

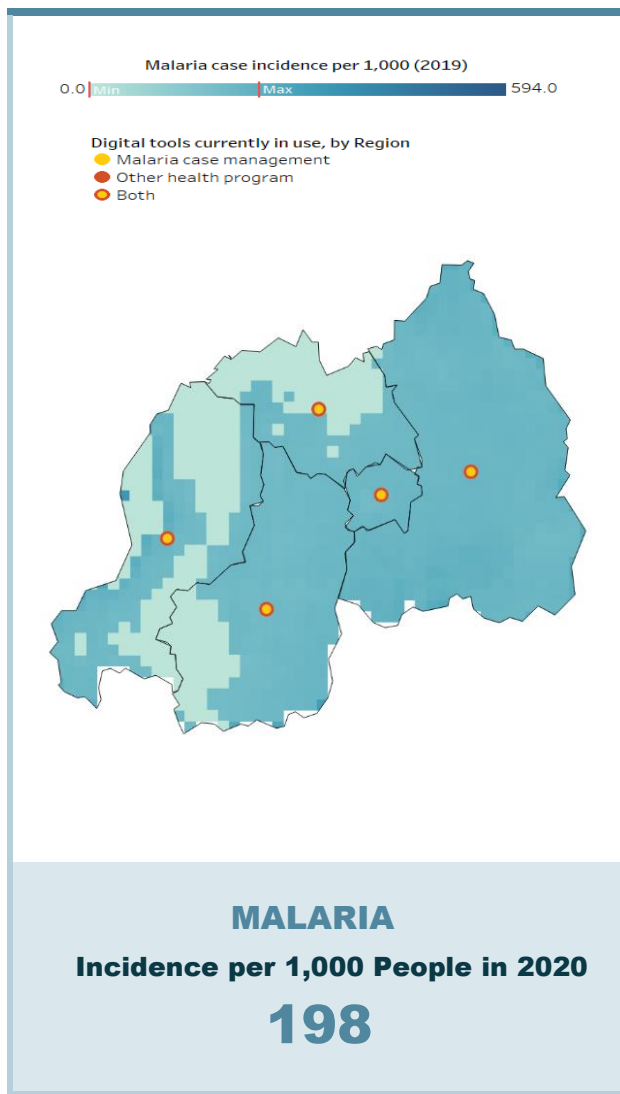
RWANDA

Executive Summary

While Rwanda has reduced malaria incidence from 409 to 198 cases per 1,000 people in 2016 and 2020, respectively, risk of infection remains.¹ The reduction in cases was due to prioritizing and implementing high-impact interventions at facility and community levels (e.g., long-lasting insecticide-treated net [LLIN] distribution, indoor residual spraying [IRS], integrated Community Case Management [iCCM], health communication for social behavior change, etc.).²

Over 50 percent of malaria cases in Rwanda are managed by about 58,000 community health workers (CHWs), who provide an integrated package of services. Each village has four CHWs, two of which provide home-based iCCM.³

Rwanda has a robust health information system (HIS), with serviceable platforms implemented and overseen by the government.⁴ CHW documentation and reports are still paper-based, but reports are sent to health centers (HCs), where data are entered into SIScom, a digital HIS. RapidSMS is used to notify HCs and malaria program managers of severe cases and commodity stockout. Health facilities manage commodities using an electronic logistics management information system (eLMIS) and report on severe malaria cases/deaths using an electronic Integrated Disease Surveillance and Response system. However, improvement in data triangulation and use via system integration/interoperability is needed, and CHW paper-based reporting can potentially be replaced by digital tools. The Ministry of Health (MOH) aims to develop standardized electronic medical records (EMRs) that are interoperable with the current HIS at both facility and community levels.



PEOPLE

Community Health Worker (CHW)



58,286 CHWs
47 per 10,000 people

GOVERNANCE

National Digital Health Strategy



YES

SYSTEMS

Digital Health Index



Not available

*No published data available

Recommended Actions

PEOPLE



CHWs and other decision-makers

Support training of CHWs on use of digital health tools and integrated community health packages

Given that many CHWs have not used any digital health tools apart from RapidSMS, training them on the use of such tools will be an integral part of digitalizing community health in Rwanda.

Prioritize systematic competency testing for CHWs

Currently, there is no standard competency testing for CHWs. The MOH is engaging implementing partners to develop a standardized assessment of CHW skills and knowledge. A policy to this effect has been updated and is awaiting MOH approval. Once approved, implementation of competency testing for CHWs will need to be resourced. The testing will help to identify key capacity gaps and guide planning of refresher trainings, as needed. The competency testing could be conducted during supportive supervision of CHWs and as post-training follow-up to ensure acquired knowledge and skills are put into practice.

GOVERNANCE



Strategies and policies

Strengthen the digital health governance structure to improve coordination of digital health interventions

There is a need for a deliberate effort to operationalize the digital health transformation strategy and coordinate planning of key interventions, including malaria, at central and decentralized levels. The Digital Health Technical Working Group (TWG) was established by the MOH, in collaboration with the Rwanda Information Society Authority (RISA), to ensure coordination of digital health implementation at national and subnational levels in alignment with national policies. This TWG has defined terms of references but is yet to be fully operational, despite the existence of governance procedures and stakeholders. Operationalizing the TWG will ensure support and participation of key actors during design and rollout of digital systems.

There is a need to establish decentralized digital health TWGs at subnational levels to effectively coordinate implementation at district hospitals / HCs and at the community level.

SYSTEMS



Processes and digital tools

Prioritize interoperability between digital health systems

The existing CHW tools are not interoperable, yet the community health program provides a range of integrated health services. Hence, there is a need to develop an interoperability layer to enhance data quality and use through program integration and system interoperability to enable EMRs at all levels, including for malaria services at the community level. The MOH is developing an interoperability layer before launching EMRs.

Consider use of robust digital health options for the community health program

There is need to improve case management and reporting of malaria using an integrated community EMR. Digitization of community health services is currently a key priority for the MOH. The system would help to organize consultations with CHWs based on appointments, deliver services as prescribed in the guidelines, facilitate documentation, and improve reporting, as well as data use.

Develop a sustainability plan for digitization of the community health program, including malaria

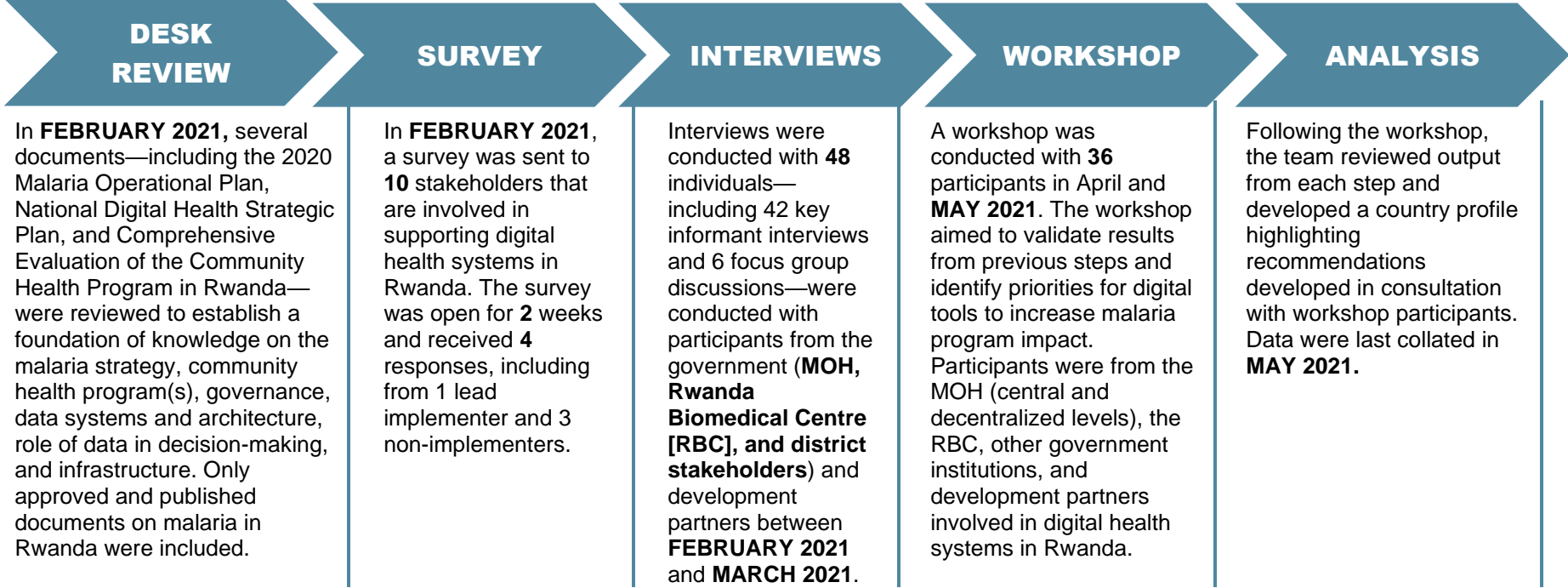
The community health program does not have adequate resources to facilitate digitization of community services. CHWs are not salaried workers and do not have adequate tools to facilitate their work. There is a need to develop a sustainability plan that should include resource mobilization to support digitization; interventions to improve compensation of CHWs, reduce CHW workload, and train/retain CHWs; replacement of CHWs; self-reliance; and sustained use of digital solutions at the community level.

Provide digitally enabled devices for CHWs

CHWs need smart phones to keep up with the rapidly changing technology to improve efficiencies. They are currently using feature phones which cannot support newer digital tools, such as EMRs, whereas smart gadgets would help CHWs to use such tools. The MOH, in collaboration with RISA, is committed to developing policies that would govern the use and maintenance of smart phones once deployed.

Methodology

This assessment used qualitative methods, such as desk review, survey, key informant interviews, and focus group discussions. Standardized tools developed by PMI/PATH and Digital Square were used to collect and analyze the data. Additional information was collected during the validation workshop. The consultant summarized all findings and developed the Rwanda country profile. The assessment took approximately five months (January through May) from the time of conducting the desk review to the time of conducting the validation workshop and reporting the results. During the workshop, participants discussed findings from the assessment and reviewed all the three domains on the maturity model (community health programs; policy, funding, and technical infrastructure; and existing health technologies), as well as the four business processes (malaria case management and referral, community commodities and stock management, community e-learning and supervision, and home visits).



Information collected through the methods described above was categorized according to key components within three domains: people, governance, and systems. These domains and their underlying components were informed by an [existing maturity model](#) and adapted to incorporate malaria-specific content. The components include personnel, training, and technical support (“People”); policies, strategies and governance structures, and their implementation (“Governance”); and data flow, digital tool structures, functionalities, and use (“Systems”). Together, these components describe the *desired state* for CHW use of digital tools for malaria case management, a state in which community health programs can leverage digital tools to generate and use data that improve malaria programming with the ultimate aim to decrease the local malaria burden.

PEOPLE



People highlights the community health workers, supervisors, information technology support staff, and decision-makers that contribute to effective use of digital tools and data in malaria community health programs.

GOVERNANCE



Governance describes the national strategies and policies that provide the framework for community health programs' use of digital tools for malaria, and their implementation.

SYSTEMS



Systems describes the processes and digital tools that enable community health programs to effectively use digital tools and data to guide malaria community health programs.

People



The Rwandan community health program is scaled up across the entire country. In addition to other services—such as community-based maternal/neonatal health and provision of family planning, as well as nutrition and hygiene—CHWs provide malaria services as part of the iCCM package. ICCM services are delivered by two CHWs, a man and a woman (also known as *binomes*).⁵ They provide prevention, diagnosis, and treatment services for malaria at the village level. Preventive services include community sensitization and awareness around malaria prevention, distribution of LLINs, and community supervision to ensure effective use of LLINs and IRS. Curative services include temperature checks, use of rapid tests to diagnose malaria, provision of treatment for confirmed malaria cases in children and adults, and referral to HCs for severe cases.⁶ Since each village has four CHWs, there is an opportunity to expand delivery of malaria services at the community level through training of the two CHWs currently not involved in malaria-related activities who focus on maternal, newborn, and child health and on family planning.

Community health worker digital readiness

CHWs in Rwanda do not typically have high education levels and training/experience in use of digital tools and systems, and as such, it is expected that their readiness to adopt digital tools would be challenged, as noted by prioritization workshop participants. However, some stakeholders are optimistic that adoption of digital tools by CHWs could yield significant benefits since the majority of CHWs are capable of using their feature phones for accurate reporting using RapidSMS. There is an opportunity to train and equip CHWs with digital tools because many of them are committed to learning and to upgrading their skills. It is important to note that, apart from RapidSMS, CHWs have not used any digital health tools and would need training, as well as maintenance and technical support, if they were to use them. On the other hand, the teams that provide support to CHWs at the HC, district, and central levels are experienced in using digital platforms, which could facilitate the integration and digitization process for community health services. These teams include community and environmental health officers (who directly supervise CHWs), data managers, information technology officers, and community health program managers at the MOH/RBC.

58,286

Community health workers in country

Compensation: VOLUNTEER

29,746

Providing malaria community case management

Compensation: VOLUNTEER

Data-driven decisions at each level of health system

Data-driven decisions are mainly done at the national level; the MOH, particularly RBC / Malaria Division staff, analyzes and uses Rwanda Health Management Information System (HMIS) data to track progress, plan IRS, and monitor LLIN distribution. Each facility has a trained data manager who can analyze data, display graphs, and generate reports. District administrative staff have sufficient capacity for data analysis, which guides discussions in different meetings and fora at the district level. At the facility level, the data managers look for irregularities, investigate reported cases, and identify potential outbreaks. Eventually, at the national level data are used to coordinate outbreak response and stock replenishment/redistribution. CHWs use RapidSMS to report severe malaria cases and risk of stockouts. CHWs supervisors at the HC level compile hard copies of village reports and enter them into SIScom, which is eventually reviewed to calculate performance-based financing incentives for CHW cooperatives. SIScom is an electronic reporting tool that is used at the HC level to aggregate community-level data and transmit reports to the national level. The system is integrated within the District Health Information System 2 (DHIS2). Overall, regular data quality assessments are conducted to ensure that produced data are complete, accurate, and timely.⁷ The 2020 Malaria Operational Plan also noted that data reviews and audits are integrated into strategic plans and conducted on a regular schedule. Regular meetings are held by a national governing body on data quality, and any data discrepancies identified are addressed through an established remediation process.

<p>NATIONAL LEVEL</p>	<p>Leaders in various departments access reports generated by hospitals and HCs (from the community). Reports are also shared with other government implementing partners. The reports are generated through DHIS2 and through monthly meetings where program managers meet with various TWGs and make programmatic decisions based on the data, as needed. Such decisions include targeting areas that need IRS, distribution of LLINs, risk communication, etc.</p>
<p>DISTRICT LEVEL</p>	<p>Data collected and analyzed at the facility level are used at the district level for decision-making. Digital data collection is of great importance in supporting timely, informed decision-making. Facility data are used to plan/inform interventions, as well as resource allocation at the district level. The district health managers use the data to forecast commodity supply, including medicines, malaria tests, LLINs, etc. They access these data through registers and SISCOM, which is integrated into DHIS2.</p>
<p>HEALTH FACILITY LEVEL</p>	<p>Health facilities verify the quality of data and make decisions that can be escalated to the district and national levels depending on the level of concern. Digital tools play a significant role in reporting by minimizing errors and simplifying sharing of reports. Facility managers provide feedback to CHWs during their monthly meetings and conduct random visits to the communities to provide support as needed. They review the data to ascertain their authenticity.</p>
<p>COMMUNITY LEVEL</p>	<p>Data collected by CHWs guide their decisions in determining whether they should treat or refer patients for further follow-up. CHWs collect the data using paper-based reports and RapidSMS. The data collected help them to identify potential emergencies. CHWs also use data to request refills of malaria commodities, such as LLINs, rapid tests, and medicines.</p>

Governance



	DIGITAL	COMMUNITY HEALTH	MALARIA
Name	National Digital Health Strategic Plan*	Community Health Strategic Plan	Malaria National Strategic Plan
Current strategy dates	2018–2023	2009–2013	2020–2024
Coordinating body	Ministry of Health	Rwanda Biomedical Centre	Rwanda Biomedical Centre
Funding strategy	Yes	Yes	Yes

* This is still in draft version.

The National Digital Health Strategic Plan (2018–2023) provides guidance that translates strategy into crosscutting actions that holistically contribute to the improvement of service delivery enabled by the adoption and use of innovative technology.⁸ The commitment to prioritize digital health systems through such actions will contribute to an integrated and interoperable digital health system that cuts across all levels of the health system and improves clinical decision-making and patient management. The Community Health Strategic Plan (2009–2013) did not prioritize digitization of community services; however, there is a plan to review/update it, and this will include the use of technology to provide community services. The Malaria National Strategic Plan (2020–2024) does not mention use of digital options in service delivery at the community level, but such options are contained in the overarching national Health Sector Strategic Plan, or HSSP (2018–2024). The community health policy currently under review is expected to highlight the role of digital health to improve health system performance and service delivery, including malaria. Once approved and adopted, the policy will guide development of digital health interventions, which in turn will be included in the next version of the Community Health Strategic Plan. The previous one expired in 2018 and is yet to be reviewed and updated.

GOVERNANCE

Policies define digital health and health data governance roles, responsibilities, and structures.

Rwanda has both a robust National Digital Health Strategic Plan and HSSP IV, which capture the vision for digitization of health care systems (including malaria services). The MOH has an eHealth team (eHealth Unit, Health Management Information System Unit, the RBC, and Information and Communication Technology [ICT] Unit). Also, there is an eHealth TWG which brings together government stakeholders, implementing partners, and donors. The TWG, however, does not meet regularly, and as such, not all stakeholders are up to date on the status of digitization. To ensure successful and sustainable eHealth structure, policies, and legislation, efforts around implementation and training of end users need to be addressed. Digital health systems are regulated by RISA to ensure they meet certain requirements.

DATA MANAGEMENT

Policies provide specifications for data access, privacy, security, and confidentiality and outline stipulations for data sharing.

HSSP IV emphasizes the need to strengthen the National Health Observatory, which can serve as a one-stop shop and open-access platform for storage (repository), analysis, and synthesis and dissemination of health data and information. The MOH has a data warehouse that serves as a health data repository and a robust HMIS, which is built on the DHIS2 rolled out across the whole country and used to collect and report health indicators, including those on malaria.

STANDARDS AND INTEROPERABILITY

Policies describe an enterprise architecture, normative standards—such as health information standards—and digital identity.

Rwanda was one of the first countries in the region to develop a national Health Information Exchange. It continues to work on digitizing the national health system and is taking steps to strengthen the enabling environment for digital health service and HIS interoperability to facilitate linkage between service delivery points (within and between facilities) and reporting of indicators, including malaria. The HSSP IV prioritizes linkages and interoperability of all HISs, as well as strengthening of health systems research for evidence-based policy and decision-making. However, a number of HISs have been developed and deployed, and interoperability remains a challenge. The country is currently developing requirements for interoperability.

INFRASTRUCTURE

Policies define data hosting and storage (e.g., local or cloud), mobile device management, and telecommunications access.

The HSSP IV prioritizes development and enforcement of policies for personal data access and protection. Also, the country plans to ensure, by 2024, availability of interoperable, responsive, and functional HISs providing high-quality data in a timely manner to inform planning and decision-making. Although Rwanda invested in efforts to improve coverage in digital infrastructure across the country, some areas remain unconnected or with low bandwidth. CHWs have feature phones to use for RapidSMS, but there is no device management plan.

WORKFORCE

Policies describe workforce job structures and descriptions, plans for training, digital literacy expectations, and incentives for digital adoption.

The National Digital Health Strategic Plan provides for staff designated to support eHealth in most institutions, from data managers at the HC and hospital levels to ICT officers in provincial and district hospitals. A long-term plan to support sustainability of staff and skills development exists and articulates how staff performance can be monitored (incentives are defined and monitored through a performance-based funding system at the national level). Training for all government ICT staff is handled by the Ministry of ICT, with pre-service and in-service training. However, the MOH does not have a human resources strategic plan that identifies the digital HIS and interoperability skills and functions needed to support the national digital HIS. There are also gaps in skill sets at all levels (including the community level), and staff capacity is insufficient to drive the digital health and HIS interoperability work.



Data flow

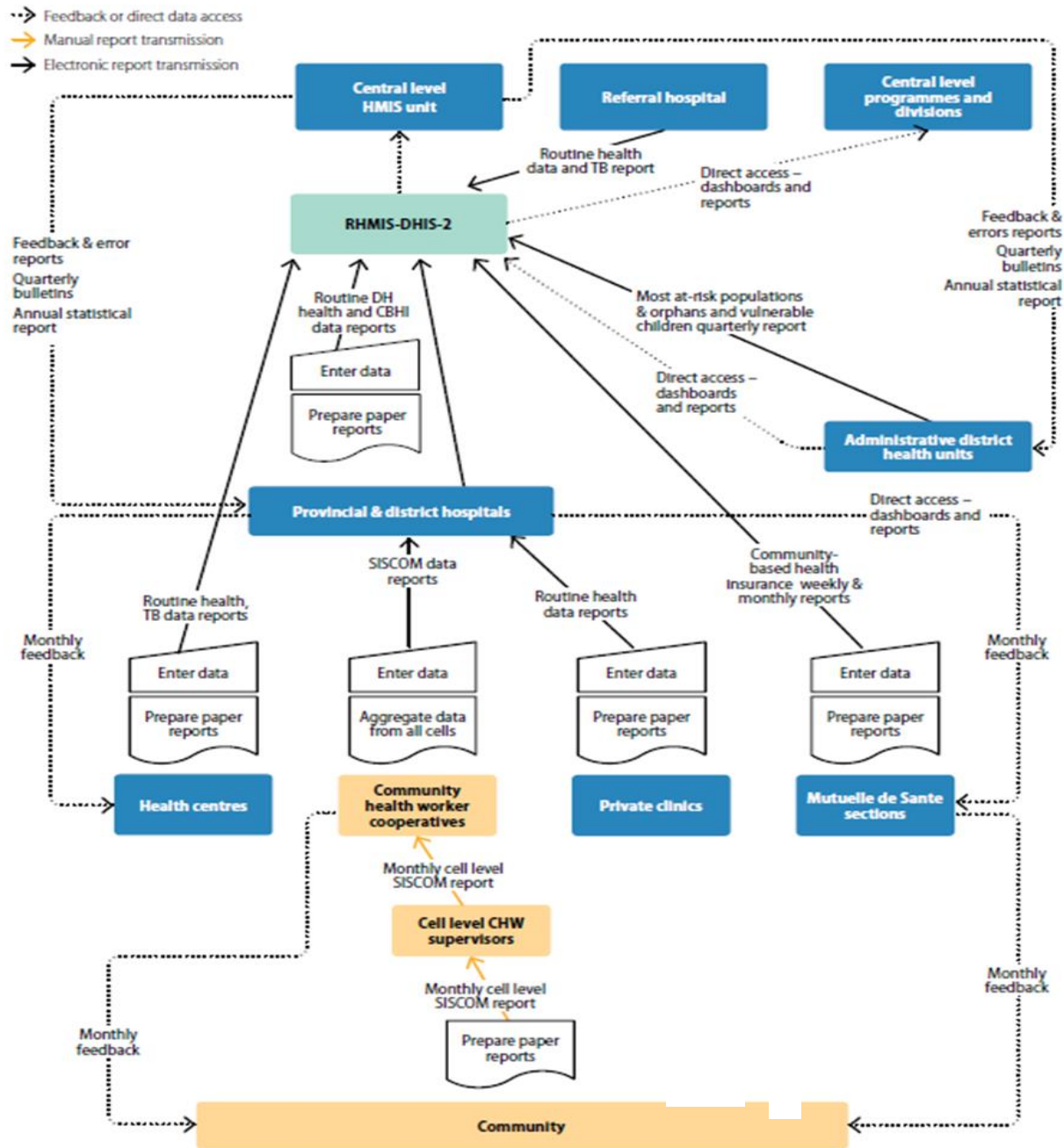
CHWs record data in registers and stock cards. At the end of each month, each CHW compiles a report from the two data sources, consolidates the data into a village paper-based reporting form, and submits it to the respective cell coordinator, who then compiles a cell report and, in turn, sends the report to the CHW cooperative group (an association of CHWs coming together for mutual assistance and working towards improving their livelihoods) at the sector level. The aggregated sector report is then sent to the HC, where data are entered into the electronic SIScom (now integrated into DHIS2) and made readily available online for program managers at the MOH's Community Health Desk. At the same time, each HC shares the report with the sector steering committee in the center's catchment area and with the supervising district hospital.

Additionally, the RapidSMS system is used to monitor severe malaria cases and stockout of malaria commodities. CHWs receive patients, identify severe malaria cases, and notify health facilities using the SMS platform on their mobile phones. They use the platform to notify health facilities about commodity stockouts and to report through a real-time text message reporting system. Using this system, they report on additional indicators, including pregnancies; child vaccinations; antenatal care consultations; births; postnatal care visits; newborn care visits; iCCM (including malaria); nutrition; life-threatening emergencies; maternal, newborn, and child deaths; and growth monitoring in children under 5 years of age. RapidSMS data are transmitted directly from the community level to the health facility and national levels at once.

Using the electronic Integrated Disease Surveillance and Response system, data managers collect data for immediate (and weekly) entry into respective modules, look for irregularities in trends, investigate reported cases, and identify potential outbreaks.

Both SIScom and RapidSMS (built on Python) collect malaria data at the community level, although there is variation in the indicators collected. The two systems are not interoperable, and this makes it hard for quick data triangulation, analysis, and use for decision-making. The MOH and RISA are already working on the interoperability layer, and this will be completed within one year.

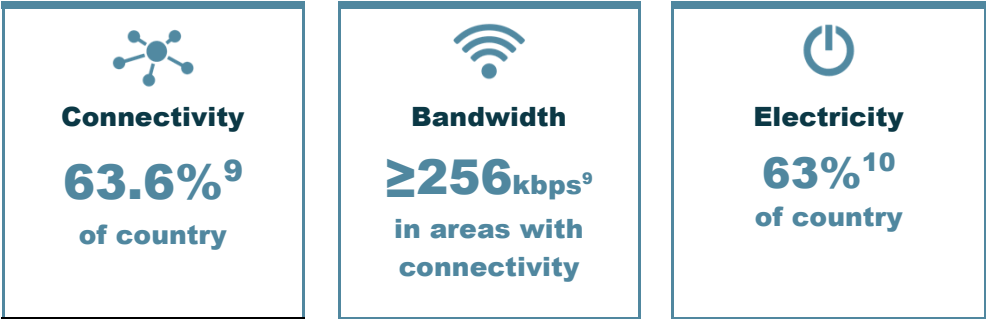
The following flow diagram illustrates the flow of data from the community to the central levels. It also indicates the flow of feedback from one level to the other.



Source: Ministry of Health (23).

Digitally enabling infrastructure

Rwanda plans to avail interoperable, responsive, and functional HISs that provide high-quality data in a timely manner to inform planning and decision-making for its health system by 2024. The cellular network is provided by two carriers, MTN Rwanda and Airtel. Hospitals and HCs have access to electricity (either national grid or solar), computers, and modems for Internet connection. Although the country has invested in efforts to facilitate coverage in digital infrastructure across the country (cellular network coverage stands at 95 percent), a few areas either remain unconnected or have unstable connection, while a few others still have challenges with electricity. The government, through the MOH, provides maintenance and hardware for existing electronic systems. CHWs are provided with feature phones through a collaboration between the government and partners. These phones are used to run the RapidSMS platform. Currently, CHWs do not have or use smart gadgets (either phones or tablets), and therefore CHWs face barriers in building technical skills and digital literacy. During the workshop (see “Methodology” section), participants recommended that CHWs be provided with smart phones to improve work efficiency and facilitate data collection, management, and use.



Digital health tools in use and functionality

CHWs currently use RapidSMS to report key community health indicators, including malaria. Community health supervisors at the HC level use SIScom to report program data and an eLMIS to manage the supply chain for their communities. SIScom and RapidSMS collect similar indicators in some instances. However, the systems are not interoperable. SIScom is integrated into DHIS2, while RapidSMS is a stand-alone system. The government is upgrading RapidSMS to a more robust system known as RapidPro, which will be interoperable with DHIS2 and OpenMRS, an open source EMR system. The system has the capacity to integrate with OpenMRS and DHIS2. It is currently being used on a small scale, with plans to expand to all CHWs in the country.

USE CASE(S)	SIScom/DHIS2	RapidSMS
Providing malaria community case management	■	■
Tracking malaria proactive and reactive case detection	■	■
Tracking malaria screening with referral	■	■
Transmitting messages to community on malaria	□	■
Training health workers	□	□
Tracking routine LLIN distribution during ANC or vaccination visits	■	■

■ = Current use ■ = Possible, but not currently in use □ = Does not meet use case

CASE MANAGEMENT FUNCTIONALITIES	RapidSMS
Aggregate case reporting and analytics Tool collects aggregate case data and has data analytic functions in tool or online	■
Individual case entry and analytics (<i>important in low-burden or elimination settings</i>) Tool collects individual case data and has data analytic functions in tool or online	■
Case geolocation (<i>important in low-burden or elimination settings</i>) Tool allows collection or use of geospatial data for individual cases	□
Interoperability with HMIS Tool sends information to the official national health information system	■
Off-line capability Tool functions, at least partially, off-line	■
MANAGEMENT & SUPERVISION FUNCTIONALITIES	RapidSMS
CHW identification Tool uniquely identifies CHWs	■
CHW catchment location Tool identifies CHW associated position in org unit hierarchy/link to health facility/system	■
CHW performance analytics Tool has analytic functions (data validation, graphs, charts) that support data quality, quality of care, or other performance issues	■

■ = Current use ■ = Possible, but functionality not currently in use □ = Does not have functionality

Abbreviations: ANC, antenatal care; CHW, community health worker; DHIS2, District Health Information Software 2; HMIS, Health Management Information System; LLIN, long-lasting insecticidal net; SMS, Short Message Service.

Appendices

APPENDIX A ► **References**

APPENDIX B ► **Abbreviations**

APPENDIX C ► **Contributors**

APPENDIX D ► **Community digital health tools**

APPENDIX E ► **Next-generation tool functionalities for malaria case management**



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For more information: digitalsquare@path.org

APPENDIX A

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Abbreviations

CHWs	Community Health Workers
DHIS2	District Health Information System 2
eIDSR	electronic Integrated Disease Surveillance and Response system
eLMIS	Electronic Logistics Management Information System
EMR	Electronic Medical Records
EPI	Expanded Program on Immunization
HC	Health Centers
HIS	Health Information System
HMIS	Health Management Information System
HSSP	Health Sector Strategic Plan
iCCM	Integrated Community Case Management
ICT	Information Communication Technology
IRS	Indoor Residual Spraying
LLIN	long-lasting insecticide-treated net
MOH	Ministry of Health
OpenMRS	Open Medical Record System
PMI	U.S. President's Malaria Initiative
RapidSMS	Rapid Short Message Service
RBC	Rwanda Biomedical Centre
RISA	Rwanda Information Society Authority
SIScom	Community Health Information System
TWG	Technical Working Group

APPENDIX C

Contributors

Informant Name

Barirwanda Samuel
Byiringiro Jean Baptiste
Gaju Erick
Gakuba Richard
Gikic Djo
Hagenimana Marc
Hirwa Aime Dieudonne
Ishimwe Loic Ntwali
Kagiraneza Samuel
Kamali Francois
Kayinamura Assumpta
Kayirangwa Michel
Kayitare Evariste
Manzi Emmanuel
Mbonyimana Yves
Mapendano Emmanuel
Muhire Andrew
Mukamana Beatrice
Munyana Edith
Munyangaju Jose Edouard
Ndaribumbye Evariste
Niyonshuti Benjamin
Niyonzima Ibrahim
Nkunda Denis

Organization

Muhima Hospital
Rwanda Biomedical Center
UNICEF
Enabel
Enabel
Rwanda Biomedical Center
Ruhengeri Hospital
QT Software Ltd
Ministry of Health
IntraHealth
IntraHealth
Ministry of Health
Rwanda Biomedical Center
UNICEF
King Faisal Hospital
Ruhengeri Hospital
Ministry of Health
Rwanda Biomedical Center
Ministry of Health
Rwanda Food and Drug
Administration
Chemonics
Muhima Hospital
Ministry of Health
Ministry of Health

Nyatanyi Thierry
Nzabandora Felix
Sinzahera Jovite
Sylvere Mugumya
Tayebwa Edwin
Tran Ngoc Candide
Tuyishime Gad
Umuhoza Denise
Umunyana Jacqueline
Umutesi Sharon
Umutoni Nathalie
Uwakijijwe Bonheur
Uwayezu Gilbert

IntraHealth - consultant
Rwanda Medical Supply
IntraHealth
RISA
IntraHealth
World Health Organization
Kicukiro Health Center
Kicukiro Health Center
IntraHealth
Rwanda Biomedical Center
Ministry of Health
Kicukiro Health Center
UNICEF - consultant

APPENDIX D

Community digital health tools*

Name of Tool	Type of Digital Health Intervention [†]	Implementer (Funder)	Scale	Malaria Use Case
RapidSMS	2.0 Healthcare Provider Communication	Ministry of Health	All districts (30) All 58,286 CHWs	Provider communication Referrals Reporting

*Data that come from the survey have not been independently validated aside from tools featured within the profile.

[†]See [Classification of digital health interventions v1.0](#), World Health Organization, 2018.

APPENDIX E

Next-generation digital health tool functionalities for malaria case management

CASE MANAGEMENT FUNCTIONALITIES	RapidSMS	SIScom/DHIS2
Notifications Tool sends and receives notifications	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Stock reporting & analytics Tool collects stock data and has analytic functions to support stock and logistics data analysis and decision-making	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Interoperability with other national health systems Tool sends information to other national systems (iHRIS, LMIS, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
Referral coordination Tool allows CHW to notify local health facility of referrals and track them	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Scheduling & work planning Tool allows CHW to plan and schedule key activities in the community	<input type="checkbox"/>	<input type="checkbox"/>
MANAGEMENT & SUPERVISION FUNCTIONALITIES	RapidSMS	SIScom/DHIS2

Decision support		
Tool provides algorithms or checklists to guide CHW service provision	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Training materials & resources		
Tool provides access to training materials, policies, or other useful reference documents	<input checked="" type="checkbox"/>	<input type="checkbox"/>
CHW geolocation		
Tool allows collection or use of CHW geolocation data for monitoring and planning distribution	<input type="checkbox"/>	<input type="checkbox"/>
Supervision		
Tool can be used by supervisors to assess CHW skills and capacity	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

= Current functionality
 = Possible, but functionality currently not in use
 = Does not have functionality