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Maternal and Child Survival Program

National Community Health Information Systems in Four African Countries

Descriptions and Lessons from the Field

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The Maternal and Child Survival Program (MCSP) is a global, $560 million, 5-year cooperative agreement funded by the United States Agency for International Development (USAID) to introduce and support scale-up of high-impact health interventions among USAID's 25 maternal and child health priority countries,* as well as other countries. The Program is focused on ensuring that all women, newborns and children most in need have equitable access to quality health care services to save lives. MCSP supports programming in maternal, newborn and child health, immunization, family planning and reproductive health, nutrition, health systems strengthening, water/sanitation/hygiene, malaria, prevention of mother-to-child transmission of HIV, and pediatric HIV care and treatment.

* USAID's 25 high-priority countries are Afghanistan, Bangladesh, Burma, Democratic Republic of Congo, Ethiopia, Ghana, Haiti, India, Indonesia, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nepal, Nigeria, Pakistan, Rwanda, Senegal, South Sudan, Tanzania, Uganda, Yemen and Zambia.

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We thank all who gave their time to participate in the report.

Acronyms

APE	*Agente polivalente elementar* (Community health worker)
BCZS	*Bureau Central de la Zone de Santé* (Central Office of the Health Zone)
CAC	Community action committee
CDA	Community Development Agency
CDC	U.S. Centers for Disease Control and Prevention
CHEW	Community Health Extension Worker
CHIS	Community health information system
CHO	Community health officer
CHW	Community health worker
CHWP	Community Health Workers Programme
CLD	*Comité local de développement* (local development committee)
CODESA	*Comité de développement de santé* (community health committee)
CORP	Community resource person
CPD	*Comité de développement provincial* (provincial development committee)
CSO	Civil society organization
D5	*Direction de développement des soins de santé primaires* (Directorate of Primary Health Care)
DFID	Department for International Development
DHEC	District Health Extension Coordinator
DHIS2	District Health Information Software 2
DHO	District health office
DHT	District health team
DPS	*Division provinciale de la santé* (Provincial health division)
DRC	Democratic Republic of the Congo
DREAMS	Determined, Resilient, Empowered, AIDS-free, Mentored and Safe)
DSNIS	*Division du système national de l'information sanitaire* (National health management information system division)
ECZ	*Equipe cadre de zone de santé* (health zone management team)
FMOH	Federal Ministry of Health
HC	Health center
HEP	Health Extension Program
HIRD	Health Information and Research Directorate
HIS	Health Information System
HRIS	Human Resource Information System
HMIS	Health Management Information System
iCCM	Integrated community case management
IT	Information technology
JCHEW	Junior community health extension worker
LMIS	Logistics management information system

M&E	Monitoring and evaluation
MCHIP	Maternal and Child Health Integrated Program
MCSP	Maternal and Child Survival Program
MOH	Ministry of Heath
MOHP	Ministry of Health and Population
MoHSS	Ministry of Health and Social Services
MSP	*Ministère de la santé publique* (Ministry of Public Health)
PEPFAR	U.S. President's Emergency Plan for AIDS Relief
PHCU	Primary Health Care Unit
PPMV	Private and Proprietary Medicine Vendor
REC-QI	Reaching Every Child – Quality Improvement
RMNCAH	Reproductive, maternal, newborn, child, and adolescent health
RR	*Raedat Refiat* (Community health worker)
SOP	Standard operating procedure
TWG	Technical working group
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development
VHT	Village Health Team
VSAT	Very Small Aperture Terminal
WHO	World Health Organization

Executive Summary

As countries work toward the Sustainable Development Goals, Ministries of Health (MOHs) are increasingly recognizing the vital role of community-based health programming to achieve national and global health goals. At the community level, families receive health services, health education, and other social services delivered by community health workers (CHWs). CHWs have the potential to fill critical gaps in service delivery in communities that lack easy access to other health service providers. To plan, monitor, and evaluate these vital services delivered by CHWs, countries are using and further developing community health information systems (CHIS) that promote community engagement, identify those in need of services, support case management, and ensure accountability.[1]

In countries with high burdens of maternal and child mortality, USAID's flagship Maternal and Child Survival Program (MCSP) works with MOHs and their partners to strengthen their community health programming, including CHIS. MCSP's efforts include strengthening overall systems to ensure data reporting completeness, quality, and use at the country level. In addition to documenting MCSP's lessons learned through supporting MOHs in four African countries—the Democratic Republic of the Congo (DRC), Egypt, Namibia, and Uganda—to strengthen their CHIS, this report also serves to provide a descriptive profile of each system. This technical report has three primary objectives:

1. to describe the structure and functioning of national CHIS across four African countries,
2. to document MCSP's contributions to strengthening national CHIS, and
3. to draw lessons learned and serve as a resource for stakeholders to learn more in order to strengthen their national CHIS.

MCSP adapted MEASURE Evaluation's broader Community-Based Information System Model to produce a framework for developing and implementing CHIS, with a thematic focus on reproductive, maternal, newborn, child, and adolescent health. The framework identifies seven key dimensions of a robust CHIS, around which this report organizes its findings. A summary of overall key findings and recommendations is below.

Dimension A. Enabling Environment

System Design

- There was a trend toward **comprehensive application of digital CHIS designs**. Most countries showcased in this report were going digital, not just at the summary level but also at the point of data collection. While countries moved to digital, they were often also using paper-based CHIS forms, which placed a double reporting burden on CHWs. Looking forward, it will be important that CHIS are designed to **minimize the dual reporting burden on CHWs** to enable them to further focus on service delivery, increase efficiency of data collection, and bolster motivation.
- CHIS designs tended to **focus on central-level data collection**. Across case studies, it was noted that CHIS were quite well designed for aggregating data up to the central level; however, they were less equipped for doing so at other levels. Future programs are encouraged to expand the reach of CHIS design and utility through ensuring that **relevant, disaggregated data** can be directed **to various stakeholders** including CHWs, supervisors, and district-level officers.
- CHIS designs **varied in accordance with program design, scale, and budgets**. Just as no two countries have identical community health programs, there was not a universal or standard CHIS design across countries. Programs should **continue to customize CHIS** according to the unique community programming and context of each country's CHIS budget and scale.

Leadership and Governance

- **Governance and leadership support was essential** to fostering financial resources, political will, and technical capacities to move a CHIS from vision and design phases to piloting or implementation.

- Across most of the countries showcased in this report, leadership and governance support was largely **driven by national-level leaders**. There is an opportunity to further expand the scope of leadership support through **actively investing in stakeholders from local, district, and state levels**.
- Although governments made various financial, human resource, and hardware investments, CHIS often **rely on external partners' financial and technical support** as noted in DRC, Egypt, and Namibia. Although initial inputs towards building CHIS capacity were important, there was a need to situate these endeavors into **fuller, government-led efforts** that could sustain an enabling environment for CHIS.

Systems Management

- **Oversight of CHIS operations was often complex,** yielding concerns over whether national and subnational staff and CHWs were actually being appropriately compensated or simply reporting to partners who were providing other incentives. In general, **governments need to continue to move toward overall CHIS system management** and oversight.
- **CHIS infrastructure/resources were tied to funding streams.** CHIS infrastructure and resources were integral to the enabling environment and were often directly linked to key donors.

Dimension B. Information Generation

Data Sources

- Community health programs vary substantially and their technical purview can be as diverse as antenatal care, outbreak control, substance abuse, neonatal health, child health, water/sanitation/hygiene, mental health, disabilities, and many more. As a result, **CHIS designs vary depending on what services are provided** at the community level and what associated data are captured in addition to key budgetary and scale considerations.

Data Management

- Across countries, standard operating procedures (SOPs) for data management often existed but were **not consistently well disseminated or used** at subnational levels. There is a need to **further understand the conditions that inhibit dissemination and use of CHIS SOPs.** Effective practices in the dissemination and use of health facility health management information systems (HMIS) SOPs may reveal some promising solutions.

Information Products and Dissemination

- **CHIS information was rarely summarized and utilized**, particularly at subnational levels. Health workers were rarely oriented into how their inputs fit within broader data aggregation and dissemination practices. It is recommended that **more information products be developed for use at the lower levels**, using information products to foster competition or quality and help workers directly experience how they are part of a larger system.

Data Flow

- CHIS data flows **varied by country**. There is an opportunity at the country level to add **CHIS data flow reviews** as part of data review activities or meetings. Representatives from each level can discuss current practices as they compare to the mapped data flow (including feedback mechanisms) and where useful, adapt practices or the data flowchart itself. This exercise can also be useful in identifying "pain points," or areas of difficulty, in data transmission and feedback.

Data Compilation and Analysis

- Although countries were compiling data, **further analyses** like comparing community- and facility-based service delivery data **were lacking**. It is strongly advised that pertinent **community data be incorporated** into the larger HMIS.
- Generally, countries' CHIS were in an early stage of their lifecycle and as such, more complex analyses were not carried out yet. In order to support these endeavors, there is a need for **guidance** of various types of analyses, including tailored recommendations for different levels/audiences and different purposes.

Data Protection

- This review did not identify specific information related to data protection; measures designed to protect data are likely addressed via **other national strategies**, like a national eHealth strategy. It is recommended that at a minimum, CHIS plans or strategy documents include **reference** to these **corresponding data protection guidance** and if not, that the CHIS plan itself include these parameters.

Dimension C. System Performance

Data Quality

- Ensuring the timeliness, completeness, and quality of reporting in a CHIS needs to be a priority before data can be used to their full potential. However, challenges identified to monitoring and assessing the timeliness, completeness, and quality included a trend towards heavy reliance on **donor support**. Generally, countries should continue supporting mechanisms that track **timely submission of results**, including monitoring for completeness as well as accuracy via strategies like community data quality assessments. Donors also need to prioritize building country **capacities** to lead and fund **data quality endeavors** over time.
- The CHIS highlighted in this report were relatively new. As a result, CHIS functioning, including data quality, may be **lower priority** due in part to existing country-level challenges with implementing HMIS at health facilities.

Data Use

- Although existing **practices to assess CHIS data quality and use appeared limited**, it is advised to consider new approaches that may include **integrating** the two needs. For example, data quality checks can be incorporated into processes for visualizing and using data, such as checking for outliers or missing data while preparing graphs for a presentation.
- **Peer-to-peer platforms** like WhatsApp or SMS/text messaging presented informal **opportunities** for **real-time discussion of key findings** in the area (i.e., sanitation, low facility delivery, use of insecticide-treated bed nets), as well as data entry or supervision support. Looking forward, community health programs can continue to leverage these existing channels for informal exchanges about data inputs or applications to real-time community health service delivery work.
- This assessment design did not explicitly explore whether **ethical measures** were put in place with CHIS data, including considerations related to privacy, confidentiality, and consent. Despite this limitation, there is an opportunity for CHIS technical working groups (TWGs) and global entities to consider **drafting a global guidance** document that addresses key considerations with protecting communities and community members' data.

Dimension D. Human Element

Capacity Building

- Investing in **community health working training and orientation** had benefits for CHIS as well. Overall, when cost inputs are lower, there is an opportunity to design a less complex CHIS at a more streamlined scale to start.
- Although not unique to CHIS, across countries, **capacity building** endeavors often focused on bolstering data collection and data entry skills and less so on **critical competencies and tools for data analysis and use** (i.e., scorecards, dashboards, etc.). Key stakeholders from the community to the national levels need to know not only how to collect data but also how to visualize, interpret, and communicate it to their key constituencies so as to have the greatest impact on maternal and child morbidity and mortality.

Supportive Supervision and Mentoring

- Countries should re-examine existing supportive supervision tools and consider opportunities to include content that facilitates some data review and data use. These competencies as part of supportive supervision and mentoring visits will not only build capacity but also **foster motivation** for a **system that supports CHWs in their daily work.**

Motivation

- **Public officials using CHIS data appeared to influence motivation among CHWs**. There is an opportunity to expand the scope of data use for advocacy by public officials. When done effectively by leaders at different levels, use of community data serves to bolster motivation, by way of validating the critical contributions of community actors in progress towards positive health outcomes.
- From MCSP-supported digital health technical assistance to TWG involvement in incorporating community data into national dashboards as well as other activities, **partner support demonstrated a critical role** in fostering motivation for national CHIS.
- CHIS **supervisory staff need to have the time and resources** to support the CHIS. If the tasks of supervising CHWs and reviewing their respective CHIS inputs are added on to their normal duties, supervisory staff may not prioritize these roles. As a result, CHIS data quality and data use will be de-prioritized.

Dimension E. CHIS Stakeholders

- **Technical coordination bodies** at the national level generally strengthened CHIS design and/or management, but often **ebbed and flowed in their functionality.** These groups were often concentrated at the national level and had minimal representation from subnational levels, often due to resource constraints. CHIS TWGs should be in **communication** and **coordination** with the **broader HMIS TWG**.

Dimension F. Contextual Factors

- Each country showcased in this report demonstrated various system strengths that contributed to their CHIS development. In the future, it will be important to **leverage a country systems' strengths** to advance development and maintenance of CHIS.

Dimension G. Feedback

- Across nearly all case studies, findings revealed various **challenges** with **putting feedback mechanisms into practice**. Country CHIS are encouraged to continue to **foster and create specific feedback mechanisms at all levels**, ensuring that appropriate funds are allocated to support them, including adequate human resources, training, supplies, and meetings.

Background

Governments and their development partners are increasingly relying on community health programming to achieve national health goals. Trained community health workers (CHWs) deliver essential reproductive, maternal, newborn, child, and adolescent health (RMNCAH) services and promotional messages at the community level in underserved and remote areas where the population cannot easily access health facilities. At national and subnational levels, timely and valid data from community-based services are necessary to plan and manage community programs effectively and to advocate for investments in these services by quantifying the contribution of CHWs and community-based services. At lower levels, CHW supervisors need data to monitor and supervise CHWs, and CHWs can use data to track their work and improve services for their clients.

Community health information systems (CHIS) are designed to collect data about the provision of health services and activities at the community level and share that information with CHW supervisors, program managers, monitors, and planners in the health system and with the communities that they serve. The four core functions of a CHIS are to: 1) promote community engagement in health; 2) identify people in need of services; 3) support case management and care coordination; and 4) ensure accountability of CHWs to the health system and the communities they serve as well as the health system to the communities.[1] CHIS, especially where data are collected about services in the community, are usually part of the Health Management Information Systems (HMIS) that collect data about services delivered at health facilities.

Many countries are working to develop and strengthen national CHIS for collecting, aggregating, and using data from community health programs. However, the level of development, implementation, and institutionalization of CHIS varies among countries. In countries in the earlier stages of developing CHIS, community-level data are not integrated or interoperable with their overall national Health Information Systems (HIS),[i] parallel information systems are used at the community level, community data are aggregated with facility-based data in the HMIS, or community data are excluded altogether. Countries with further developed and institutionalized CHIS still struggle to ensure that community-based indicators are comparable to the facility-based indicators and that high-quality community-level data are collected, analyzed, and used to inform decisions.[2]

The complexities and diversity of community health programs lead to challenges in designing and strengthening CHIS. Community programs have many different types of community delivery platforms, community health providers, and community action or support groups, and can cover many areas of health services and promotion, even outside the realm of health. CHWs in different countries have varying levels of training and skills (from a few days or weeks of in-service training to more professional pre-service training) and varying levels of incentives (from community-selected volunteers to salaried health workers who are assigned to a community and officially recognized and integrated into the health system). Thus, there is no standard design for CHIS, as countries must develop and support the systems based on the country's unique community programming and trade-offs in terms of cost, complexity, and scale.[3] A literature review by MEASURE Evaluation found that countries' use of CHIS varies by health area, technology use, level of integration within national HMIS and HIS, and overarching goals of the system.[4]

Despite the variability in the design and implementation of CHIS in countries to meet the needs of their community programming and context, very limited documentation exists that describes how countries are designing, implementing, institutionalizing, and utilizing their CHIS.[4] Documenting and learning from how countries have designed, strengthened, and institutionalized their CHIS to support community programs is invaluable to advancing a collective effort toward robust, relevant, and accessible community data for decision-making. To this end, USAID's flagship Maternal and Child Survival Program (MCSP)

[i] Routine HIS may include paper-based records of patient care, electronic medical records, facility or community-based health management information systems (HMIS), public, private, and parastatal HMIS, laboratory and imaging information systems, disease surveillance information systems, routine supervisory information systems, financial management information systems, human resource information systems, logistics management information systems, and/or infrastructure and equipment management information systems. [Walker, D. (2018) *Model of a Community-Based Information System: Essential Components and Functions*. Chapel Hill, NC. MEASURE Evaluation].

supports countries to strengthen their national CHIS, including strengthening the systems, data reporting completeness, quality, and use at the country level. This technical report presents MCSP's comprehensive lessons learned supporting Ministries of Health (MOHs) to strengthen their CHIS in the countries of the Democratic Republic of the Congo (DRC), Egypt, Namibia and Uganda.

Background on the Maternal and Child Survival Program

MCSP is a global USAID initiative to introduce and support high-impact health interventions in 25 priority countries to help prevent child and maternal deaths. MCSP supports programming in maternal, newborn, and child health, as well as immunization, family planning and reproductive health, nutrition, health systems strengthening, water/sanitation/hygiene, malaria, prevention of mother-to-child transmission of HIV, and pediatric HIV care and treatment. MCSP tackles these issues through approaches that also focus on household and community mobilization, gender integration, and digital health, among others.

Objectives

Using a case study approach, this report describes the design and operations of national CHIS in four African countries with the overall goal of informing global and national-level community programming and CHIS stakeholders about CHIS design and functioning in countries and the lessons learned across them. This technical report has three primary objectives:

1. To describe the structure and functioning of national CHIS across four African countries;
2. To document MCSP's contributions to strengthening national CHIS; and
3. To derive lessons learned across the aforementioned four countries.

Methods and Analytic Strategy

Country Selection Criteria

Although many countries in the world are developing and strengthening their CHIS, this report focuses on experiences in four African countries. MCSP used the following selection criteria to choose countries to develop distinct case studies that describe the design and functioning of CHIS in a variety of different country contexts:

- MCSP provided support to the country between 2015 and 2019
- Promising approach to national CHIS
- Diversity of community health programming
- Contributes to understanding of the adapted CHIS framework/model
- Reproductive, maternal, newborn and child health focus

MCSP identified four countries that fit the criteria and asked MCSP and MOH staff to participate in this learning activity: DRC, Egypt, Namibia, and Uganda. This report presents case studies on four different CHIS implemented in these countries.

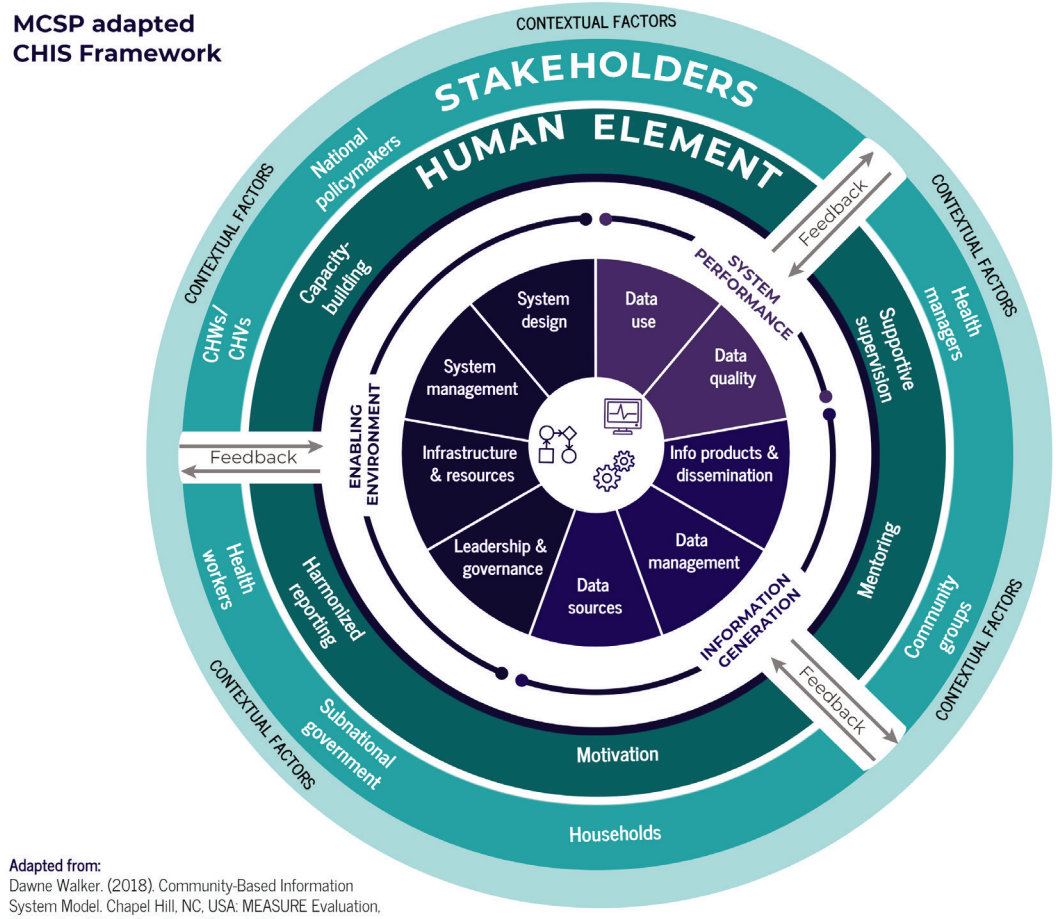
Existing CHIS Models, Selection, and Adaptation of the Community-Based Information System Model

MCSP reviewed existing CHIS models to produce a framework for developing and implementing CHIS, with a thematic focus on RMNCAH to guide the country case study development. The existing frameworks reviewed included:

- Community-Based Information System Model, Dawne Walker (2017), MEASURE Evaluation/Palladium[1]
- Health Information System Strengthening Model (2017), MEASURE Evaluation[5]
- DHIS2 Community Health Information System Pillars (2018), University of Oslo[3,6]
- Health Metrics Network Framework (2012), World Health Organization (WHO)[7]

MCSP elected to use and adapt MEASURE Evaluation's Community-Based Information System Model (2017) due to its comprehensive design. MCSP received permission to adapt the model in February of 2018, and proceeded to modify Walker's framework, adding "Feedback," "Human Element," and "Contextual Factors" components (Figure 1). The adapted framework served to guide all subsequent data collection and analysis.

Figure 1. MCSP-adapted Community Health Information System Framework



Dimensions of a Community Health Information System

The adapted framework identifies the following key components of a robust CHIS, categorized within the seven dimensions of enabling environment, information generation, system performance, human element, stakeholders, contextual factors, and feedback:

Dimension A. Enabling Environment

- ***System design*** refers to constructing a CHIS system that meets the needs of users and stakeholders, while taking into account how community health services are delivered in that specific context.
- ***Leadership and governance*** refers to the strategic vision and structures necessary to institutionalize the use of community data and to achieve harmonization of the CHIS with the national health system.
- ***System management*** refers to management of financial, human, and infrastructural resources and oversight of the CHIS.

Dimension B. Information Generation

- ***Data sources*** include routinely collected data through service delivery.
- ***Data management*** refers to the standard operating procedures of entering, cleaning, and validating data; data flow; data compilation and analysis; and data protection.
- ***Information products and dissemination*** refers to the development and distribution of reports, presentations, fact sheets, and dashboards to communicate what is happening at the community level to a range of stakeholders and to hold programs accountable to beneficiaries.

Dimension C. System Performance

- *Data quality* refers to accurate, complete, and timely results from well-defined, standardized data collection procedures.
- *Data use* refers to data-informed decision-making at all levels of the health system during program monitoring, review, planning, advocacy, and policy development.

Dimension D. Human Element

- *Capacity building* refers to activities that develop competencies necessary for CHIS management, data entry, report generation, data review, communicating results, and utilizing CHIS data for decision-making.
- *Supportive supervision,* according to WHO, is "a process of helping staff to improve their work performance continuously. It is carried out in a respectful and non-authoritarian way with a focus on using supervisory visits as an opportunity to improve knowledge and skills of health staff… It focuses on monitoring performance towards goals, and using data for decision-making, and depends upon regular follow-up with staff to ensure that new tasks are being implemented correctly" (WHO, 2008). In order to facilitate timely, accurate, and complete data entry into CHIS and data use from CHIS, supportive supervision of CHWs, health facility staff, and local government focal points, is essential.
- *Mentoring* includes the provision of formal or informal guidance, modeling, or feedback with the intent of stewarding CHIS stakeholders in effective and efficient utilization of CHIS data.
- *Harmonized reporting* includes strategies like operating procedures, capacity building, or supportive supervision in order to ensure consistent, timely, and complete inputs into CHIS.
- *Motivation* addresses issues related to the degree of interest and commitment that stakeholders have in CHIS as well as the conditions that support their interest and commitment.

Dimension E. Stakeholders

A robust and highly functional CHIS is comprised of stakeholders with unique roles and responsibilities at each level of the health system.

- The *national government* plays a major coordination, facilitation, and financing role in the development of a CHIS. The national-level MOH is vital to ensuring leadership and governance, system management, and coordination of stakeholders, and is also a key consumer of data generated by the CHIS.
- The *local government* also plays important key roles in system leadership, governance, and management. The local government adapts national policies and guidance to the local context, trains implementers, and advocates for community health programming. The local government also provides critical inputs for system design, including existing infrastructure and capacity of human resources. Local government is responsible for verifying and aggregating data and sending it to the national level, and is also a key producer and consumer of CHIS data.
- *Facility staff* can play a key role linking and verifying community data to facility data, if the CHIS is closely aligned with facility-based data systems. Facility staff can use community-based data to better serve clients, determine if additional services are needed, and coordinate care with CHWs.
- *Civil society organizations* (CSOs) play a significant role in developing and implementing CHIS, ensuring that systems are designed to reflect needs of the community. CSOs also train CHWs on data collection and often take part in providing community-based health services themselves. CSOs may use data generated from a CHIS for program management and advocacy work.
- As the primary data collectors, *community health workers* (CHWs) play a significant role in data completeness, accuracy, and timeliness. CHWs also use CHIS data to provide better care to community members.
- *Households and individuals* as well as community leaders benefit from a well-functioning CHIS and can use community-level health data to advocate for services.

Dimension F. Contextual Factors

Contextual factors are any characteristics in the local environment (political, social, natural, etc.) that may affect the implementation and performance of a CHIS. Examples of contextual factors that could affect a CHIS include political or economic instability, health worker strikes, rugged or inaccessible terrain, or lack of communications infrastructure in a country.

Dimension G. Feedback

Feedback refers to mechanisms for providing constructive feedback on data quality issues, technical challenges, and reporting.

Data Collection and Analytic Strategy

Desk Review

In order to become familiar with the current (and limited) body of existing, relevant country-specific CHIS literature, MCSP conducted an internet-based search of documents, using key search terminology. Additionally, MCSP country colleagues in each of the four countries were contacted to supplement documents. Forty-six documents were obtained and the majority were uploaded into web-based, qualitative analysis software Dedoose (version 8.0.42) and key terms (codes) were defined via a codebook for extrapolating relevant content. All key terms align with the adapted CHIS framework used by the team. Thematic analysis for each case study was conducted in Dedoose or manually, per the discretion of the case study lead.

Key Informant Interviews

To collect qualitative data from key informants and supplement gaps in the literature, key informant interviews and correspondences with MCSP headquarters and field staff as well as MOH counterparts were conducted. An interview guide was developed and notes were used to document responses; the guide's structure mirrored key components of the adapted CHIS model. Key findings from notes and Dedoose desk review were input into a country case study template.

Table 1. Number of key informant interviews, by country and respondent type

Country	Number of Interviews	Respondent Type
DRC	2	MCSP staff
Egypt	2	MCSP staff
Namibia	3	MCSP & MEASURE Evaluation Staff
Uganda*	4	MCSP staff
TOTAL	12	---

* Responses to interview questions were sent in writing.

CHIS DHIS2 Academy Participant-Observation

In order to observe additional examples of current practices, data flow, and national CHIS challenges and opportunities, two members of the report team attended the DHIS2 Level 2 CHIS Academy in Dakar, Senegal hosted on March 19–23, 2018 by UNICEF and the University of Oslo. Although specific findings are not documented in this report, this opportunity provided the team with broader exposure to the CHIS initiatives occurring beyond the four countries showcased in this review. Major challenges that the countries presented were around indicator harmonization, various ways of capturing the community units within the HMIS, and interoperability, as well as the overarching issue of sustainability of CHW programs in general.

Limitations of this Review

This review encountered several limitations. First, the aforementioned dimensions of the Adapted CHIS Framework, although very useful, were not mutually exclusive and as a result, certain aspects of each CHIS case study were difficult to classify. The review team aimed to classify content according to the most appropriate dimension (and not cross-list content across multiple dimensions); however, this process was often subjective. Second, the review took place at a single point in time; at the time of writing, some of the MCSP country programs included in the review had already closed and as such, the review team had less access to key informants in-country. Third, travel to country offices was not included in the methodological approach, which also compromised access to key informants and data sources, including key local government stakeholders. In spite of these limitations, extensive efforts were taken to obtain current key documents for the desk review, and where feasible, country colleagues at MCSP or affiliated partner offices were contacted via email or phone for guidance and review. Similarly, because travel was not included, the review team noted a bias in the case studies towards intended or descriptive discussion of CHIS dimensions versus an assessment approach that would examine, first hand, how the documented CHIS compared with present-day functioning and data use.

CHIS Case Studies and Highlights

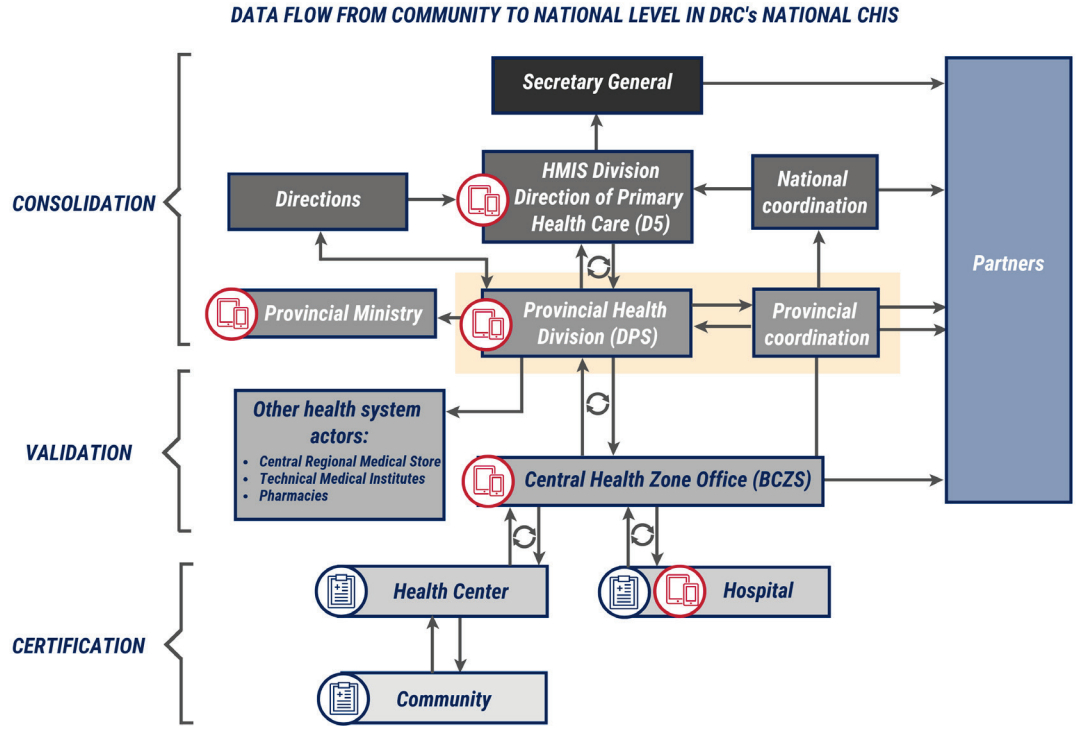
DRC

Background

The Democratic Republic of the Congo has a long history of working with communities and community health workers (CHWs) who are volunteers (*relais communautaires*). The Ministry of Public Health (*Ministère de la santé publique*, or MSP) created the Directorate of Primary Health Care (*Direction de développement des soins de santé primaires*, or D5) and introduced community activities into the minimum activity package in health centers and districts in 1982, after ratifying the health-for-all vision of the Alma Ata Declaration in 1978. More recently, the MSP developed a manual for CHWs and community committees in 2003, a procedural manual for community structures and approaches in 2016[8] and in 2017/2018 developed a strategic plan for community health.[9]

DRC has over 7,000 community care sites (each overseen by a CHW) across its 26 provinces, with analyses suggesting a need for an additional 8,000 sites[10] to over 58,000 sites[9] in the future. CHWs in DRC provide integrated community case management (iCCM) services to sick children for malaria, diarrhea and pneumonia, screening and referral for malnutrition; they are also responsible for distributing family planning commodities, insecticide-treated bed nets, and other commodities. Additionally, CHWs and "promotional" CHWs carry out social and behavior change communication activities for maternal and child health (promotion of key family practices), community mobilization and advocacy, community engagement activities, and civil registration. CHWs are tasked with collecting, reporting, and interpreting data related to these activities. CHWs' scope of interventions and the support they receive from the health system vary greatly across the country, and are often defined by partner and donor support and resource availability.[ii]

Figure 2. DRC data flow



[ii] Government financing for the community program is weak.

CHIS System Components

Dimension A. Enabling Environment

System Design

DRC's community data follows a similar flow as the rest of the national HMIS. Figure 2 shows that CHWs complete a paper-based summary form each month and submit it to their supervising health center, or *centre de santé*. The staff, usually the head nurse, at the health center then compiles the report from one or more CHWs in their catchment area and includes these data on one page of the health center summary form, which is then submitted to the district level (called the Central Office of the Health Zone or BCZS/*Bureau Central de la Zone de Santé*). In principle, the head nurse reviews the CHW data and provides feedback, although it is unclear how often this happens. The BCZS reviews the data[iii] in monthly review meetings with the health center staff where there is partner support, and the district data manager then enters the data into the national DHIS2. The provincial and national levels also summarize and review the data (see more details under data use).

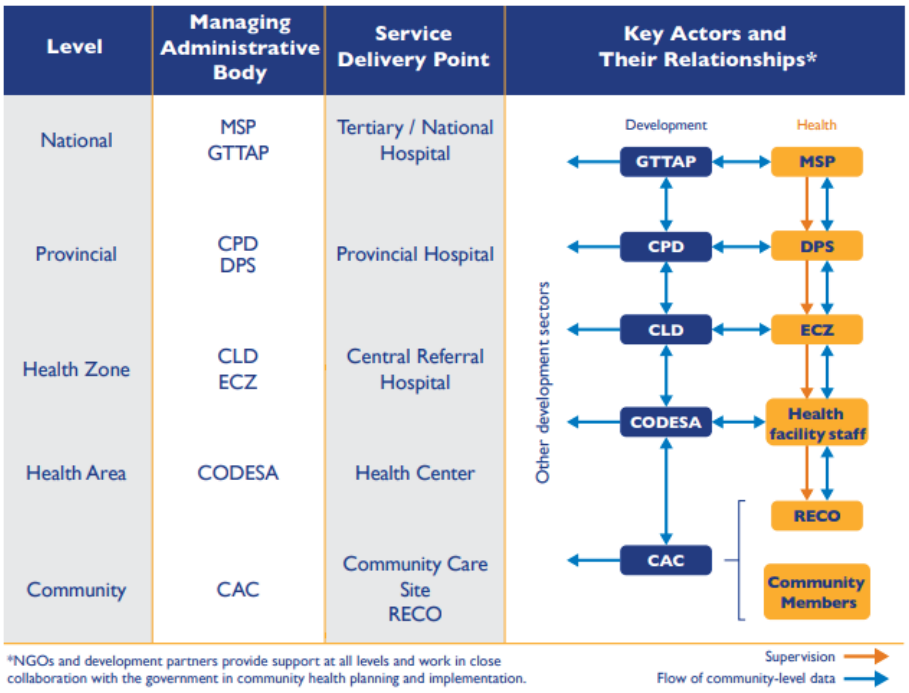
System Management

The HMIS Division (*Division du système national de l'information sanitaire*, or DSNIS)—under the direction of the D5 at the MSP—leads the HMIS and CHIS in the DRC. The DSNIS is responsible for programming DHIS2, ensuring data completeness and quality, analyzing data at the central level, and disseminating information products such as quarterly bulletins. The HMIS normative framework (*cadre normative*), revised in 2013 for the DHIS2 platform, defines the functioning of the overall HMIS, including the role of each actor, operating rules, data to be collected, and data flow and transmission.[11] The DHIS2 platform is hosted on a cloud server outside of the country, due to infrastructure constraints.

Leadership and Governance

Under the DRC's decentralized structure, the national, provincial, district, sub-district, and community levels should all play a role in the leadership and governance of community health systems and the data they produce, similar to the data flow described above. Figure 3, taken from Devlin, Egan, and Pandit-Rajani 2017, [12] shows the leadership and management structures at each level for community structures. At the national level, the MSP is responsible for all standards and policies and coordinates technical and financial partners. At the provincial level, the health division (*Division provinciale de la santé*, or DPS) is responsible to collect and analyze data from the health zones and share information with provincial authorities and the MSP. At the district (health zone) level, the health zone management team (*Equipe cadre de zone de santé*, or ECZ) is responsible for all health activities, including

Figure 3: Health system leadership and governance related to CHIS (*taken from Devlin, Egan, and Pandit-Rajani 2017*)



[iii] In areas with partner support, there are monthly review meetings with health center staff and district management teams.

reviewing, compiling, and transmitting community health data.[12] Health areas, or the sub-district level, in DRC usually have one health center and may have a few health posts (a small health center staffed by a nurse) and community care sites. The health center for each health area is responsible for reviewing and transmitting community data. Community health development committees (*Comité de développement de santé*, or CODESA) at the health area level are comprised of local leaders and partners. These committees participate in planning, management, and oversight of health and social service delivery in the health zone, and in principle use routine data from the facility and community levels to track results, identify, and resolve problems.

At the community level, the village chief leads the community action committee (CAC) and its members include the CHWs and other community leaders. The CAC coordinates health activities, including CHW work and is responsible for the management of community care sites, including service delivery and supply data. Development committees at the national (*Groupe de travail technique d'accompagnement de la participation communautaire*, or GTTAP), provincial (*Comité de développement provincial*, or CPD) and district (*Comité local de développement*, or CLD) levels are comprised of government staff, partners, and local actors such as civil society organizations; these committees may analyze and track community data.[12] Although these governance structures exist to oversee the community programming and data, they are often functionally weak and implemented in a disparate manner. The recent national strategic plan for community health outlines strategies to strengthen these structures at all levels.[9]

Infrastructure and Resources

The government receives donor support, such as grants from the Global Fund, World Bank, Department for International Development (DFID), USAID and Gavi, the Vaccine Alliance, to strengthen the broader HMIS that includes the CHIS. Between 2015 and 2017, the health zone levels received equipment, such as computers, Very Small Aperture Terminals (VSAT) to connect to the internet, and solar energy kits, to enable uploading of information to the DHIS2 platform.[11] Due to technical challenges with the VSAT (lack of technicians, poor connectivity), back-up modems using the cellular network have recently been incorporated into standard operating procedures. In selected areas, development partners, through grants from donors such as the Global Fund and USAID, often provide support, such as transportation and refreshment allowances, for training health workers and for community data review meetings at the health facilities and overall HMIS data at the district levels. The HMIS Division cites lack of government financial support for the CHIS and overall community programming as a major challenge.[13]

Dimension B. Information Generation

Data Sources

CHWs use registers and summary forms for iCCM, referrals, family planning, immunization outreach sessions, and community participation/meetings to collect and report data monthly to the health centers. CHWs also collect and report on the number of supervision visits, number of CHWs and functioning community care sites in their village through the formal CHIS linked to the national DHIS2. The data elements collected through the DHIS2 do not include other community activities, especially those related to health promotion and community engagement.[9] For example, CHWs also manage home visit and supply registers and although these data do not flow into the electronic national CHIS, they can be used more locally. At a regional workshop in 2017, the national HMIS Division cited as a priority the inclusion of a broader range of community indicators in the national system to lessen dependency on parallel community information systems.[14]

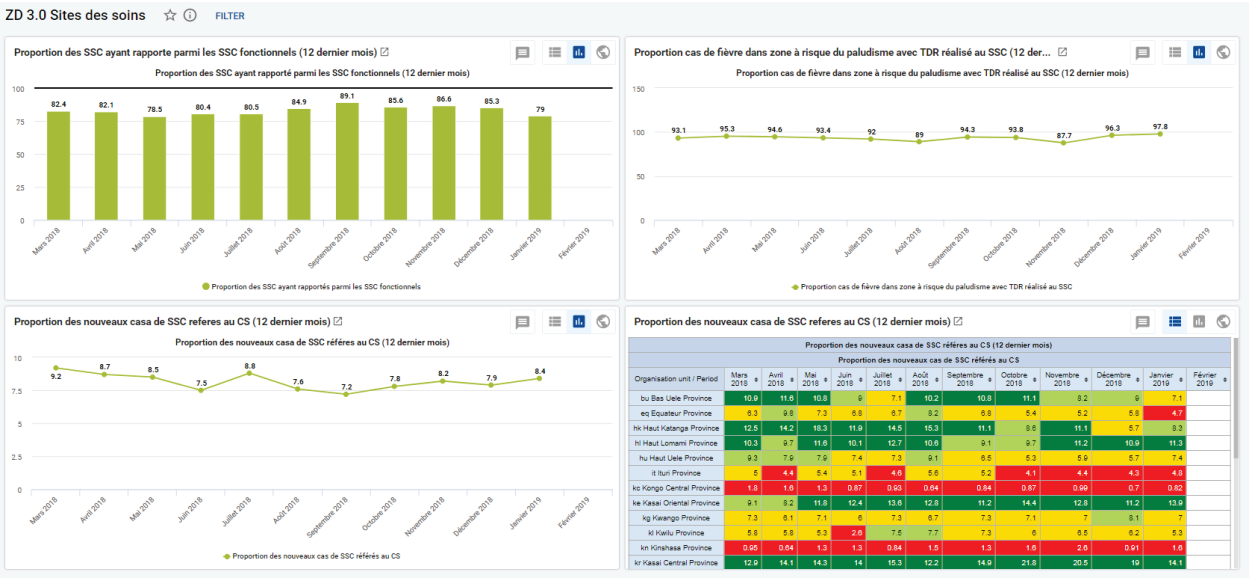
Data Management

As described above, the CHWs report on a monthly basis to their supervising facility using a paper-based form. Each supervisory facility summarizes the CHWs' forms from their catchment area in their summary form, then submits their summary form to the district (health zone) level, where the data are entered onto the DHIS2 platform.

Information Products and Dissemination

CHWs report on a monthly basis and the raw data are reviewed at the health center and the district level. The national DHIS2 electronic platform (or, DHIS2 instance) includes a dashboard using charts and graphs to display community site data by geographic areas (provinces, districts), such as reporting rates and malaria testing rates.

Figure 4: Data dashboard of CHW sites reporting and malaria indicators in DRC national HMIS DHIS platform



Dimension C. System Performance

Data Quality

Completeness of reporting in DRC reached over 85% in 2017, with 21 out of 26 provinces with at least 80% completeness of reporting for basic services (including community data).[13] Ensuring data quality is difficult. The data review processes described under the aforementioned leadership and governance and data use subsections may not happen and when they do, are often technically weak in reviewing data quality.[11] Ongoing challenges that affect data quality include: inadequate availability of data collection and compilation tools; low personnel competencies in data collection, compilation and entry; and weak infrastructure.[11] The government, often with partner support, carries out periodic rapid data quality audits, but it is unclear how often these exercises include community-level data.

Data Use

In principle, every level of the health system in DRC reviews and uses HMIS and CHIS data. Table 2 provides an overview of the data review and use structures specified in national policies. Additionally, the DSNIS cites using community data in developing different strategies, for example, examining trends in new cases received at community care sites in developing a national child health strategy.[10] However, feedback mechanisms and data use remain relatively weak at all levels of the health system for community and other service delivery data.[11,14] CHIS data elements related to child health and family planning are the same as those collected at the facility level; however, disaggregated analyses examining the contribution of community care sites in relation to services at facilities are rarely conducted.

Table 2: Data review/use meetings previewed at each level

Level	Description of data review	Frequency
Community	Meeting with the CAC and CODESA, with data review	Monthly
Health Area/ Health Center	Data review meeting with CHWs and health center staff	Monthly
District (health zone)	Meeting for data monitoring and validation with health center and district staff	Monthly

Level	Description of data review	Frequency
Province	Meeting for data monitoring and validation with district and provincial staff and partners	Quarterly/ Annually
National	Meeting for data monitoring and validation with provincial and national staff and partners	Bi-annually /Annually

Dimension D. Human Element

CHWs in DRC are unpaid volunteers who deliver a number of promotional and curative packages for reproductive, maternal, newborn, and child health. Devlin, Egan, and Pandit-Rajani (2017)[12] provide an excellent overview of the full range of services and promotional activities CHWs undertake in the DRC. CHWs are selected by communities and must: live in the village; be able to read and write; and have a good reputation for responsibility, influence and leadership. Formal training for CHWs often depends on partner and donor priorities and support. Training for data collection and quality occur during training for child health or family planning services. In principle, the CHWs have 3-year renewable "contracts" with local authorities, but the contracts can be replaced by the community if they are not satisfied.[12]

Incentives for CHWs vary across the country, with some receiving performance-based financing incentives or per diems in some districts.[12] Other incentives may include discounted health services, umbrellas, bicycles, t-shirts and other in-kind goods, which are most often provided by implementing partners.

The head nurses of facilities serve as CHW supervisors and are tasked to provide feedback to CHWs on their reports and data quality. This cadre is also responsible for providing care at the facility level, as well as routine reporting for facility-level service delivery. Officials at the provincial and district levels are responsible for reviewing, entering, and using data. Capacity building and mentoring for health facility, district, and provincial staff in collecting, reviewing, and using community data is dependent on partner support in the provinces.

Dimension E. Stakeholders

National level

The program and divisions in the MSP—such as the national reproductive health program or malaria control program—are the key national stakeholders in the CHIS in DRC. Government agencies and nongovernmental organizations have been involved in the design and operationalization of the HMIS, including the CHIS. The "multi-donor project" (*projet multi bailleurs*), has provided support to strengthen the HMIS on the DHIS2 platform and includes donors such as the Global Fund, World Bank, DFID, Gavi, USAID (including the U.S. President's Malaria Initiative), European Union and Canadian Cooperation. Technical partners include WHO, Health Information System Program at University of Oslo, IMA World Health, BAO Systems, and Sanru.[11]

Subnational

In DRC's decentralized context, the provincial (DPS) and district (ECZ) health authorities are important stakeholders, as are the corresponding development committees (CPD and CLD) at these levels. The health center staff and CODESA are key local level stakeholders and actors in the CHIS. The enabling environment (Dimension A) section above describes the role of these stakeholders.

Community

In addition to the CHW at the community level, the CAC is an important stakeholder group that works with the CHW to manage and monitor their work; in some instances, the CAC may help CHWs complete reports.[9,12]

Dimension F. Contextual Factors

DRC is a large country, covering over 2 million square kilometers of territory and with a large population—estimated at 85 million in 2015—that is very rural (62%)[15] and remote. DRC has less well-developed infrastructure than other African countries, and the low availability of electricity and internet connectivity affect the functioning of the HMIS and CHIS. Additionally, DRC has been plagued by years of instability that affects functionality of the health system and reporting. DRC has also recently gone through a decentralization process from 11 provinces to 26 provinces, resulting in varied levels of leadership and experience in the health offices of the new provinces and health zones. These factors all represent challenges to attaining and maintaining complete reporting of high-quality community data and facilitating data use across all the levels and geographic areas.

Dimension G. Feedback

The governance structures and the data review and use meetings described above are meant to provide feedback on data quality and any issues or trends in community services that the data analyses reveal. However, these feedback mechanisms are weak and tend to function better in areas with partner support.

Community health workers practice family screening and community assessment on their tablets during the RR HMIS training in Ismailia, Egypt. Photo: Mohammed Helaly/MCSP

Notable Features

- **Integration within overall HMIS:** DRC's CHIS is integrated into the national HMIS since 2014, with CHWs reporting to their supervisory health facility. This ensures that as the government and partners strengthen the national HMIS to have more complete and quality data at scale, the CHIS data will follow. However, this system design does not allow for analyses by individual community sites or CHWs, as is possible in other systems.
- **National-level scale-up and high levels of reporting:** It is notable that although DRC confronts many challenges, it has scaled up its CHIS in a relatively short time between 2014 and 2017, with over 80% of health zones reporting.
- **Coordination between government and partners to strengthen systems:** Although some parallel systems still exist, the government of DRC, including the programs at the MSP, and development partners have made a concerted effort to build and strengthen the national HMIS and CHIS, leading to less fragmentation.

MCSP Contribution

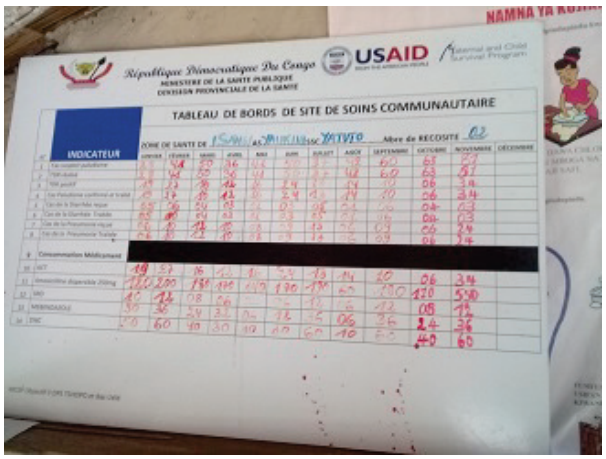
MCSP has supported the government of DRC to make the HMIS and CHIS more functional in two provinces starting in early 2017 to early 2019. MCSP provides technical and financial support to implement child health, nutrition, water/sanitation/hygiene, and/or family planning interventions in 119 communities in Tshopo and Bas-Uélé provinces. Accompanying the program, MCSP has worked with the provinces and districts to strengthen CHIS reporting, providing data collection (registers) and reporting forms, and training the CHWs and their supervisors in the interventions and data needs. MCSP provides technical support for regular data review meetings in eight districts implementing iCCM and family planning. MCSP promoted the use of simple dashboards (tables) to visualize iCCM data at the community level, providing laminated poster boards to the community sites to track child health and family planning data (Figure 5). MCSP worked with the DPS and health zones to support the installation and ongoing oversight and engagement work of CACs in 119 sites in Tshopo and Bas-Uélé provinces. MCSP has also supported the MSP in the development of national child health and community strategic plans. These plans were developed in coordination with partners and include monitoring and evaluation frameworks that draw heavily on indicators from the CHIS.

Lessons Learned

It is possible to have a functional national-level CHIS with unpaid volunteers who report their activities. This relatively simple system, built into the reporting structures of the national HMIS allows for scale-up at less cost than a complex, stand-alone system would require.

Dependence on partner support leads to uneven implementation and reporting. In every aspect of the HMIS and CHIS, the level of implementation—from reporting to data use—is dependent on donor and development partner support in the geographical area.

Figure 5: Simple dashboard at CHW site displaying child health data in Tshopo province, DRC



Egypt

Background

The *Raedat Refiat* (RR)—or "village pioneer"—community health worker (CHW) program was established in 1994 under the Ministry of Population to address Egypt's high fertility rate by increasing demand for family planning services and improving health behaviors among key populations. In 1996, the Ministries of Health and Population (MOHP) merged and the RR scope of work expanded to include reproductive health activities and to support the newly established Women's Clubs.

Egypt's RRs are responsible for approximately 500 households and are charged with making 150 household visits per month. The initial scope of RRs was to conduct home visits to share specific health knowledge addressing high fertility rates and to encourage women to visit primary health care facilities to receive family planning services. On 31 August 2016, the Minister of Health issued a ministerial decree to form a technical advisory group for the preparation of a national RR strategy. MCSP served as the secretariat to provide ongoing support for the technical advisory group functioning. With the new national strategy, the RR scope expanded to include a comprehensive maternal and child health package reflective of the MOHP's Family Health Package, including reproductive health, nutrition, newborn and child health, and communicable and non-communicable diseases. In parallel to home visits, RRs support health and income generation activities at the Primary Health Care Unit's (PHCU) Women's Club. Alongside their routine community awareness activities, RRs provide services to the PHCU managers by assisting women who come to the facility and by conducting health seminars in the waiting area. Additionally, they take part in the preparation and deployment of mobile clinics and the MOHP's nationwide health campaigns on both regular and emergent bases (e.g., recent Hepatitis C campaign).

The CHIS, which captures and reports on the activities of the RR (referred to as the RR HMIS throughout this section), is fed from data reported by the RR regarding their household visits and community activities held. At present, there is the RR HMIS, which is paper-based, and a digital version of the system that the RRs use on tablets. The digital RR HMIS has the same reporting features as the paper-based system, in addition to job aids and a record of the RR's demographic and training information.

CHIS System Components

Dimension A. Enabling Environment

Egypt's CHIS has been designed to provide key information on community health, relying on RRs to make home visits and report up through health facilities to the national level. Each RR is supervised by an RR Supervisor who reviews the weekly activity plans and monthly reports for the approximately 10 RRs they supervise.

System Design

The system has been designed to capture several important aspects of the RRs work including: basic human resource information, method of health messages' delivery, data reporting, planning, and achievements. The digital RR HMIS serves as a central registry of all RRs, their age, location, and training received/seminars attended. This information is available at district, governorate, and national levels to aid the MOHP in planning for resource needs. The digital RR HMIS also produces all of the reports needed by the RRs to report up to the RR Supervisors and the district and governorate level, and allows for the input of the supervisory reports that the RR Supervisor and district and governorate supervisors need to complete. The digital system was introduced in two governorates (Luxor and Ismailia) in 2018, and in Damietta, Port Said, and Assiut governorates in 2019. There are plans for the MOHP to continue to roll out the system in other governorates after the MCSP project ends and system management transitions to the MOHP.

System Management

The digital RR HMIS is currently managed by MCSP Egypt on cloud-based servers. As MCSP Egypt closes in 2019, there is a plan to transition to a server that is owned and maintained by the MOHP. MOHP central-level and governorate-level information technology (IT) staff have been trained on troubleshooting and supporting of the RR system. For example, training has been offered to district-level staff on troubleshooting hardware problems; to governorate-level staff on software issues; and to central-level staff on Team Viewer so that a tablet view can be accessed remotely for troubleshooting by national- and governorate-level staff as well as steps for running reports.

Leadership and Governance

The RR strategy was built on four pillars: 1) institutional and governance; 2) availability of services; 3) partnership; and 4) capacity building. This strategy was developed to provide a framework to integrate the RRs within the Family Health Strategy and Reproductive Health Program in line with the Sustainable Development Goals 2030. This program benefits from support at the national level through the Minister for Health and the MOHP undersecretaries.

The RRs work as members of the PHCU, or health facility. RRs receive instructions from the PHCU Director while their technical supervisor is the RR Supervisor (unit supervisor or district supervisor) located within the family planning sector. At the governorate level, the Family Planning Director supervises the RR Supervisors. The district-level RR Supervisor usually oversees several RR Supervisors and each RR Supervisor oversees approximately 10 RRs.

Infrastructure/Resources

At a public event in 2017, the former Minister of Health committed to provide tablets for all RRs, about 14,000 RRs nationwide, as the system goes to scale. MCSP purchased 41 routers for internet connection (ensuring functionality of tablets in rural areas) and 454 tablets. Additionally, partnerships were fostered with Save the Children Egypt's Sponsorship program to provide 510 tablets (these figures are accurate as of the time of writing but may change as implementation continues). The MOHP will re-purpose approximately 13,000 tablets for this work, which had been procured earlier for the census completed in recent years. Specific details related to the establishment of a data center to host the system within the MOHP are under ongoing discussion as of November 2018.

Dimension B. Information Generation

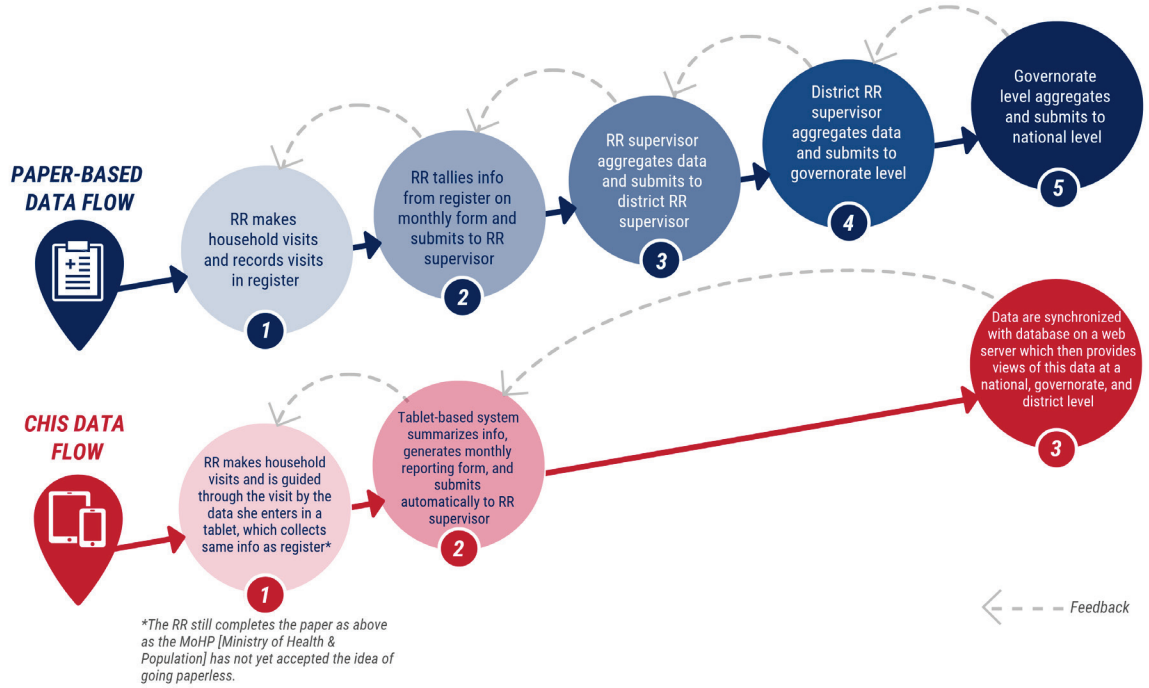
Data Sources

RRs capture data about households for the RR HMIS during household visits. RRs register households; record outcomes of household visits (such as referrals made and health topics discussed); create a schedule for their upcoming work; and report on the number of visits and referrals made, health behaviors adopted at the household level, and community activities held. There are 15 health behaviors and 31 messages that the RRs report via paper registers, and then aggregate in monthly reports, which they submit to the PHCU. Demographic data about RRs (including age, sex, location, and training history) are captured when they register into the system; each RR's training history is also recorded in the system.

Data Management

Paper copies of the monthly reports are prepared by the RRs and shared with their supervisors at the facility level, where they are aggregated and sent to the next level up through the national level as shown in Figure 6 below. In the digitized RR HMIS system, data on household visits are entered electronically on tablets and aggregate data are made visible to the supervisors on tablets, as well as to the governorate and national levels through access to the digital RR HMIS server. As of November 2018, there are ongoing discussions about allowing the governorates to report only electronically and not require completing the paper forms, thus alleviating the current dual burden of reporting (both on paper and electronic). This issue was most recently discussed at a September 2018 national monitoring and evaluation (M&E) steering committee meeting, where tablets were highlighted as an essential M&E tool.

Figure 6: Egypt's data flow (paper-based vs. CHIS)



Information Products and Dissemination

RRs complete monthly reports on the number of referrals made, household visits, health behaviors adopted by households, and community activities held. These data are aggregated in reports and shared upwards through the reporting system but not at present shared back down to the RRs or the communities they work with. A notable exception is the periodic dissemination of information on the number of visits performed by the RRs which is shared from the Minister for Health during media interviews.

Dimension C. System Performance

Data Quality

The paper-based RR system relies on the RR Supervisors and district- and governorate-level HMIS staff to perform data quality checks. However, in practice, these checks are not reliably being carried out. An HMIS M&E plan that includes standard operating procedures for data analysis and data quality is in the process of being developed by MCSP and should help to address this gap. Data accuracy will be verified by the central team as they make random household visits to check on the accuracy of data already entered.

Data Use

The existing paper-based reporting system focuses on basic information on the number of visits made and the number of women using family planning methods. This information is aggregated from the RR

level through the district and governorate levels and then ultimately to the MOHP. Although this information is not reliably analyzed or used at the intermediate levels, the MOHP does cite this data in interviews with the media, which serves to signal to the RR program and the country that information on community health service delivery is valued.

Dimension D. Human Element

Based on MCSP's earlier analysis of the RR system using the CHW Coverage and Capacity tool (C3) to establish operations and time management priorities of the RR workforce, about 30% of RR working time is devoted to administrative work. This has obvious drawbacks, as it limits the amount of time RRs can spend providing services to the communities they serve. The development of the RR HMIS promises to allow the RRs to more efficiently and effectively spend their time with members of households. RRs are paid employees of the MOHP, so they will continue to perform their visits. Increased capacity for the RR Supervisors to access and review their work will likely serve as additional motivating factors for the RRs to utilize the digital RR HMIS. Additionally, the inclusion of training modules and job aids into the digital RR HMIS application allows the RRs to improve their knowledge and skills in nutrition, newborn and child health, reproductive health, and communicable and non-communicable diseases.

Dimension E. Stakeholders

National

MCSP Egypt has worked closely with the MOHP in every step of the system development process for genuine co-creation and an in-depth understanding of the system. This partnership has extended to the rollout of the system, including the training of MOHP central-level staff as master trainers of the system. Doing so has fostered ministry ownership, ensuring the sustainability of the community HMIS long after MCSP's presence in Egypt ends.

Governorate

Administratively, each RR is directed by the PHCU Director and is supervised by the RR supervision team at the district level. The RR supervision team provides the RR with follow-up and technical performance evaluation, which is carried out at the health unit level as well as the district level. The performance evaluation is done through the completion of supervisory checklists and community feedback, which exist both on paper as well as electronically (via tablet) in the digital RR HMIS system.

Community

To mobilize the local community members to participate in local activities, the RRs are responsible for coordination with the local authorities in villages including Community Development Agencies (CDAs), which are partner governmental organizations. RRs are responsible for coordinating community activities with CDAs and reporting back on services provided. In practice, this level of programmatic coordination and feedback does not regularly take place—a missed opportunity to improve the level of community engagement in the program.

Household

RRs serve households in the respective communities where they work. Households and community members receive information from the RRs and can provide feedback on any concerns they have on the services being provided at the facility level or by the RRs themselves through community leadership structures and the CDAs. As highlighted above, the low level of engagement between the CDA and the RRs indicates that this household-level feedback may not be utilized to its fullest potential.

Dimension F. Contextual Factors

There are few limiting, current contextual factors. The MOHP's present nationwide Hepatitis C outreach campaign, involving RR directly, has slowed the rollout of the digital RR HMIS pilot due to the MOHP's requested prioritization of the campaign efforts. The tendency for RRs to be mobilized in support of national health campaigns is a reality that will likely influence not just the rollout of the electronic system, but the ongoing provision of services to the household level. Another limiting factor for the digital RR

HMIS, though not unique to this setting, is the lack of reliable connectivity at the community level. For this reason, the system has been developed to function offline and synchronize when a connection is available.

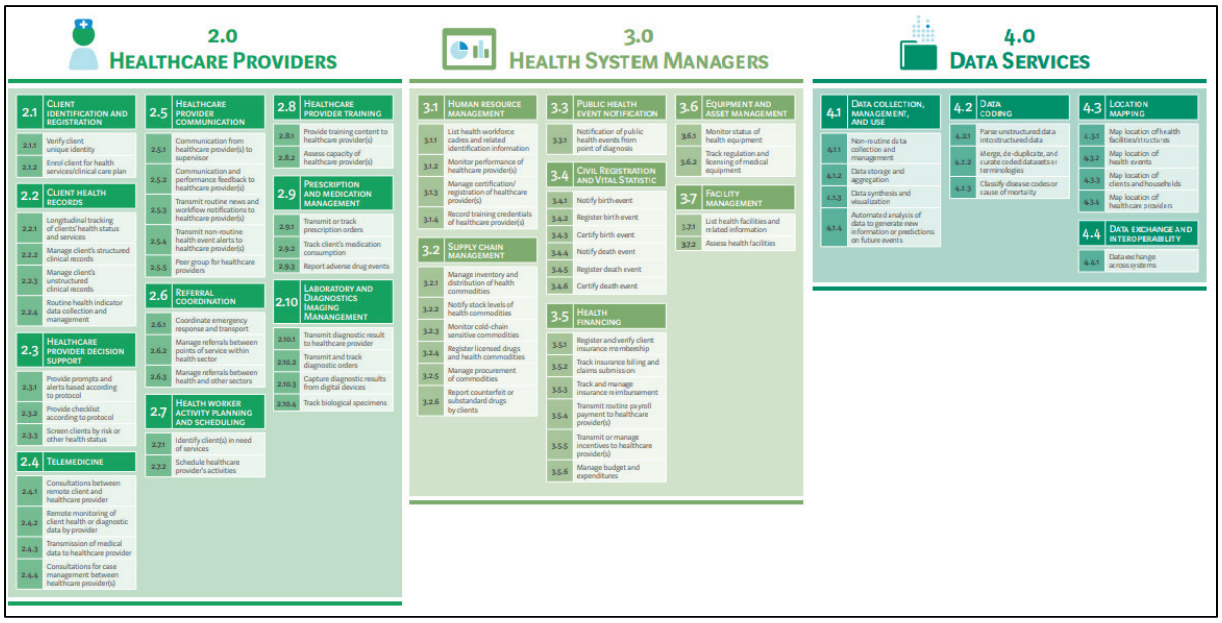
Dimension G. Feedback

Although the system was designed for RR Supervisors and district-, governorate-, and national-level staff to provide feedback to the RRs, in practice there is limited evidence that the RRs receive feedback about their performance. It is envisioned that the ability to provide feedback will be enhanced through the electronic availability of data, but the reasons that feedback is not being provided routinely, which may include people and processes, should also be explored as the RR program continues. It would also be beneficial if the link between the CDAs and the RRs could be strengthened to leverage the feedback provided by the households the RRs serve.

Notable Features

- **Digital systems developed immediately following new Community Health Strategy.** The RR HMIS was developed following the development and validation of the new RR strategy in 2017. Key areas highlighted for improvement of the RR program included training and capacity building, documentation and information management, and program performance management. MCSP drew directly from this strategy to develop the digital RR HMIS, which allows the RR to document their work and share data on their performance and plans with their supervisors at the click of a button. RR Supervisors can then review the RRs' work on an ongoing basis.
- **Paperless**. The digital CHIS system is designed to replace all of the paper forms that the RRs were asked to complete as part of their routine work, thus reducing the time spent on tabulating reports and improving data accuracy.
- **Integrated System.** Many CHIS may only serve a narrow purpose, but the digital RR HMIS provides multiple functions within a single, integrated system. Using the WHO's classification of digital health interventions, as shown in Figure 7 below, it becomes clear that the digital RR HMIS tool is designed to meet many of the needs of the health care provider, in addition to supporting health systems managers and supporting routine data collection. The tablet-based application includes demographic and training information on the RR workforce that are used to maintain the human resource listing about the RRs and their training statuses. eLearning modules are embedded within the application and provide on-demand videos, training materials, and job aids to the RRs to be utilized during home visits and when RRs feel they need a refresher. Data on registered households and visits performed by the RRs then feed into the key indicator reports that are accessed by the RR Supervisors, as well as the follow-up visits that form the basis for the RRs' weekly plans.

Figure 7. Mapping the Digital Health Interventions in Egypt's digital RR HMIS against the WHO Classification of Digital Health Interventions[16]



MCSP Contribution

Working closely with the MOHP and various country-level stakeholders, MCSP was a key actor in the development of the RR national strategy, which the MOHP validated and endorsed in late 2017. Working closely with stakeholders at the community, supervisory, and national levels, MCSP designed, developed, and deployed this digital system, with deliberate capacity building measures built in (e.g., training of central-level MOHP staff in the RR HMIS). MCSP also developed the national M&E plan for the RR system (both paper and digital RR HMIS) to monitor the national RR system, regardless of its media format.

Lessons Learned

Engage systems stakeholders at all levels early in the design process. MCSP worked with the MOHP in the development of the system and incorporated their feedback into the systems design and implementation plans. This interaction was mainly through the leadership and technical teams of the Population and Family Planning Sector of the MOHP. Meetings were held to finalize and agree upon the RR registers and RR HMIS system. In addition, progress on system development was shared continuously. RR Supervisors were involved in the system design discussions at the training of trainers session, when they provided very useful feedback covering some functions such as the calendar pickers and search options as well as updates requested to the user manuals. In the future, it is recommended to solicit and incorporate this feedback at an earlier stage in the systems development process, rather than having to re-engineer some components of the system to accommodate these valuable inputs.

Plan for basic hardware and IT skills training. As the system was being rolled-out to the RR Supervisors, who are charged with training the RRs and supervising the use of the system, some participants struggled with basic concepts about the digital devices (e.g., how to connect to a wi-fi network). In response, MCSP in partnership with MOHP colleagues, delayed the RR Supervisor training until a 2-day introductory course on using the tablet could be developed and included in the training, which will also be added as a module to the RR training. The tablet course consists of an introduction to the buttons and navigation of the tablet as well as basic administrative tasks like connecting to a wi-fi network. Including this in the RR Supervisor and RR training will help ensure that the system is well supported and that the users have a solid foundation to build upon for using the CHIS. In addition, the MOHP has been prompted to develop and implement a 3-day training on basic IT skills covering the internet and the Microsoft Office Suite as the MOHP workforce increasingly uses digital tools in their work.

Build capacity to manage the system from the start. MCSP was deliberate in working with the central level of the MOHP in the systems design as well as with the RR Supervisors who would serve as trainers for the system. By adopting a training of trainers approach, the MOHP now has a group of trainers who can support and help to scale up the RR system both now and in the future. For technology support, MCSP trained national- and district-level IT staff on the system as well, with an additional focus on basic troubleshooting, so that these staff can provide support to ongoing and future implementation.

Namibia

Background

The Ministry of Health and Social Services (MoHSS) first piloted Namibia's Community Health Workers Programme (CHWP), formerly known as the Health Extension Program (HEP), in April 2012 in the Kunene region of Namibia. Since then, the program has been scaled up nationally to include 2,298 community health workers (CHWs). While the pilot and scale-up were taking place, the MoHSS in collaboration with partners developed the country's national CHIS, known as the CHWP monitoring and evaluation (M&E) system, to "improve the health status of the people through improved health system performance."[17]

CHIS System Components

Dimension A. Enabling Environment

System Design

Figure 8. Data Flow Summary for CHWP[18]

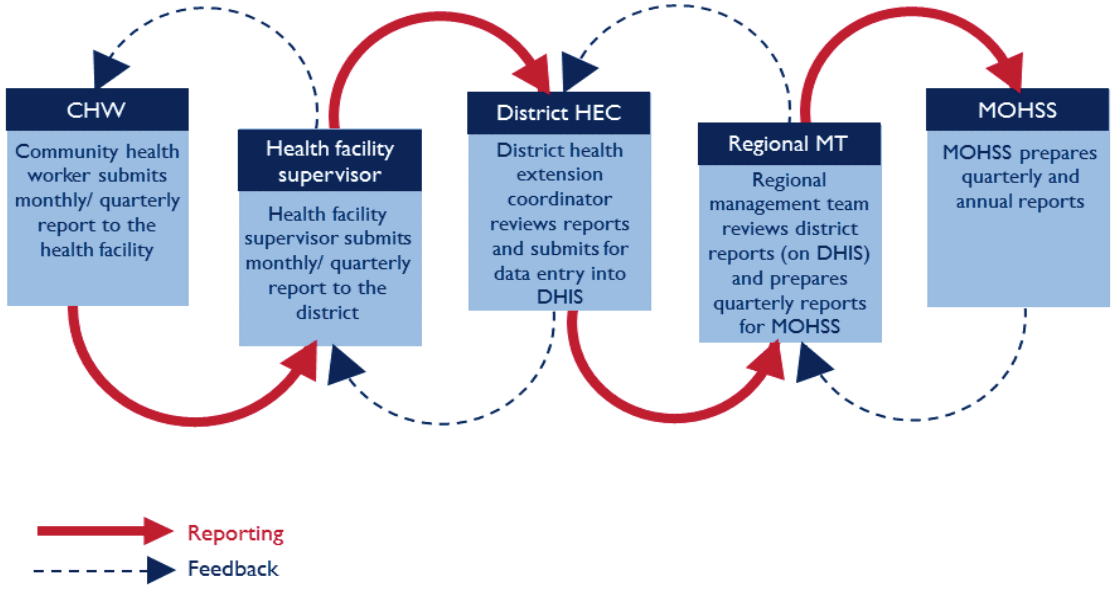


Figure 8 illustrates the CHWP data flow. The CHW (formerly referred to as Health Extension Worker) collects data using paper-based forms and submits this data on a monthly and quarterly basis to their designated health facility. Health facility supervisors review, provide feedback, and then send aggregated monthly/quarterly reports to the District Health Extension Coordinator (DHEC). The DHEC reviews the report and provides feedback to the health facility supervisor and then submits aggregated data to the District Health Information System (HIS) officer for entry into the country's DHIS2 system. Once the data are included in the DHIS2, the regional management team reviews and develops a summary report that is subsequently sent to the national level.

The system as described has been detailed in the *National Health Extension Program Data Management Procedures Guide*. In practice, the data flow has been implemented without the review of the DHEC. The

DHEC position has not been established due to funding limitations, which has resulted in missing quality control and feedback at the district level.

System Management

The MoHSS is responsible for the national HIS system, into which the CHWP M&E system is fully integrated. The Health Information and Research Directorate's (HIRD)'s Division of Health Information Systems is responsible for all data entered into DHIS2, including the CHWP M&E data.

Pre-service training for CHWs is a comprehensive 6-month program with both classroom and field modules, coordinated by the National Health Training Center. One component of this training focuses on providing guidance on how the CHWs should complete paper registers and summary forms and submit them to supervisors. Refresher trainings are offered on an informal, ad hoc basis, an area for improvement identified by UNICEF's 2017 evaluation of the CHWP.[19]

Leadership and Governance

The HIS technical working group is a national-level group that acts as the main coordinating body for all HIS activities, including the CHWP M&E system.

Infrastructure and Resources

In addition to the government support of the country's HMIS, technical and financial support of the CHWP M&E system is currently provided by the Health Information Systems Program with support from CDC-PEPFAR and MCSP through PEPFAR Strategic Initiative funding. At the conclusion of MCSP, technical and financial support for the system will transfer to the USAID-funded DREAMS project.

Dimension B. Information Generation

Data Sources

Data collection forms used by the CHWs include:

- CHW Integrated Daily Activity Register
- Maternal and Neonatal Health Individual Form
- Household Census Register Form
- Catchment Area Census Register Form

CHWs compile this data into monthly, quarterly, and annual reports (the Vital Event and Activity Reporting Form and the Disease and Disability Reporting Form) and submit them to the health facility. Monthly reports focus on CHW contacts and visits, first aid, maternal and neonatal health, child health, HIV/AIDS, TB, malaria, disabilities, social services, health promotion activities, and referrals. Quarterly reports focus on water and sanitation, and annual reports capture the annual catchment area census results.

The CHW supervisor at the facility compiles data related to reporting timeliness and completeness, the number of CHWs reporting, and supportive supervision activities, and submits this data to the district level.

Data Management

Reporting occurs on a monthly and quarterly basis. Data are collected by CHWs on paper and entered into the national electronic DHIS2 system at the district level. The HEP Routine Data Collection and Reporting User's Guide outlines in great detail how each form should be completed by the CHW. Additionally, MCSP drafted a data management standard operating procedure (SOP) in September 2016, which offers guidance for HEPs on data collection, processing, reporting, analysis, and interpretation.

Information Products and Dissemination

Reports are generated using CHW data at the facility, district, regional, and national levels. As noted above, monthly reports include a summary of data elements related to household visits and client contacts, first aid, maternal and neonatal health, child health, HIV/AIDS, TB, malaria, disabilities, social services, health promotion activities, and referrals. Quarterly reports include water and sanitation, and annual reports capture the annual catchment area census results.

Dimension C. System Performance

Data Quality

Data quality is an ongoing issue in the country. MCSP assisted in the development of a data quality SOP that includes guidance for community-level data. Piloting of the SOP occurred in August 2017 in Namibia's Khomas Region and the rollout of the guide is ongoing.

In practice, data are not always reviewed at each level as indicated in the data flow (Figure 8). At the facility level, CHW supervisors may be overseeing the work of 20 or more CHWs and must see patients at the clinic as well. Thus, CHW supervisors have very limited time to review data and provide supportive supervision.

Data Use

Annual CHW data review meetings take place at the national level at which relevant ministry staff review and discuss regional-level CHW data. CHWs participate in monthly and quarterly review meetings at the health facility level, which are designed to review and discuss data captured in the CHWP M&E system. However, in practice, data use and decision-making at this level is informal and non-systematic.

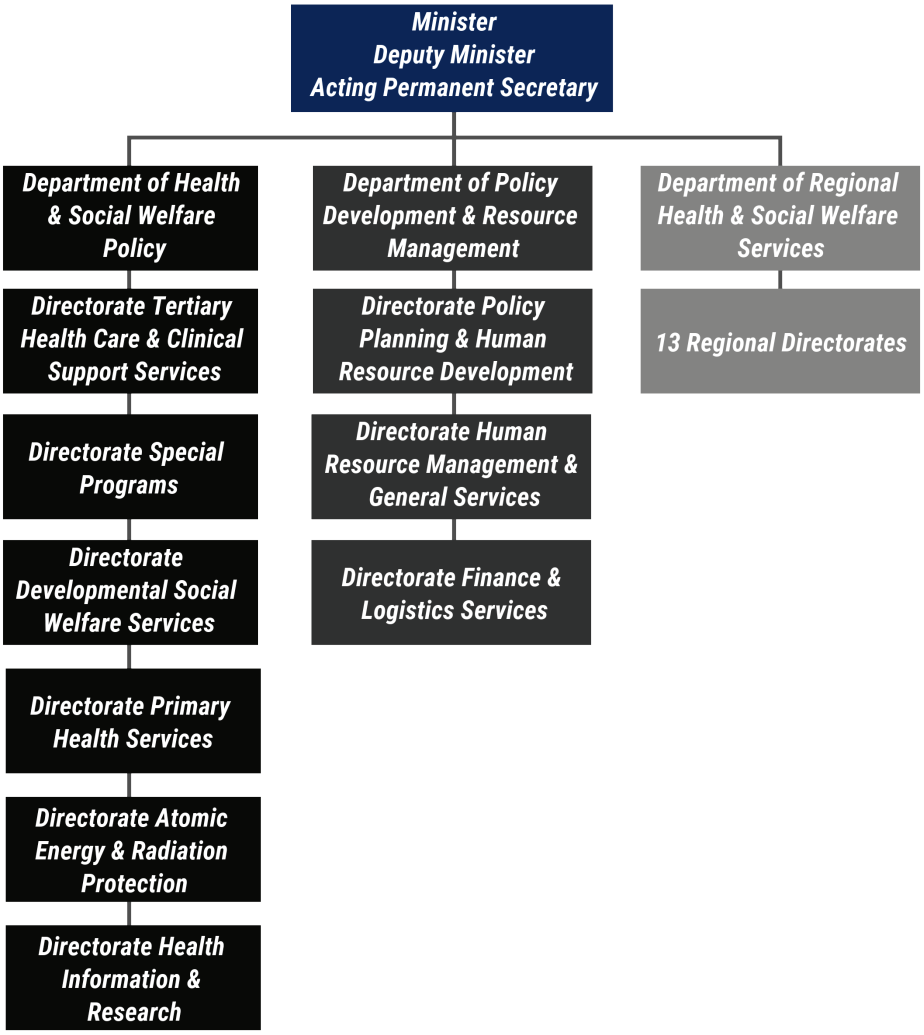
MCSP supported regular data review meetings in three districts implementing community-based HIV testing and counseling that included the use of graphs and dashboards, but this practice has not been institutionalized nationwide.

Dimension D. Human Element

CHWs in Namibia are fully and formally integrated into the national health system. CHWs are considered a formal cadre under the MoHSS and receive a monthly salary. However, inadequate human resources at the facility level is an ongoing challenge for implementation of the CHW M&E system. CHW supervisors, who are tasked with providing feedback to CHWs on reports and play a critical role with ongoing quality control, are also responsible for providing care to patients at the facilities, which leaves little time for supervisory duties.

Dimension E. Stakeholders

Figure 9. Namibia Ministry of Health and Social Services Organogram



National-level stakeholders involved in the design and operationalization of the CHWP M&E system came from both the government and nongovernmental organizations. The MoHSS, for which an organogram is provided in Figure 9, led the operationalization of the effort, drawing on staff from the HIRD and the HIS subdivision. The Directorate of Primary Health Care and the Community-Based Health Care Subdivision, responsible for the CHWP itself, provided additional guidance and support. Departments within the Directorate of Primary Health Care that were instrumental in providing programmatic guidance included the departments of Child Health, TB, HIV, and Social Welfare. The National Health Training Center (a Subdivision of the Directorate of Policy Planning and Human Resource Development) has also been involved in the development and implementation of a curriculum for CHWs that includes training on the CHWP M&E system.

International partners and projects involved in the development and operationalization of the CHWP M&E system and members of the national steering committee include: UNICEF, USAID, WHO, the Maternal and Child Health Integrated Program (MCHIP)/MCSP, C-CHANGE, Project Hope, and CDC, among others.

Stakeholders at the regional, district, and facility levels were also instrumental in the design and development of the system as well as its operationalization. The planning process included multiple rounds of workshops held with regional, district, and health facility staff to define indicators, translate them into registers, and develop SOPs for data collection. CHWs also participated in initial workshops to help design the registers.

Operationalization of the system also requires participation from health officials at various levels of the system, from the CHW to the regional level. Additionally, community leaders and community health committees are integral to the design of the CHWP, providing support to CHWs and reviewing and using community data. In practice, according to the UNICEF evaluation, these committees are not operational in all communities where CHWs work and, as noted above, data presentation and use is not systematically incorporated at the community level.

Dimension F. Contextual Factors

Economic instability in the country has been a barrier to sufficiently staffing health facilities and key positions within the CHWP M&E system. While political will to implement and expand the CHWP as a whole is currently strong, support of the program has historically varied by administration, resulting in inconsistencies and gaps in program implementation.

When compared with other countries in Africa and those included in this report, Namibia is relatively small, population-wise, with only 585 health facilities and 2,298 CHWs in the entire country. Its smaller size makes scale-up less challenging than in countries with multiple thousands of health facilities and many more CHWs. However, Namibia is also one of the least densely populated countries in the world,[20] which presents challenges when trying to standardize systems across remote, hard-to-reach areas.

Dimension G. Feedback

Feedback mechanisms have been designed to operate at each level, as illustrated in Figure 8. In practice, these mechanisms are lacking due to human resource limitations, contributing to data quality concerns.

Notable Features

- **Integration**: One notable feature of Namibia's CHWP M&E system is that it is fully integrated within the country's national routine HIS. Data related to maternal and newborn health, health promotion activities, water and sanitation, and general household census data are aggregated at the facility level and sent to the district, where data are entered into DHIS2.
- **Nationwide System**: Another unique characteristic of the CHWP M&E system is that the system was designed for use by the national government instead of a parallel system set up by nongovernmental organizations for specific projects. During the design phase, a priority was developing an integrated reporting collection system to be used across the health system. Although funding for the system came largely from donors focused on HIV, the MoHSS was able to establish a national-level CHIS with broader programmatic areas, including maternal and neonatal health, child health, HIV/AIDS, TB, malaria, and social services.
- **Broad Scope**: The CHWP M&E system also focuses on aspects of social wellbeing that are usually outside of the scope of most community health programs. CHWs are trained to identify and report households eligible for social support and those that have not received grants for this purpose as well as to report domestic violence, elder abuse, and health problems that fall outside of most community health programs, including substance abuse, suicidal behaviors, and developmental delays in both children and adults.

MCSP Contribution

Under MoHSS guidance, MCSP revitalized and operationalized Namibia's HIS technical working group and related subgroups, tasked with addressing human resources, infrastructure, governance, and other HIS issues. Through MCSP support, these subgroups in collaboration with HIRD reorganized and are working towards a harmonized HIS. There is currently a draft national Health Information System Strategy, which reflects the efforts which have been made on this front, and when launched, will provide the underpinnings of the national health information architecture. The CHWP M&E system is one of many systems that previously existed outside of the national framework, that now operate within. This integration demonstrates a national-level commitment to CHW data monitoring with improved access to reports that can support evidence-based decision-making.

Additionally, MCSP and its predecessor project, MCHIP, assisted with to the development of standardized guidelines related to the national CHWP M&E system. Documents include:

- *HEP Routine Data Collection and Reporting User's Guide (2014)*
- *HEP M&E Framework (2014)*
- *Data Quality Standard Operating Procedures for the Routine Health Information System (2017)*
- *HEP Indicator Definitions Manual (2016)*
- *HEP Data Management Procedures Manual (2016)*

Finally, MCSP implemented a digital platform for HIV testing and services at the community level to improve the availability, accuracy, completeness, and timeliness of the data collected by CHWs. Under this effort, 20 CHWs recorded data from their household visits on Android tablets running Open Data Kit collect, from which data were extracted into DHIS2. This small-scale implementation demonstrated the feasibility of mobile data collection in the country to improve outcomes such as data quality.

Lessons Learned

Adequate human resources at each level are essential for ensuring high functioning supervisory and feedback mechanisms, as designed. This supervision and feedback, especially at the CHW level, help promote quality data collection and reporting by the CHWs.

Data use is a crucial component of the CHWP M&E system to ensure its continued use and sustainability. Data quality is an ongoing challenge and barrier to data use identified by respondents that the government is working to address. In the meantime, as data quality improves, promoting data use at each level should be prioritized to ensure that the data collected by CHWs inform decision-making.

The involvement and leadership of the central coordinating mechanism, led by the MoHSS, was key to establishing and launching the integrated system. This support and leadership enabled the system to incorporate various program elements that are included in the CHW program instead of creating a siloed reporting system. This integrated system gives decision-makers a higher level view of the health system and enables more informed decision-making.

Digitization of the system moving forward, from data capture at the community level and integration with DHIS2, has the potential to improve data quality through structured data capture mechanisms and a more streamlined review and feedback process by supervisors, timeliness of reporting resulting from electronic transmission, and subsequent use of data due to built-in visualization capabilities. MCSP's implementation of a digital platform for HIV testing and services at the community level confirmed that digitization is feasible in the country and should be considered moving forward.

Uganda

Background

Uganda faces the challenge of providing high-quality, accessible health services to a population that is over 70% rural and, as of 2014, was spread across 122 districts and 58,000 villages.[21] Community health services are a vital component of the country's health strategy that seeks to provide universal health coverage and improve accessibility and affordability of health services to rural and poor communities where the highest burden of infant, child, and maternal morbidity and mortality are concentrated. In 2001, Uganda adopted the Village Health Team (VHT) model that links communities with health facilities through the training and support of 180,000 volunteers across 112 districts to serve their communities with basic preventive and curative services. While the VHT model has mobilized and had a positive impact on communities, inadequate funding coupled with inconsistent coverage (i.e., not all villages have VHTs selected, trained, and/or functional) has resulted in an overstretched volunteer force and inability to reach health care targets.

In 2016, in an effort to the address these shortfalls and increase community engagement, participation, and ownership of community health activities, a decision was made to transition to the Community Health Extension Worker (CHEW) Strategy. The goal is to train and support a total of 15,000 CHEWs by the year 2020, with 1,500 already trained and serving. These Ministry of Health (MOH)-supported and salaried community workers receive 12 months of training (in comparison to the 5- to 7-day training provided to VHTs) and are supervised by the Health Center III (HC III). CHEWs in collaboration with the local health center and existing VHTs provide basic services, surveillance, and vital registration within their communities. The CHIS for the CHEWs strategy is being developed with the goal of integrating community data into DHIS-2 being used at the HC III level.

CHIS System Components

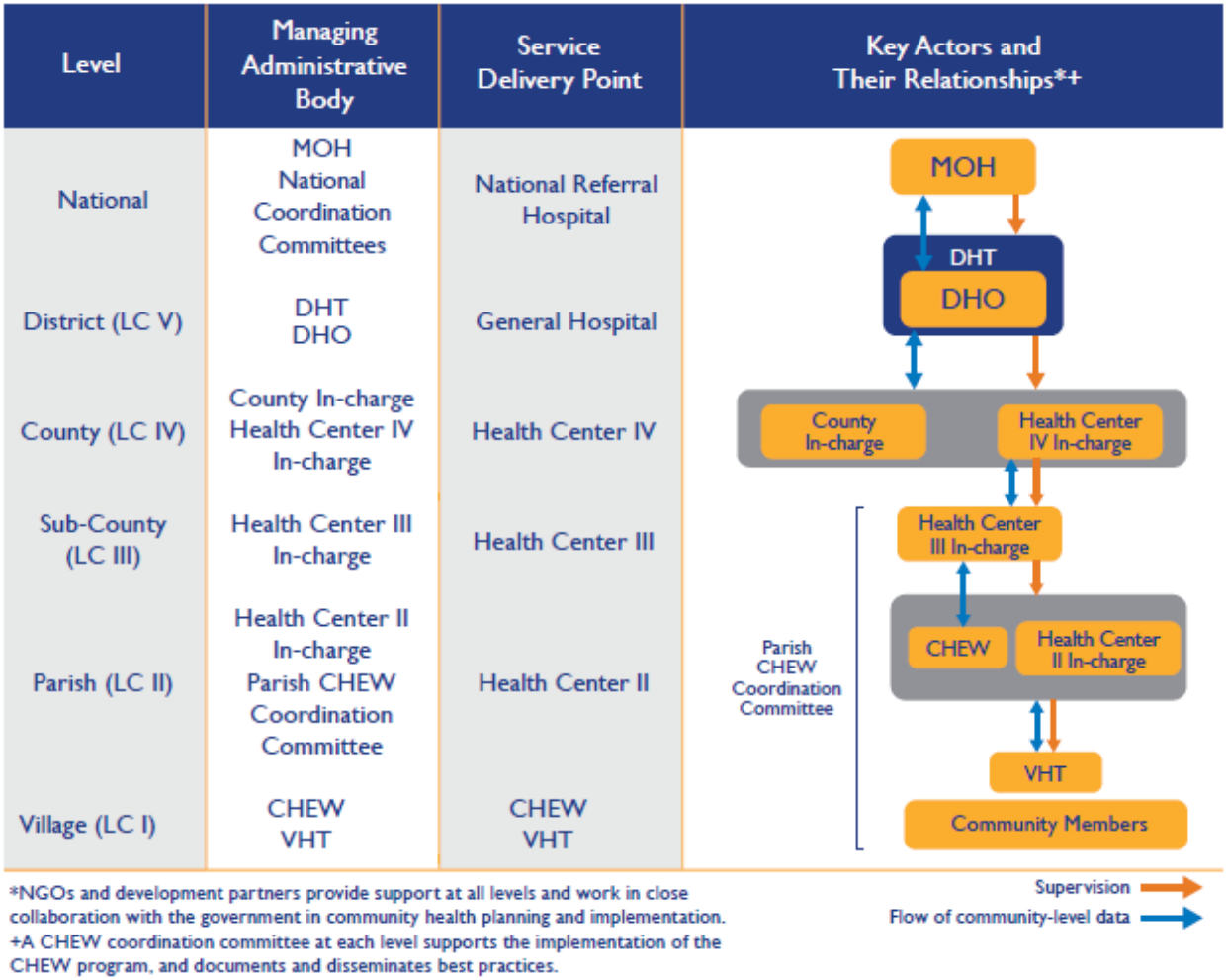
Dimension A. Enabling Environment

System Design

Figure 10 shows the planned flow of community health information through the health system structure.[22]

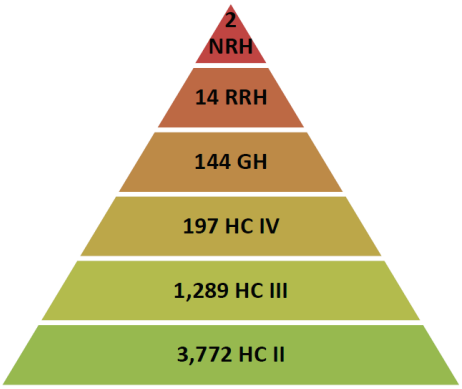
VHTs submit paper-based data on a quarterly basis to either the CHEW if operational in their area or to the HC II in-charge, who in turn sum the data of all VHTs working in their areas and submit it to the HC III in-charge. If operational, CHEWs sum up their own data and that of the VHTs operating in their zones and submit it quarterly to the HC III in-charge. Ideally, review and feedback on the data is provided during the quarterly review meetings with the health center staff and parish committee. HC IIIs provide quarterly summary reports to the HC IV in-charge who provide aggregated quarterly reports to the district health office (DHO). The DHO in turn submits quarterly reports to the national MOH. An Annual Health Services Performance Report is compiled by the MOH. However, despite these reporting processes, one key informant indicated that "most of the reported data are not put to use anyway."

Figure 10. Uganda's Community Health Program system structure



Uganda has been utilizing DHIS2 since August 2012 with HC IIIs entering information into DHIS2. At the HC II and III levels, service provision information is first recorded by hand in paper-based registers and then entered into DHIS2 at the HC III level. Figure 11 shows the number of reporting units per HC level as tracked by DHIS2.[23]

Figure 11. Organization of Health Services in Uganda (and corresponding number of units) DHIS2



Note: HC - Health Centre; GH – General Hospital; RRH – Regional Referral Hospital NRH - National Referral Hospital;

Although community health information is not routinely compiled into health center data nationally, Uganda's implementing partners have supported a significant number of districts with training, technical, and financial support that have resulted in successful community health program interventions including digital community health data collection and utilization. Lessons from these programs are gathered and

synthesized to inform a national, standardized, and harmonized system for community health services and outreach and related HMIS. Implementing partner supported initiatives at the district level include:

- Integrated community case management (iCCM), which enables CHEWs and VHTs to submit data directly online to DHIS2;[24]
- mTrac, a mobile-phone-based system that enables VHTs and CHEWs to electronically submit information about supplies and send stock-out alerts as well as conduct disease surveillance;[25]
- Saving Mothers, Giving Life, which links expectant and new mothers to essential services to address maternal mortality;[26]
- FamilyConnect, which registers households with pregnant women and sends them life-cycle-specific messages;[27] and
- The Reaching Every Child – Quality Improvement (REC-QI) approach, which equips health center staff with skills and tools to link with VHTs and CHEWs to map and track target populations for essential services and problem solve together for improved and equitable coverage.[28]

While standardization of approaches is necessary for scale-up and management, district health team members, health center staff, VHTs, CHEWs, and communities have gained skills to engage stakeholders, register target populations, track services, provide follow-up, and use data to plan and problem solve.

System Management

The HMIS is managed by the Department of Health Information at the national level.[29] The Resource Center is situated in the MOH Department of Planning and is tasked with providing quality and timely health-related data and information to all stakeholders. However, there are inadequate human resources and low government financial allocation for HMIS and for health research and learning in general. At the district level, the system is primarily managed and allows for the district Biostatistician and/or HMIS focal point person who enters the health center data into DHIS2 and submits the quarterly report to the national level. Ideally, the district health team (DHT) is supposed to identify indicators the biostatistician should analyze for every given period (e.g., monthly) and provide information for decision-making. A National Community Health Coordination Committee has been established and is tasked with rolling out the new CHEW strategy and developing the new community health information tools.

At the health facility level, if staffed, a records assistant or a designated staff supports collection and submission of quarterly reports to the district level—some districts have health facilities that enter data directly into DHIS2. As more of the health system moves to digital capture of data down to the health facility level, the reporting burden is lessening. Although access is currently limited, data dashboards have the potential to help supervisory staff more readily incorporate data analysis into supervision activities with CHEWs and VHTs.

At the community level, data collection, use, and reporting is managed by the VHT/CHEWs under the supervision of the responsible health facility (health facility in whose catchment area the village lies).

The CHEW strategy planned for less than 0.5% of its budget to support the digital development and management of community HMIS. With this meager amount, advocacy and implementing partner support will be needed to mentor newly trained CHEWs/VHTs in conducting household registrations, surveillance, supervision of VHTs, and management of the data collected for community services provided. At the same time, existing VHTs continue to carry out village mapping and use paper-based register books with very little training and support. Encouragingly, active steps are underway to incorporate CHEWs and VHTs into the MOH national Human Resource Information System (iHRIS) digital registry (a free software program being utilized in Uganda[30]) creating the potential to better support and target CHEWs in underserved areas.

Leadership and Governance

Uganda's HMIS policy has the goal of utilizing HMIS to provide quality information to support decision-making at all levels of the health care system in Uganda.[31] To achieve this, the HMIS unit seeks to ensure data use at all levels, as well as accuracy, timeliness, and relevance of the data being collected. The information collected is expected to develop, monitor, and evaluate work plans and health care service

delivery and inform national health policy. The goal is to have one single system to which all data entry and interpretation aligns and one that reliably tracks births, deaths, and causes of death. Uganda has selected reproductive, maternal, newborn, child, and adolescent health (RMNCAH) and Sustainable Development Goal-related indicators for tracking that have been incorporated into the HMIS. Emphasis is being placed on improving civil registration and vital statistics in order to facilitate effective planning especially at the health facility level, track services utilization for better reach, track mortality changes, and direct and monitor appropriate resources including vulnerable populations.[32] The Uganda Bureau of Statistics is responsible for the registration of births and deaths, and works collaboratively with the MOH, local government, and communities to improve implementation especially at the community level. The *Mobile Vital Registration System*[33] is facilitating birth registration at hospitals and in the community (introduced in 2010 with the support of UNICEF and has increased registration from 30% to 69%). The 2015 Registration of Person Act is also helping to increase birth registration.[34] Unfortunately, registration of deaths and related causes is very low (14%).[35]

An e-technology strategy has been developed to guide the collection and use of digital health information as the country benefits from the increased opportunities for "connectivity" in the East Africa Region.

A National Community Health Coordination Committee has been established and is tasked with rolling out the new CHEW strategy and developing the new community health information tools.

Dimension B. Information Generation

Data Sources

The VHT training manual provides guidance and data collection forms along with instructions on what data are to be collected, how often, and where to record it. Data includes births, deaths, illnesses, immunizations, pregnancies, as well as all outreach activities, health services, treatments, health education talks, and water and sanitation-related information. Where feasible, collected data are disaggregated by gender and age. VHT volunteers are given Village Registers to record information. The register is complemented by a community map created and updated by VHTs that includes all households in the community as well as key resources (roads, health providers, water sources, schools, places of worship, and households with children under four, among others). The *HMIS Health Unit and Community Procedure Manual* includes a module on the community, including data collection tools for VHTs (VHT/iCCM Register), quarterly report forms (Quarterly Household Summary, VHT/iCCM Quarterly Report, and Integrated Neglected Tropical Disease Control Treatment Register) and guidance on how to complete and submit these forms.[36] The MOH is responsible for developing the new data collection forms for CHEWs and the DHO will do the training and supervision on use of the forms.[37] Currently, private sector data are not included in the HMIS or collected by the MOH and there is no documented plan for the collection or incorporation of this data.

Data Management

The MOH intends to create a database at national and district levels that update CHEWs performance data regularly. Implementing partners have supported districts to conduct quarterly review meetings that include health facility staff, community leadership, and community volunteers for planning and problem solving. Pilots for Near Real-Time Monitoring using mTrac (mobile phone submission of community information for disease surveillance and drug stock-outs) have been positive.[38] There are plans for scale-up with almost one-third of districts already benefiting from the program.

Information Products and Dissemination

Submission of the quarterly HMIS report from the HC III to the HC IV level is given priority as timeliness is a criteria that is used on the *Annual Health Services Report* HMIS District League Table rankings. Direct entry of data at the HC III level into DHIS2 is a positive step; however, access to indicator dashboards is still being expanded beyond the district level. A pilot test of quarterly data dashboards for RMNCAH indicators at the HC III level is paving the way for improving access to indicator measurements. Community data, when collected, is reviewed when quarterly supportive supervision takes place. The use of community data, as mentioned earlier, is much more active in districts where implementing partners are supporting health center linkages to CHEWs and VHTs providing essential services.

Dimension C. System Performance

Data Quality and Data Use

The HMIS focuses on performance indicators related to timeliness and completeness often at the expense of data accuracy, analysis, and utilization. Where data are still being collected manually on forms, the tedious and time-consuming task of collection and summation leaves no time for checking data quality. Given staff shortages and heavy workloads, health facility staff have little time available to provide supportive supervision to CHEWs and VHTs. In HMIS reviews, the HC II and VHTs showed the least amount of data analysis and use.[39] HMIS reviews, not surprisingly, also found improved quality of community data and greater motivation for collection and utilization in areas where supportive supervision was taking place.

MCSP provided training and support for peer group supportive supervision in districts with staffing shortages, resulting in improved VHT performance for service coverage and data completeness.[40] Work performance also improved after facilitating cross-site learning workshops where high performing districts worked with poor performing districts to improve service coverage and data collection. MCSP applied an "orient, establish, strengthen, and sustain" model for equipping health center staff to work with VHTs to register and track target populations for improved coverage of essential child and maternal health services at the community level. This same initiative worked with the health center staff to reduce the amount of data collected to allow additional time for analysis and problem solving. As more data are collected and submitted electronically, software tools that can conduct data quality checks and prepare indicator dashboards will allow quality and data use to become more feasible. This potential is already being realized at the HC III and DHO level with the use of DHIS2.

Dimension D. Human Element

There is potential for controversy at the community level as the CHEWs strategy is implemented and integrated with the existing VHTs. VHTs can serve as CHEWs but they must meet the criteria as follows: age range of 18 to 35 years old; minimum of Uganda Certificate of Education (ordinary level); ability to communicate in English and the local language; and must be a resident of the local parish and willing to work in the local parish.
As mentioned previously, supportive supervision by HC III staff has not been easy to implement due to resource shortages, resulting in low levels of data analysis and use. Though not explored in the MCSP-supported districts, health assistants (civil servants) can provide support and coordinate community services and data generation plus use. In MCSP-supported districts where supportive supervision was implemented, VHT performance and data completeness improved.

A more in-depth training on data collection and use is being provided to CHEWs who complete the 12-month training. While VHTs will work with the CHEWs to collect community information, a more realistic volume of tasks is being adapted with roles for CHEWs and VHTs outlined in the CHEWs strategy. VHTs who do not become CHEWs will be given the opportunity to receive training to serve as model households for positive health behaviors in their communities.

Dimension E. Stakeholders

National

At the national level, the MOH provides leadership and guidance for the CHEW strategy via the CHEW Coordination Committee that oversees CHEW program development and implementation. Key stakeholders for the successful implementation of the CHEW strategy include other government agencies like the Uganda Bureau of Statistics, UN agencies (specifically UNICEF, UNFPA and WHO), international donors (USAID, DFID), and multiple international and national implementing partners that support policy and strategy development and provide technical support, systems strengthening, and other capacity building efforts. As of March 2019, the CHEW strategy was not approved by the president, on first presentation.

District

Multiple implementing partners including international and local nongovernmental organizations, civil society organizations and UN agencies partner with DHTs to provide technical and financial support for the implementation of RMNCAH interventions at the health center and community level. As government resources for community health have declined, implementing partners have supported training, supervision, and provision of supplies and incentives. This assistance has been vital and has led to innovations for providing essential services and supportive supervision, tracking target populations, and piloting digital data collection. However, further coordination for a standardized approach to training, support, and incentives is needed across partners.

Community and Household

Community leaders partner with HC II and HC III level staff for VHT and CHEW selection, community mobilization and for ongoing implementation of activities including participation in quarterly review meetings where data are used to identify and address existing bottlenecks and together develop action plans to move forward. VHTs use their household registers to follow up on households who are falling behind on their health service visits whether it be for immunization, or weight monitoring, or prenatal care. More than 179,000 community members across 112 districts have been trained and serve as VHT volunteers within their communities providing essential services. They collect data on the services they provide, report to the local council one (LC 1) and to their responsible health center. VHTs who do not become CHEWs will continue serving as VHTs and be given the opportunity to serve as model households in their communities.

VHT volunteers and CHEWs come from households within the community and work to provide their neighbors with basic services and health promotion activities. Emphasis is placed on reaching pregnant women, women of child bearing age, children under four, newborns, and individuals with disabilities.

Dimension F. Contextual Factors

There is a heavy reliance on external funding for the health budget. Currently, 45% of the health budget is provided by external support, with the government spending 8.7% of its overall budget on health expenditures. Budget shortfalls negatively impact staffing levels and supplies needed to support a robust HMIS and CHIS. The ongoing devolution of management and budgets to local government is empowering but also entails a transitional period as institutional capacity is built for quality implementation, particularly in rural districts with poor health indicators. It is hard to recruit and retain staff at rural sites due to their remoteness and lack of adequate accommodations.

Dimension G. Feedback

Feedback loops are part of the HMIS at every level and contribute to data quality and utilization. However, these loops are dependent on supportive supervision taking place. As more data are integrated into DHIS2, access to indicator dashboards has the potential to save time and facilitate dialogue around health service performance and changes needed to reach targets.

Notable Features

Notable features of the developing CHIS in Uganda are the following:

- **Continuous learning and openness to innovation:** Learning from neighboring country models during exchange visits, hosting regional community health conferences, and working with implementing partners on pilots at the district, health center, and community levels, has provided Uganda an opportunity to learn from innovations in community health service delivery and adapt and scale up models appropriate for the Ugandan context.
- **Commitment to register and track the target population:** There is a recognition that a good HMIS begins with knowing the target population. While still a work in progress, multiple efforts are underway at the health center and community level to register and follow up target populations for essential services. There are also multiple initiatives seeking to improve the systematic registration of births and deaths so that progress can be measured.

- **Movement towards digital collection and management of data:** While both registration of community volunteers into the digital iHRIS and integration of community health information into DHIS2 are in the process of being scaled up, they have significant potential to facilitate management of community resources for improved coverage and outcomes.

MCSP Contribution

MCSP has partnered with 11 district teams and 400 health facilities to apply the REC-QI approach that trains, empowers, and equips health center staff to map and track their target populations for improved quality and equitable immunization coverage. In addition to defining the target population for planning, implementation, and follow-up, quarterly review meetings equip district health teams with skills to lead teams, build networks with local stakeholders, and together with partners use data to problem solve, develop action plans, and mobilize local resources to supplement government contributions.

The REC-QI success has led to opportunities to strengthen the national immunization program. More specifically, the concepts and revised tools that MCSP has introduced for immunization in over 400 health facilities in 11 districts have now been incorporated into key MOH immunization reference materials used nationwide.

In addition, given MCSP's results of improved equity and increased numbers of children vaccinated and the improved child health services delivery, the Ugandan MOH has adopted MCSP's REC-QI approach for mapping health facility catchment areas/populations to strengthen RMNCAH interventions in 75 of 112 districts (67%) in Uganda, with support from the World Bank's Global Financing Facility-funded RMNCAH program. Implementation of REC on a larger scale further strengthens the CHIS by equipping health center staff, CHEWs, and VHTs with skills including mapping and tracking target populations, and working with the local communities and stakeholders to use data to monitor performance and improve quality, access, and equitable coverage. Applying REC on a larger scale contributes to creating a supportive implementation culture where data is integrated with actions and utilized to move towards results at all levels.

Lessons Learned

Supportive supervision, including peer support groups, done at least quarterly, is an essential vital approach to sustain motivation and quality of VHTs and CHEWs coverage and performance. Where staffing is limited, innovative models such as peer support groups are a valuable option. Implementation of DHIS2 provides a method for increasing data visibility, quality, and use. Efforts that extend access of these DHIS2 capabilities to all levels of the system should be supported. (CHIS integration into DHIS2 should accompany the training and placement of the new CHEWs workforce.)

Equipping health facility staff and VHTs with tools plus empowering them to work together with local stakeholders to map and track target populations for essential child health services leads to improved quality, equitable coverage, and higher performance outcomes.[41] The REC-QI approach has provided useful tools for districts, health facilities, and VHTs to define, engage, and reach the community for improved child health leading to their adoption for use on a national scale.

Stakeholder consensus behind a shared vision, like REC, coupled with mutual accountability that monitors coverage with performance data and real-time actionable follow-up, creates a transformative process that can lead to tackling bottlenecks and improved outcomes. Local stakeholders, including health and non-health actors, are needed for sustaining this process.

Continuous learning, monitoring, and openness to innovation have allowed Uganda's MOH to identify models with potential for viability and adaptation to the Ugandan context. Uganda has multiple implementing partners who are collaborating with district teams to improve the quality of, and extend access and equitable coverage to, maternal and child health services at the community level. These investments include many pilot programs that have resulted in adaptation and national scale-up after being proven successful.

A heavily tasked, poorly supported and under-resourced community volunteer workforce is unstainable and ineffective over a long period. Provision of community health services through community health workers should complement the presence of health facility staff and not just compensate for the lack of staff. Community health worker programs incur their own costs, including worker compensation, training, regular supportive supervision, and provision of supplies.

CHIS Highlight: Mozambique

CHIS System Highlight

Community health workers in Mozambique, known as *agentes polivalentes elementares* (APEs), are community members who are trained to provide basic health care to the remote areas in which they live. Building on Malaria Consortium's previous work in Mozambique through the Bill & Melinda Gates-funded inSCALE project (2009–2016), the upSCALE project will further develop the mHealth system and APE app (formerly known as inSCALE APE CommCare), that was previously introduced in selected districts in Inhambane province, to create a national APE mHealth system.[42] To build the APE mHealth system, APE-level indicators will be integrated into Mozambique's electronic (DHIS2 platform, known as *Sistema de Informação de Saúde de Moçambique para Monitorização e Avaliação* (SIS-MA). The APE-level indicators in SIS-MA will be populated in real time from data collected by APEs and submitted directly to SIS-MA. Government health officials will be able to view this data on the APE dashboard in a user-friendly format. This system will help to assist data-driven decision-making around APE program investments, surveillance of and responses to infectious diseases including malaria, and early detection of disease outbreaks.[42]

MCSP Contributions

Although financial resources were not budgeted for this endeavor, MCSP supported the APEs in partnership with UNICEF and the Malaria Consortium as a member of upSCALE's technical working group. Specifically, MCSP contributed inputs into:

- Important aspects to include in the software, as relevant to the APEs tasks, the eight phases for adequate clinical management flipchart, as well as data collection tools and reporting; and
- Formative discussions about the inclusion of APEs and other community cadres' data generated in the DHIS2 platform.

CHIS Highlight: Nigeria

CHIS System Highlight

Multiple, uncoordinated community health programs exist in Nigeria. Nigeria's official policies include a number of community workers: 1) community health officers (CHOs); 2) community health extension workers (CHEWs); 3) junior CHEWs (JCHEWs); and 4) community resource persons (CORPs). The CHOs, CHEWs, and JCHEWs tend to work at primary health centers, although they may also carry out community outreach activities.[43] CORPs, who include informal public and private health providers in communities, are most analogous to community health workers in other contexts. Although included in Nigeria's policies and directives, CORPs do not receive a government salary and are mostly supported by various nongovernmental organizations. CORPs' compensation, training, supervision, and scope of work depend on the organization or project supporting them.[43] Thus, Nigeria's community health programming has been characterized as diverse and uncoordinated.[44]

As of early 2018, Nigeria's national CHIS was under development and reporting of community health interventions remained fragmented. The Federal Ministry of Health (FMOH) had developed and reviewed CHIS data collection tools and activated a CHIS module within DHIS2, the platform used for the overall HMIS. However, Nigeria still faced challenges with the harmonization of existing tools, the overall design of the CHIS and data flows, and infrastructure, as well as challenges faced by all CHIS, such as financing, remoteness of communities, and data quality. In 2018, the FMOH set out to pilot the

CHIS data collection tools in the field and identify priority areas that could strengthen the proposed system.[44]

MCSP Contributions

MCSP worked with the Nigerian FMOH to pilot the developed CHIS tools within a learning activity that introduced services for sick children at Private and Proprietary Medicine Vendor (PPMV) outlets in 2018 to enhance the quality of integrated community case management (iCCM) through PPMVs and partnerships in order to further develop and institutionalize the tools and systems. PPMV outlets are small drug shops located in communities that are registered with the Pharmaceutical Council of Nigeria; PPMVs can be considered CORPs. The pilot took place in four Local Government Areas of Ebonyi and Kogi states and included the FMOH-developed CHIS tools, as well as integrating the FMOH iCCM tools and newly developed logistics management information system (LMIS) tools for the community level.

Program partners, including MCSP and the state government agencies, trained and supported PPMVs to use these new tools, tracked their service data (which used the data flow developed for the CHIS and ultimately fed into a DHIS2 instance compatible with the national DHIS2), and used these data with stakeholders to solve problems and improve services. Reporting roles and responsibilities, data flow and timelines for CHIS in the states were agreed upon with the stakeholders in the states. By developing and integrating the CHIS and LMIS addenda into the iCCM curriculum, MCSP made it possible for the first time to capture private sector data from PPMVs, with the potential for it to be incorporated through public-sector HMIS data flows into the national DHIS2 database in future. As part of the PPMV supervision sustainability plan, data from PPMV outlets in Kogi and Ebonyi will continue to be tracked and reported into the DHIS2 database after the close-out of MCSP.

CHIS Highlight: Rwanda

CHIS System Highlight

The Rwanda HMIS encompasses facility- and community-based information systems via a DHIS2 platform. SISCom is a CHIS that tracks community service delivery data and includes an integrated information system for human resource management data, and a logistics management information system for commodity tracking and supply. A national Ministry of Health (MOH) dashboard consolidates data from each reporting system to allow for integrated indicator monitoring. In addition to home visit registers, community health workers (CHWs) use mobile phones through a real-time RapidSMS text message reporting system[45] for capturing the individual records and send pregnancy and specific reminders to the CHWs for follow-up.

Data capture begins with the CHW registers. Then CHWs summarize their months' data via the monthly summary form which is submitted to the cell coordinator. Cell Coordinators conduct the first tier of aggregation, and then send an aggregated summary form to the CHW cooperative. The cooperative collects and aggregates the summary forms to fill out a sector report that is shared with the sector steering committee and sent to the health center, where they are entered in SISCom and submitted to the MOH's Community Health Desk. Data proceeds to the district hospital and MOH electronically. Overall, the CHIS has achieved successes, including: all CHWs using the standard data collection tools; CHWs are equipped with telephones and receive a stipend for RapidSMS; the DHIS2 SISCom is functional nationwide; and strong feedback mechanisms are in place and functional. However, some challenges remain, including the turnover of trained CHWs leading to incomplete reporting and low rates of responses on alerts sent through RapidSMS.

MCSP Contributions

Through its support to the community health program in Rwanda, MCSP trained, supported, and equipped 8,067 CHWs to provide lifesaving interventions in 3,215 villages across seven districts (out of 30). In addition, MCSP: helped create platforms for discussion and opportunities to review community data at the village, cell, and sector levels; strengthened the links between health facilities and community-based interventions; and helped build the capacity of the in-charge of community health at

the hospitals and health center levels. Through these efforts, MCSP ensured that high-quality data are entered into the SISCom in supported districts, and managers at all levels are able to analyze, review, and use the information to make appropriate decisions.

At the national level, MCSP: regularly participated in strategic discussions on community health; provided technical leadership in national data reviews, including on community health; and used the feedback and experiences from the field to inform the design of management tools in community health, including the tools used to collect and analyze data. In addition, MCSP co-chaired the Sub-Technical Working Group on Child Health, facilitating strategic linkages between MOH's Community Health Desk and its technical divisions for reproductive, maternal, newborn, and child health.

Discussion and Recommendations

Summary of the Main Findings

The four case studies and highlights from the three countries presented in this report highlight aspects of each dimension that are part of robust CHIS. Below we present these cross-case study findings and associated recommendations. These recommendations are for low- and middle-income countries designing and/or strengthening their CHIS and the stakeholders that assist in these efforts.

Dimension A. Enabling Environment

System Design

CHIS designs are trending toward comprehensive application of digital technologies. Most countries showcased in this report were going digital not just at the summary level, but also at the point of data collection. Where Namibia's community health worker (CHW) mobile data collection was only part of a small-scale MCSP-supported pilot, Rwanda had nationally scaled up the use of RapidSMS to report community-level health data into DHIS2. Uganda and Egypt are rapidly scaling up the use of full mobile applications for case management at the community level. Despite these advances, the gains in efficiency of digital data collection are not fully realized. In many countries, CHWs face a dual reporting burden, as they often are required to complete paper summary forms and rosters.

CHIS designs tend to focus on data collection for aggregation. Across the case studies, we noted that CHIS were quite well designed for aggregating data up to higher levels; however, the systems included fewer features that facilitated using and feeding back data and information to lower levels. The lack of feedback mechanisms is both a system design and implementation issue; even where systems include mechanisms for feedback to lower levels, the implementation is often very weak. There has been discussion at the global level about the value of balancing of CHIS designs to focus on aggregating data up to higher levels (as many national CHIS using DHIS2 focus on aggregation at the district, provincial, and national levels) with the need to include elements in the design for more local data use. For example, the use of data collection methods and platforms that facilitate the use of data by CHW for their daily work and that can provide real-time information to lower level community program supervisors and managers should be prioritized.

CHIS designs varied with the community program design, scale, and budget: Just as no two countries have identical community health programs, there is not a universal or standard CHIS design across countries. Instead, countries customized their CHIS structures to their unique community programming, context, budget, and scale. For example, DRC's CHIS operates at a large scale but collects fewer data elements and is integrated with the national HMIS (i.e., less complex), thus requiring less separate budgetary allocation for the CHIS. Namibia's CHIS is quite complex and collects a large number of data elements for a variety of community interventions, but is relatively affordable to scale up due to the country's smaller population size. Egypt, on the other hand, has proceeded to scale relatively quickly, due in part to the family planning-focused scope of the CHIS. Uganda made strides towards scaling up a more complex CHIS, and had limited success; their current focus appears to be making some community health program design changes which may represent potential opportunities for future CHIS.

Recommendations

- Continue to incorporate digital technologies in CHIS, but the transition to fully digital should be done relatively quickly to minimize the dual (digital and paper) reporting burden on CHWs to increase efficiency of data collection and allow them to focus on service delivery.
- Ensure that CHIS designs include elements that allow for aggregating data to higher levels, providing feedback to lower levels, and facilitating data use at the community and local levels.
- Design and adapt CHIS to each country's context, balancing complexity, scale, and cost.[3,6]

Leadership and Governance

Leadership and oversight is critical: Governance and leadership support was essential to fostering financial resources, political will, and technical capacities to move a CHIS from vision and design phases to piloting or implementation. In all countries, the Ministries of Health (MOHs) led the CHIS design and overall implementation, but often coordinated with other stakeholders, such as donors and implementing partners. In Egypt, the Ministry of Health and Population prioritized digital shifts via such initiatives as proactively requesting existing tablets from the Prime Minister's office and re-purposing them for the CHIS endeavor.

Leadership and coordination was predominantly central level-focused: Across most of the countries showcased in this report, leadership and coordination was largely driven by national-level leaders. In DRC, for example, there were various national coordinating committees invested in CHIS design and management. The same was true of Egypt. There is an opportunity to further expand the scope of leadership to actively investing in stakeholders from local, district, and state levels. Although essential, this central-level focus need not crowd out the opportunity for key support from other stakeholders at different levels in the system.

CHIS were largely partner-driven: Although governments made various financial, human resource, and hardware investments, CHIS often rely on external partner's financial and technical support as noted in DRC, Egypt, and Namibia. Although initial inputs towards building CHIS capacity were important, there was a need to situate these endeavors into a fuller, government-led plan that could sustain an enabling environment for CHIS.

Recommendations

- Ensure that leadership opportunities exist for subnational levels in the design and functioning of the CHIS.
- Identify, document, and disseminate specific strategies for successfully sustaining government funds for CHIS.

Systems Management

CHIS oversight was a complex consideration: Oversight of CHIS operations was often complex, yielding concerns by the report team about whether staff were actually being appropriately compensated or simply reporting to partners. For example, in DRC a government agency is tasked with information and technology oversight responsibilities for DHIS2, whereas in Nigeria and Namibia this was the Health Information System Program's domain. It also appeared that Egypt would be working to bolster their capacities to not only maintain their CHIS but also provide the needed programming skills. Overall, governments need to increasingly move toward overall CHIS system management and oversight.

CHIS infrastructure/resources were tied to funding streams: CHIS infrastructure and resources were integral to the enabling environment. The report team noted that they were often directly linked to key donors.

Recommendations

- Develop specific work plan activities that embolden the capacities of local governments to lead CHIS system management and oversight.
- Allocate budget line items to CHIS-specific strengthening activities.

Dimension B. Information Generation

Data Sources

Variability of data sources and data management needs: As highlighted in the 2017 presentation, "Using DHIS2 for CHIS," there is considerable variation in the scope of community-based services and their corresponding data elements.[3] Community health programs vary substantially and their technical purview can be as diverse as antenatal care, outbreak control, substance abuse, neonatal health, child

health, water and sanitation, mental health, disabilities, and many more. As a result, CHIS designs vary depending on what services are provided at the community level and what associated data are captured in addition to key budgetary and scale considerations.

For example, Egypt's CHIS was aligned not only with documenting key health messages shared during household visits but also serves as a mechanism to track CHW training history. Namibia's CHWP monitoring and evaluation system included, among other things, documenting households eligible for social support, or cases of elder abuse, substance abuse, suicidal behaviors, and developmental delays in children and adults. DRC's CHIS focuses on child health data elements, while Uganda's CHIS initially focused on maternal health and select household health indicators, but future versions will include services related to child health, family planning, nutrition, labor and delivery, as well as the supply chain.[46]

Recommendations

- Leverage future CHIS examples and explore similarities and differences across them; international bodies should leverage this variability and ensure that tools/platforms remain adaptive and effective.
- Consider showcasing innovative or creative CHIS approaches that are developed in response to program data needs or uses.

Data Management

CHIS standard operating procedures (SOPs) often exist but were not necessarily disseminated or used: Across countries, SOPs for data management often exist but were not consistently well disseminated or used at subnational levels. In Namibia, data-quality-related SOPs were drafted but were awaiting formal approvals prior to dissemination. Overall, there is a need to further understand the conditions that inhibit CHIS SOP dissemination and use at the country level; it is possible that practices that have supported the dissemination and use of health facility HMIS SOPs may reveal some promising solutions.

Recommendations

- Identify existing, effective practices for health facility HMIS SOPs dissemination and use; consider piloting adapted approaches for CHIS.
- Clarify issue(s) that impede dissemination and/or use of existing CHIS SOPs and delegate a CHIS task force for defining and piloting a solution(s).

Information Products and Dissemination

Information products were not available for lower levels: Although examples were evident of information products and/or dissemination moments at central level—like DRC's CHIS dashboard or senior ministry leadership in Egypt highlighting the number of CHW visits in official events—CHIS information was rarely summarized and utilized, particularly at subnational, facility, or community levels. Health workers are rarely oriented on how their inputs fit within broader information products and data aggregation and dissemination practices. More information products should be developed for use at the lower levels to foster competition and improve quality among health workers as part of the larger system. This strategy supports building a system-culture that values data use and quality and health worker performance.

Recommendations

- Develop an online library for information products developed for use at lower levels, including details on their intended audience and use.
- Convene a lower level technical working group (TWG) and task them with prioritizing information product needs and audiences.

Data Flow

Data flow varied by country: As the graphics embedded in each case study revealed, CHIS data flows vary by country. There is an opportunity at the country level to review CHIS data flows as part of data review activities or meetings. Representatives from each level can discuss current practices as they compare to the mapped data flow (including feedback mechanisms) and where useful, adapt practices or the data flowchart, itself. This exercise can also be useful in identifying "pain points" or areas of difficulty, in the data transmission and feedback.

Recommendations

- Ensure that CHIS data flow is mapped and incorporate this tool into existing training and MOH events.
- Incorporate, on a regular interval, a review of data flow where the mapped steps are compared with actual practice. Ideally, seek inputs from individuals at all phases on the data flow and identify strengths and challenges with existing processes; prioritize where solutions may be needed.

Data Compilation and Analysis

Countries were not yet examining community and facility service data side by side: Although countries were compiling and examining data from the community level, further analyses like comparing community and facility-based service delivery were rare.

Countries were at early stages of incorporating CHIS data: Generally, countries' CHIS were in an early stage of their lifecycle and as such, more complex analyses were not carried out yet. In order to support these endeavors, there is a need for guidance of various types of analyses, including tailored recommendations for different levels and audiences and different purposes.

Recommendations

- Develop further guidance for analyses that compare indicators of community and facility service delivery and ensure training for staff in conducting these analyses.
- Consider convening a global CHIS TWG that is, among other things, tasked with developing guidance for various types of analyses, including providing recommendations for different levels, audiences, and purposes.

Data Protection

Measures to protect data may be covered by other national strategies: Although specific information was not identified in this review, measures designed to protect data may be likely addressed via other national strategies, like a national eHealth strategy. It is recommended that at a minimum, CHIS plans or strategy documents include reference to these corresponding data protection guidance and if not, that the CHIS plan itself include these parameters.

Recommendations

- Highlight existing data protection measures and customize them to CHIS use.
- Incorporate data protection measures in the CHIS plans.

Dimension C. System Performance

Data Quality

Effective CHIS need complete reporting and good quality data before data use: Ensuring the timeliness, completeness, and quality of reporting in a CHIS need to be a priority before data can be used to their full potential. Generally, countries monitor timeliness and completeness of reporting and some conduct data quality assessments at the community level, although these assessments often rely on donor support. Donors should prioritize building country capacities to lead and fund activities to monitor and improve data quality over time.

Newly introduced CHIS systems may receive less priority than facility-based HMIS: By and large, the national CHIS highlighted in this report were relatively new, for example Egypt's was approximately 2 years old. Strengthening CHIS functioning, including data quality improvements, may be a lower priority than overcoming the ongoing, inter-related challenges with implementing HMIS at health facilities. Additionally, countries are often still discerning if CHW program costs yield sufficiently impactful health outcomes that would validate additional resource investment in practices that would support improved community data quality. In turn, partners often shoulder the burden of financing CHW programs and CHIS strengthening.

Recommendations

- Continue tracking timely submission of results, including monitoring completeness and accuracy via data quality assessments.
- Prioritize building capacity to lead and fund data quality approaches over time.
- Integrate CHIS strengthening and data quality assessment and improvement within larger efforts to strengthen the overall HMIS.

Data Use

Opportunities exist to integrate and improve CHIS data quality improvements and data use: Overall, assessments of CHIS data quality and the use of CHIS data were somewhat limited; however, new approaches that integrate these two areas could be considered. For example, data quality checks can be incorporated into processes for visualizing and using data, such as checking for outliers or missing data while preparing graphs for a presentation. Alternatively, identifying a specific use for CHIS data and having users chart and review it on a regular basis can be as critical to improve data quality as performing data quality assessments. Frank discussions about the strengths and limitations of the data can be essential before making decisions informed by data. Lastly, there is an opportunity to maximize existing data use tools like CHIS dashboards and community scorecards as well as approaches like Partnership Defined Quality, to leverage the data in new and meaningful ways at different levels.

Peer-to-peer platforms presented informal channels for data use: Peer-to-peer platforms like WhatsApp or SMS/text messaging, presented informal opportunities for real-time discussion of key findings in the area (i.e., sanitation, low facility delivery, use of insecticide-treated bed nets) as well as data entry or supervision support. Looking forward, community health programs can continue to leverage these existing channels for informal exchanges about data inputs or applications to real-time community health service delivery work, including such MCSP-supported examples as: referral tracking in Mozambique, a help desk application in Guatemala, and mentorship support in Guatemala and Nigeria.

Ethical use of CHIS data and an opportunity for guidance: The assessment design did not explicitly explore whether ethical measures were put in place with CHIS data, including considerations related to privacy, confidentiality, and consent. Despite this limitation, there is an opportunity for CHIS TWG and global entities to consider drafting a global guidance document that addresses key considerations with protecting communities and community members' data.

Recommendations

- Encourage CHIS data quality checks as a standard practice, by advocating and sharing results from such fundamental practices as checking for outliers or missing data while preparing graphs for a presentation.
- Maximize existing data use tools like CHIS dashboards and community scorecards, as well as approaches like Partnership Defined Quality, to visualize data in new and meaningful ways, at different levels.
- Foster peer-to-peer platforms for informal and real-time support for data entry and quality-related needs.
- Draft global guidance document on key considerations for protecting communities and community members' data.

Dimension D. Human Element

Capacity Building

More formally trained and paid CHWs receive more initial training in CHIS than volunteer cadres: Investing in CHW training and orientation has benefits for CHIS, as well. In Namibia, the CHIS module was part of CHWs' 6-month training and in Egypt, the *Raedat Refiat* CHWs have IT/tablet training and dedicated CHIS training. Although these investments create the conditions for CHIS to survive, there are innovative ways to circumvent cost-related limitations; for example, community health cadres can vary in compensation (from paid-to-volunteer) and level of training. Overall, when cost inputs are lower, there is an opportunity to design a less complex CHIS at a more streamlined scale to start.

Capacity building often focuses mostly on data collection and entry and less so on data review, analysis, and interpretation: Although not unique to CHIS, capacity building endeavors across countries often focused on bolstering data collection, compilation, and entry skills and less on critical competencies and tools for data analysis and use (i.e., scorecards, dashboards). Key stakeholders from the community to the national levels need to know not only how to collect data but also how to visualize, interpret, and communicate the findings to their key constituencies so as to have the greatest impact on maternal and child morbidity and mortality.

Recommendations

- Test innovative approaches to training volunteer cadres in CHIS skills; for example, creating cross-community learning/practice groups with a rotating health facility worker to troubleshoot and address problems.
- Develop and test formal and informal strategies for building capacity at all levels in visualizing, interpreting, and communicating CHIS results.

Supportive Supervision and Mentoring

Strengthen data review and CHIS supervision and integrate it into existing supervisory capacity building and tools: Although this review did not examine specific supportive supervision tools and practices (as they related to CHIS), it is recommended that countries re-examine existing supportive supervision tools and consider opportunities to include content that would facilitate data review and data use. This will not only build capacity but also foster motivation for the relevance and utility of the system for helping CHWs do their work.

Recommendations

- Add CHIS-related data review steps to existing supervision checklists and ensure that supervisors have the support they need to implement them.
- Include relevant reminders and potential questions to prompt CHWs to review their data and report on their observations.

Motivation

Public officials using CHIS data appeared to influence motivation among CHWs: In Egypt, senior officials used CHW data to highlight their household coverage. Such examples appeared to have a positive influence on CHWs, uplifting their morale and demonstrating how their results can be leveraged for program advocacy. There is an opportunity to expand the scope of data use in this fashion, not only in Egypt, but across countries with community programming and CHIS. Using data for advocacy effectively, by leaders at different levels, serves to bolster motivation, by way of validating the critical contributions of community actors in progress towards positive health outcomes.

Partner support can meaningfully influence motivation for CHIS design and/or management: From MCSP-supported digital health technical assistance, to TWG involvement and incorporating community data into national dashboards as well as other activities, partner support played a critical role in fostering motivation for national CHIS. For example, in Mozambique MCSP contributed to providing inputs into a TWG, while in Egypt MCSP lead the development and design of a tablet training module;

these inputs contribute to fostering motivation because they strengthen countries' specific community health program(s) and their corresponding CHIS priorities.

CHIS can only be as strong as the community programming systems they are intended to monitor. CHIS supervisory staff need to have the time and resources to support the CHIS. If supervising CHWs and reviewing their respective CHIS inputs is an add-on to their normal duties, it runs the risk of not being made a priority and as a result, CHIS data quality and data use will be de-prioritized.

Recommendations

- Encourage public officials to use key CHIS findings during high-visibility events to substantiate statements and bolster motivation of CHIS stakeholders to see their collective influence in action.
- Elevate the critical role of motivation for a healthy CHIS by continuing to support endeavors that fuel engagement in design and/or management needs.
- Allocate resources and time to ensure that CHIS supervisory staff can provide needed support to CHWs.

Dimension E. Stakeholders

TWGs were highly concentrated at national levels and their functionality ebbed and flowed: Technical coordination bodies at the national level generally strengthened CHIS design and/or management, but often ebbed and flowed in their functionality. These groups were often concentrated at the national level and had minimal representation from subnational levels, often due to resource constraints. CHIS TWGs should be in communication and coordination with the broader HMIS TWG. Sustained support will also be needed throughout the process; for example, in DRC there was a multi-donor group that provided support.

Additionally, due to their national focus, TWGs often did not include community representation; it is recommended that representatives be identified from all levels (i.e., community, district, state/governorate and national) to participate in these TWGs. Where needed, associated transportation and lodging costs should not preclude involvement, instead basic innovations like WhatsApp groups, remote call-in participation and other low-cost connection strategies should be employed. Overall, it is critical that community actors and groups be involved in key processes like provincial coordination and decision-making, CHIS data review and data use meetings, and training. Such practices build social accountability and investment in a CHIS that is directly relevant to members at all levels of the community health system.

Recommendations

- Build practices that foster communication and coordination between CHIS TWG and the broader HMIS TWG.
- Seek out representatives from community, district, state/governorate, and national levels to participate in CHIS TWG meetings and events.

Dimension F. Contextual Factors

Variability in systems' strengths contributed to CHIS design: Each country showcased in this report demonstrated various system strengths that contributed to their CHIS development. In DRC, the CHIS was embedded within the overall national HMIS on the DHIS2 platform, making it less complex than other systems. After a years' long trial and error process, the HMIS and thus CHIS attained national-level coverage in 2017. Simplicity allowed for large-scale implementation, but limited the data elements collected and complexity of analyses.[3] In Uganda, what started as over 60 uncoordinated eHealth projects across the country, with minimal guidance and impact, became fodder for teasing-out priority learnings and innovations that would serve to inform CHIS development. Upon piloting the CHIS in Egypt, a priority need was identified—to strengthen CHW and supervisory IT capacity for using the tablets; in response, an IT training module was developed and delivered. In Rwanda, government leadership were critical to system design, management, and governance of their CHIS model. In the future, it will be

important to identify existing partnerships and country systems' strengths and allocate a specific budgetary line item(s) to advance development and maintenance of CHIS.

Recommendations

- Identify examples of previous contextual factors or threats to the HMIS and examine what worked, what did not work, and likely implications for the CHIS moving forward.
- Leverage systems' strengths to address challenging contextual factors that influence CHIS design, management, or operations.

Dimension G. Feedback

Feedback mechanisms, at multiple levels, were limited: Across nearly all case studies, findings revealed various challenges with putting feedback mechanisms into practice. Specific barriers included human resource limitations (Namibia), reliance on supportive supervision visits (Uganda), and gaps in data quality review (i.e., in Rwanda, data quality checks are not performed by the data manager prior to data entry into the DHIS2). In DRC, feedback mechanisms to CHWs and the community may occur where there is development partner support. Even in areas with external support, human resource constraints (both overworked and underpaid health workers who serve as CHW supervisors and unpaid volunteer CHWs with limited training), geographical barriers, and poor infrastructure pose challenges to robust feedback to CHWs and their communities. Despite challenges, Rwanda has instituted some innovative strategies for garnering feedback such as: 1) health center staff providing regular mentorship opportunities including community data quality assurance; and 2) biannual data quality assessments of community data where source data (in paper) are compared at village, cell, and cooperative levels. In Egypt, providing tablets to the CHW supervisors with the ability to access summary reports in real time, as well as drill down to the household level, dramatically improved the ability of the supervisor to access data in a timely fashion and easily access the details behind the figures. Country CHIS are encouraged to continue to foster and create specific feedback mechanisms, at all levels, ensuring that appropriate funds are allocated, including adequate human resources, training, supplies, and meetings.

Recommendations

- Formalize feedback mechanisms in the CHIS data flow at all levels by identifying strategies that harmonize with the existing data flow/steps; for example, including relevant steps on a supervisory checklist, building a feedback discussion into a standing meeting agenda item, or documenting feedback issues and response via a tracker document.

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