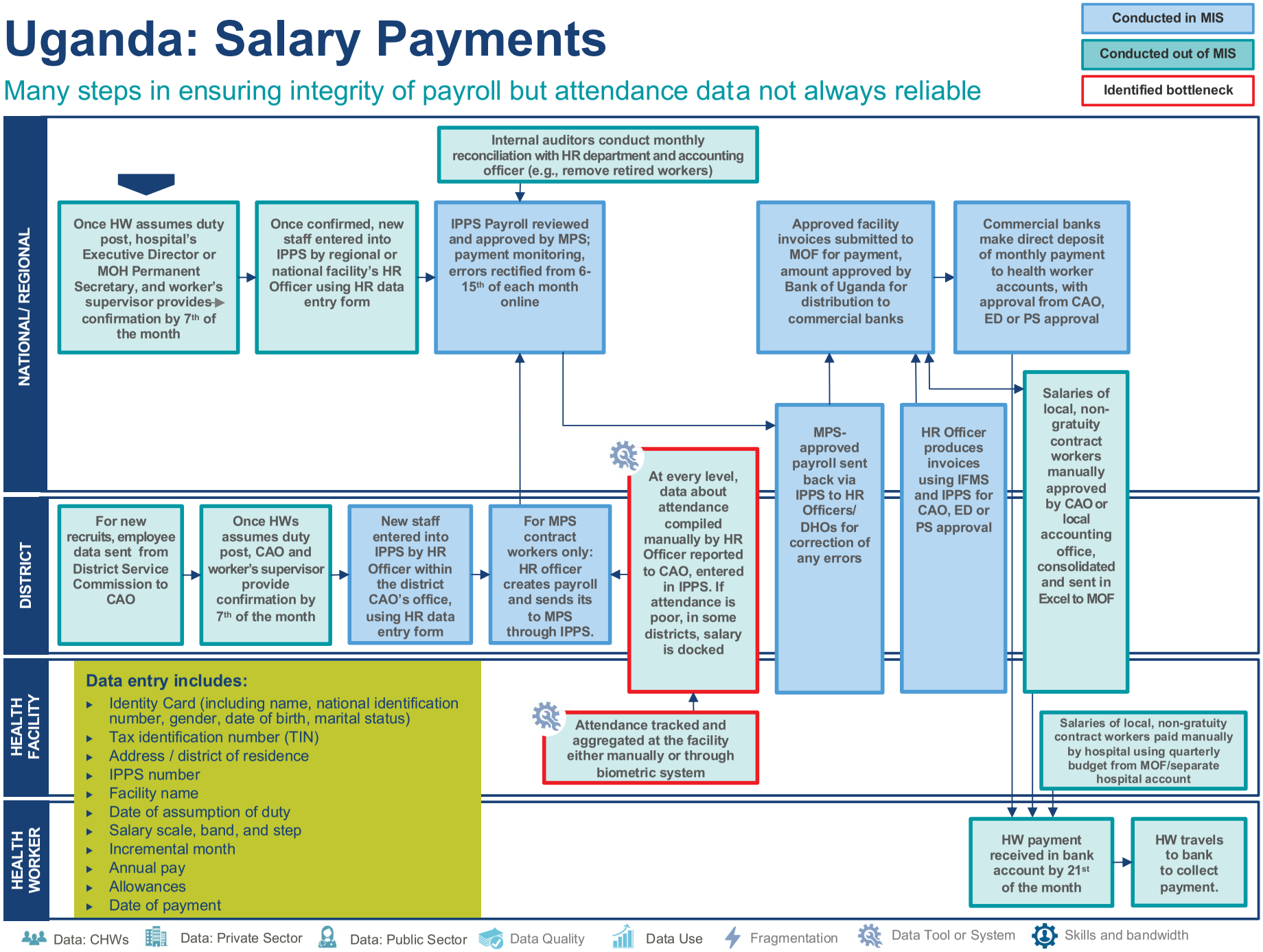
Uganda: Recruitment and Deployment

Decentralized system with majority of bottlenecks at the district level related to data use and availability of health worker data



Uganda: Salary Payments

Many steps in ensuring integrity of payroll but attendance data not always reliable



Uganda: Individual Performance Management

A paper-based appraisal system, attendance incorporated into iHRIS Manage

Conducted in MIS
Conducted out of MIS
Identified bottleneck