

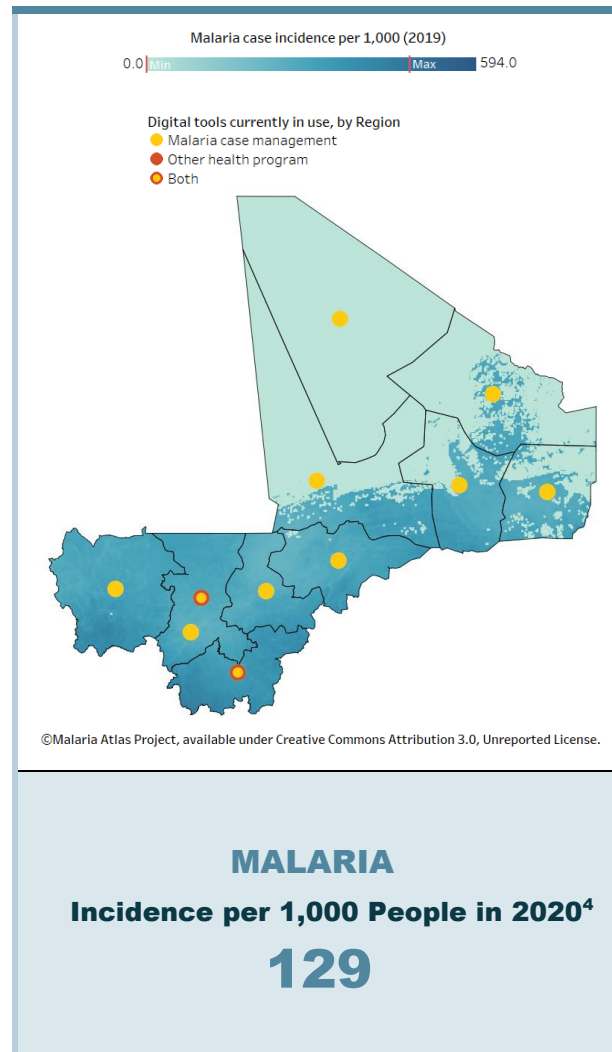
MALI

Executive Summary

Mali exhibits a strong desire to expand both its Community Health Worker (CHW) program and the use of digital tools to fight malaria. Child and infant mortality rates have fallen since the introduction of integrated community case management (iCCM),¹ and the national strategic plan for community health promotes a large scale-up of the CHW program by 2025. Digital health is mainstreamed within broader health strategies, including the updated strategic plan for community health, and data collected by CHWs are integrated into national systems and used for decision-making, including for malaria.

Despite these strengths, CHW programs remain small, with limited supervision capacity due to funding limitations. Ambitious plans for expansion require large financial commitments that neither the government nor external partners have agreed to fund at this time. Multiple digital tools for CHWs have been introduced, but these efforts are largely uncoordinated, and the tools are not interoperable with national health data infrastructure. Limited electricity and telecommunications infrastructure in rural areas further complicates the expansion of existing digital health initiatives.

To continue progress toward malaria elimination with the support of digital tools, Mali requires strengthened coordination structures and more sustainable funding mechanisms.



PEOPLE
Community Health Worker (CHW)



3,303 CHWs²
2 per 10,000 people

GOVERNANCE
National Digital Health Strategy



YES

SYSTEMS
Digital Health Index³



SCORE: 3



Recommended Actions

PEOPLE



Community health workers and other decision-makers

Formalize the status of CHWs

Engage with the Ministry of Health (MOH) to encourage adoption of the statute that has previously been drafted to formalize the status of CHWs, which would make them part of the official health system rather than volunteers, thereby guaranteeing them an official salary. While working toward the formalization of status, work with the MOH and key partners to devise strategies for improving the on-time payment of CHW stipends to improve motivation and retention, such as learning from in-country mobile money payment experiences.

Evaluate current supervision structure for CHWs

Support the MOH to evaluate the impact of dedicated supervision for CHWs, including a cost benefit analysis. Support the MOH to analyze evaluation results and define tasks and responsibilities for different actors involved in supervising CHWs in order to improve efficiency and prioritize resources.

Increase CHW training, including on digital tools

Support the MOH to develop and implement an enhanced training curriculum for CHWs, including specific modules on digital health and standardized refresher training. Where possible, training material should be developed in local languages as well as French to ensure full uptake of the material.

GOVERNANCE



Strategies and policies

Disseminate digital health strategic plans after validation

Support the General Directorate of Health and Public Hygiene (*Direction Générale de la Santé et de l'Hygiène Publique*—DGSHP) to disseminate the digital health strategic plan and the operational road map for digital health at the community level after these documents are validated later this year.

Promote coordinated financing of digital health initiatives

Engage with the MOH to draft a road map for achieving better-coordinated financing for digital health, including for malaria, with an end goal of centralized MOH budget support for these projects.

Improve coordination of digital health tools

Support the DGSHP to put in place a body to coordinate and manage digital health initiatives and to draft procedural guidelines and standards to govern the introduction of digital health tools. This committee will coordinate with and monitor implementing partner efforts in order to enhance the alignment of digital health projects with national priorities.

Pursue nontraditional sources of digital health funding

Engage with the MOH to draft a strategy for the financing of digital health tools outside of

SYSTEMS



Processes and digital tools

Identify and pilot a data collection tool for CHWs that is aligned with DHIS2

Support the MOH to identify a digital health tool for CHW data collection and supervision that can share data with DHIS2 and pilot the tool in select districts. Although several tools for CHW data collection have been introduced, so far none have been able to share data directly with DHIS2.

Develop enterprise architecture and interoperability standards

Support the MOH to develop an enterprise architecture and interoperability standards for national health data systems, including for digital tools for malaria. No formal enterprise architecture or specific interoperability guidelines currently exist in Mali, inhibiting greater interoperability for digital tools used by CHWs.

Increase information technology support staff at the subnational level

Support the MOH in assessing information technology support needs at the district and regional levels and in developing a costed plan to increase its information technology staff at the subnational level. Currently, all specialized technicians for DHIS2 and digital health initiatives are at the central level.

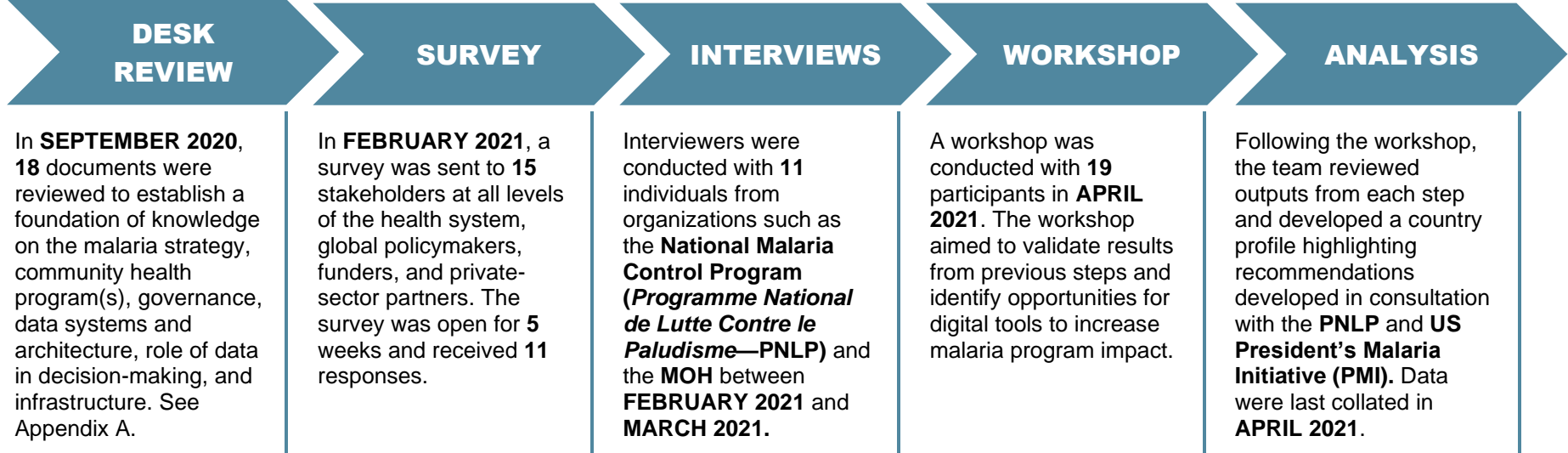
traditional development partnerships, including with the private sector and social enterprises. This strategy will draw on experiences in peer countries such as India and Zimbabwe that have pursued similar strategies to finance digital health efforts.

Define and map zones of intervention for CHW digital tool funding and implementation

Support the MOH as it works with key development partners to define and map formal geographic zones of intervention for funding and implementation of community health digital tools, including for malaria. This mapping will provide a clearer division of responsibilities to help the MOH better coordinate interventions and target partner support.

Methodology


The country profile for Mali was developed through the following process: conducting a desk review; deploying an online survey focused on the digital tool landscape; carrying out key informant interviews with experts in digital health, community health, and malaria; and facilitating a workshop to validate the findings and prioritize recommended actions. To protect interviewees and participants during the COVID-19 pandemic, interviews were conducted virtually, and the workshop was held in person with masks and social distancing. Consult Appendix C for a list of key informants interviewed and workshop participants. Consult Appendix D for detailed information on the results of the online digital tools survey results.



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 other 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 platforms to effectively use digital technology and data to strengthen malaria and other health programs.

People



As part of an approach called “essential care in the community” (*soins essentiels dans la communauté*—SEC), CHWs in Mali, known as *Agents de Santé Communautaire*, provide several malaria services, including diagnosis, treatment for uncomplicated malaria, and pre-referral treatment of severe malaria with rectal artesunate. Since 2010, CHWs have provided malaria services as a part of a larger iCCM mandate by the Government of Mali. Additionally, CHWs working for some nongovernmental organizations in pilot districts provide intermittent preventive treatment for malaria in pregnancy and proactive case detection. CHWs are linked to the Community Health Center (*Centre de Santé Communautaire*—CSCoM) to which they report and are supervised by the Health Center Technical Director (*Directeur Technique du Centre*—DTC). Per government policy, CHWs are considered volunteers whose status has never been formalized by the MOH. Although they receive a stipend of 40,000 FCFA per month (~US\$72), paid by external non-governmental sources, some implementing partners often delay payments, contributing to significant dissatisfaction and turnover. Funding and support for the implementation of CHW programs, in particular those that provide malaria services, is largely provided by partners, including the Global Fund, UNICEF, USAID, Muso, Red Cross, Terre des Hommes, and the World Bank.

The number of CHWs is currently insufficient to meet the needs of the population; in 2020, only 3,303 CHWs were active, compared to the 17,541 CHWs needed for full coverage of the population living more than five kilometers from a health center. Coverage varies geographically: few CHWs are active in the north due to the rollout strategy for SEC, which started in southern regions. The MOH has developed a costed plan to significantly increase the number of CHWs by 2025 to achieve 75 percent coverage, but they have not yet secured sufficient financing.

Community health worker digital readiness

At present, CHWs only use digital tools as part of small-scale pilot projects. Most key informants believe CHWs have a good capacity to use digital tools, though some think training would be more effective in the local language rather than French. According to recruitment criteria, all CHWs are literate in French and have a minimum level of education. Training is standardized, and CHWs receive 18 days of pre-service training, but refresher training is inconsistent and dependent on financing. Training on digital tools is not currently included in the standard curriculum. Although DTCs are formally responsible for training and supervision, in practice they have many competing priorities at the CSCoM and are not able to effectively carry out these duties. To improve supervision, Muso conducted a randomized controlled trial in 2016 to evaluate the introduction of dedicated supervisors for CHWs.⁵ Due to the success of this initiative, the MOH recently adopted this strategy at the national level, and the new community health strategic plan calls for a national rollout of dedicated supervisors over the next five years. However, funding has not yet been secured for this initiative. More broadly, MOH personnel to support digital health is limited at the subnational level. Officials at the regional and district levels have received training on the use of DHIS2. Information technology specialists are available in the districts and regions to address hardware issues, but all specialized technicians for DHIS2 are at the central level.

3,303 Community health workers in country	Compensation Policy: VOLUNTEER
3,303 Providing malaria community case management	Compensation Policy: VOLUNTEER

Data-driven decisions at each level of health system

Mali’s health management information system (HMIS), the National Health and Social Information System (*Système National d’Information Sanitaire et Sociale*—SNISS), has two coordinating bodies: a thematic group focused on statistics and a DHIS2 implementation steering committee, which oversees initiatives related to data quality and data use. Systems exist at the national level to use malaria data to inform decision-making, but these systems do not extend to the community level, as CHWs are not trained to use or analyze data. Data collected at the community level are available in DHIS2 and used at all levels to support decision-making. Data are generally combined with CSCom data in DHIS2 and are not available for individual CHWs.

<p>NATIONAL LEVEL</p>	<p>Data flows to the national level through DHIS2 and is centralized by the SNISS. The SNISS produces a statistical yearbook each year that includes community-level indicators. National managers compile national health statistics with DHIS2 reports validated at the regional level and coordinate use of the data for decision-making at the regional level. Community-level malaria data are analyzed for decision-making in several ways; for example, data on infection trends influence the planning of activities. Data users use dashboards for analysis and for orienting decision-making based on outcomes.</p>
<p>REGIONAL LEVEL</p>	<p>Regional Health Directorates receive data from districts via DHIS2 at the same time as the national level. Regional officials use DHIS2 data to analyze epidemiological trends, including for malaria, for each district. They also hold periodic data reviews for analysis and decision-making. To support CSComs, Regional Health Managers are primarily responsible for using data for decision-making and provide both supervision and training for DHIS2 at the district level.</p>
<p>DISTRICT LEVEL</p>	<p>At the district level, quarterly data reviews are organized with the support of partners for the analysis of data reported by health zones. Districts verify the consistency of data reported in DHIS2. Using data from CSComs, district officials identify challenges and try to find solutions. Districts also use data on commodities to decide what actions to take in case of stockouts or excessive supply.</p>
<p>HEALTH FACILITY LEVEL</p>	<p>The DTC, who is responsible for the health zone, uses data, including those reported in hard copy by the CHWs, to determine whether to provide commodities to CHWs and if CHWs need supervision. Data is digitized starting at this level by the DTC, who enters CHW data in DHIS2 on a monthly basis.</p>
<p>COMMUNITY LEVEL</p>	<p>CHWs collect data on paper but do not analyze data or use data to make decisions. CHWs share their data with the DTC, who analyzes the data and uses it to make decisions when necessary.</p>

Governance



	DIGITAL	COMMUNITY HEALTH	MALARIA
Name	Plan Stratégique de la Santé Numérique au Mali (Strategic Plan for Digital Health in Mali)	Plan Stratégique National des Soins Essentiel dans la Communauté (National Strategic Plan for Essential Care in the Community)	Plan Stratégique National de Lutte Contre le Paludisme (National Strategic Plan for Malaria Control)
Current strategy dates	2021–2027 <i>Currently being finalized</i>	2021–2025 <i>Currently being finalized</i>	2018–2022 <i>Extended to 2024</i>
Coordinating body	Sous-direction chargée du Système d'Information Sanitaire à la DGSHP (Sub-directorate in charge of the Health Information System at the DGSHP)	Comité de Pilotage et de Veille du Plan Stratégique SEC (SEC Strategic Plan Steering and Monitoring Committee)	Programme National de Lutte Contre le Paludisme (PNLP) (National Malaria Control Program)
Funding strategy	Yes	Yes	Yes

Mali is currently updating its digital health strategy, and the new strategic plan will be finalized later this year. The new strategy focuses heavily on improving the enabling environment through an improved legal and regulatory environment for data management and data protection and stronger interoperability architecture. The plan includes a data collection tool for CHWs as a priority. It also discusses the need to identify all tools currently used for community health programs to promote the harmonization of the data with national standards as well as interoperability with national systems. Additionally, the plan calls for the elaboration of a road map for community health digitalization, which was completed in 2020 along with an operational plan. This road map provides a detailed list of tools currently in use and their functionalities and includes a list of suggested requirements to be used to evaluate the alignment of tools with identified needs. It also includes a general deployment strategy for CHW tools and a three-year general budget for digital health deployment at the community level; however, this budget does not appear to be linked to any specific projects.

Mali's overall community health strategy is also in the process of being updated. This new strategy incorporates digital health throughout and includes specific objectives and planned activities related to digital health that are relevant to malaria, including the provision of tablets for CHWs and their supervisors; the digitalization of tools for supervision, data collection, reporting, and stock management; training on the use of these tools; and the development of dashboards for community health data. Although a detailed budget has been developed to support the strategy, most funding relies on external partners and has not yet been secured.

Reinforcing community health is one of the key strategic priorities of Mali's malaria control strategy, and several sections include specific provisions for CHWs. The strategy also promotes improved data timeliness and quality and the use of digital tools for mass messaging malaria prevention campaigns.

<p>GOVERNANCE Policies define digital health and health data governance roles, responsibilities, and structures.</p>	<p>The DGSHP is responsible for digital health and health data governance through its health information systems sub-directorate. The MOH Cabinet makes decisions regarding the use of digital health based on proposals received from the DGSHP, the National Agency for Telemedicine and Medical Informatics, and the Health Planning Unit.</p>
<p>DATA MANAGEMENT Policies provide specifications for data access, privacy, security, and confidentiality and outline stipulations for data sharing.</p>	<p>No document or policy exists to regulate health data security; however, a law on the protection of personal data has been in place since 2013, and a dedicated structure, the Personal Data Protection Authority (<i>Autorité de Protection des Données à Caractère Personnel</i>), regulates the protection of personal data. SNISS has well-established procedures in its strategic plan (Strategic Plan of the National Health and Social Information System or <i>Plan Stratégique du Système National d'Information Sanitaire et Sociale</i>) for data management at each level of the health pyramid.</p>
<p>STANDARDS AND INTEROPERABILITY Policies describe an enterprise architecture, normative standards—such as health information standards—and digital identity.</p>	<p>No enterprise architecture or formal standards for interoperability exist, although the Strategic Plan for Digital Health in Mali defines a framework to guide interoperability between systems and promote data consistency among different actors. Some small-scale attempts at interoperability between digital tools and DHIS2 have been trialed by partners such as Muso, but these have been largely ad hoc.</p>
<p>INFRASTRUCTURE Policies define data hosting and storage (e.g., local or cloud), mobile device management, and telecommunications access.</p>	<p>No formal policies have been adopted on data hosting, storage, or device management, and decisions are generally made on a case-by-case basis. The Strategic Plan for Digital Health in Mali calls for health data to be stored in a way that promotes ease of access while also respecting the legal framework for data protection. Management and replacement of devices is carried out on an ad hoc basis according to needs through district operational plans, partners, or Community Health Associations (<i>Association de Santé Communautaire</i>—ASACOs), which are involved in the oversight and management of CSComs and play a role in the selection of CHWs.</p>
<p>WORKFORCE Policies describe workforce job structures and descriptions, plans for training, digital literacy expectations, and incentives for digital adoption.</p>	<p>No strategy or policy currently guides workforce digitalization in Mali.</p>



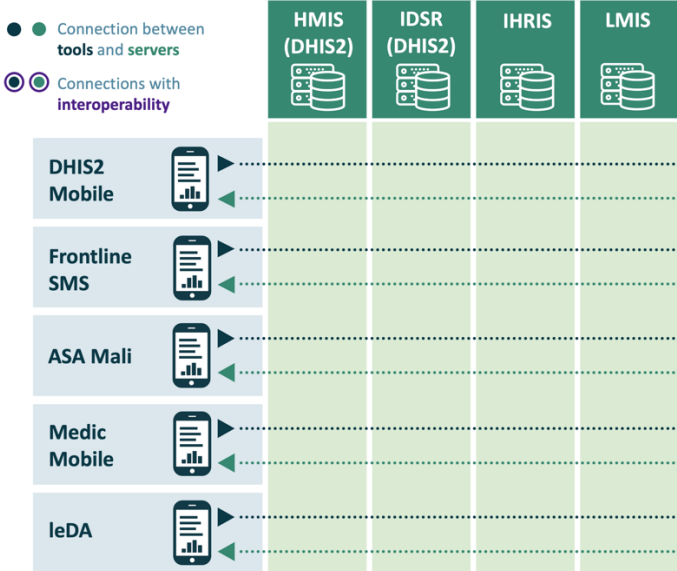
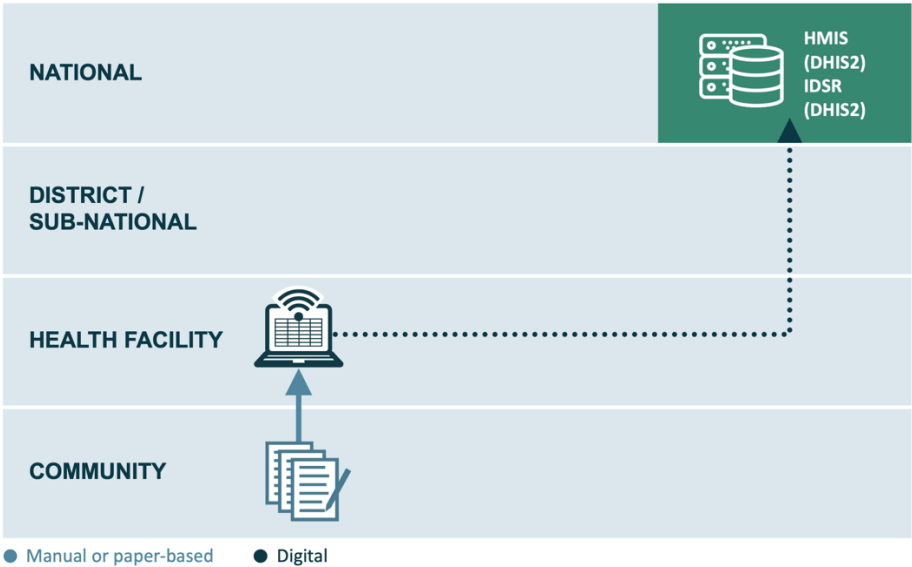
Data flow

In Mali, community health data are integrated in the national HMIS (SNISS). Malaria data are collected by CHWs on paper registers and compiled at the end of the month. Three copies of the aggregated data are produced in hard copy: one copy stays with the CHW, one is sent to the DTC, and one is shared with the implementing partner for the health zone. The DTC compiles and enters data from CHW reports into DHIS2, and some data from CHWs are added to CSCom data and entered in section 5 of the CSCom report. Most digital data collection tools supported by implementing partners, including Medic Mobile (Muso) and Integrated e-Diagnostic Approach (IeDA—Terre des Hommes) are not interoperable with DHIS2. Data collected via these tools are not incorporated into the national data system, and partners do not always provide government stakeholders with access to these data. However, CHWs in these pilot zones continue to report malaria and other data via traditional paper-based tools for entry into DHIS2. Although the PNLP would like for CHWs to be able to enter data into DHIS2 directly, only one tool compatible with DHIS2, the DHIS2 mobile tool, has thus far been introduced as part of a small pilot project by the Aga Khan Foundation, and this tool is no longer in use.

Beyond tools to enable electronic data entry by CHWs, several other types of digital tools have been introduced that are relevant to community health programs. To monitor commodity use at the community level, DTCs enter data on CHW commodity use with the Health Commodity Monitoring Tool (*Outil de Suivi des Produits de Santé*). Although this tool is interoperable with DHIS2, data quality and timeliness issues impact its effectiveness for commodity management. DTC supervision forms have been configured for DHIS2 but are not yet finalized for use. Muso has also integrated supervision and human resources functionalities into its digital tools for CHWs and supervisors.

Several challenges limit the production of high-quality data at the community level, including limited telecommunications connectivity that inhibits the expansion of digital tools, limited education and training for CHWs, and the relative complexity of existing data collection forms.

In Mali, community health data are collected in the SNISS. SNISS is made up of three systems: the Local Health Information System (*Système Local d'Information Sanitaire*—SLIS), the Hospital Information System (*Système d'Information Hospitalier*—SIH), and the Epidemiological Alert System (*Système d'Alerte Épidémiologique*—SAE). The SNISS includes the national implementation of DHIS2 via a cloud server. Gavi, the Global Fund, UNICEF, and USAID provide funding for the deployment of DHIS2. A national logistics management information system (LMIS), *OSP Santé*, exists to monitor the stock of commodities in health facilities and avoid stockouts, providing alerts in the event of low stock and expiration of products. *OSP Santé* is interoperable with DHIS2. Mali is also part of the West African Biomedical Analysis Laboratory Network (*Réseau d'Afrique de l'Ouest des Laboratoires d'Analyses Biomédicales*—RESAOLAB) and a number of laboratory technicians are trained in the use of the electronic laboratory record keeping platform, LabBook. No digital tools used within community health programs currently connect directly to national data systems.

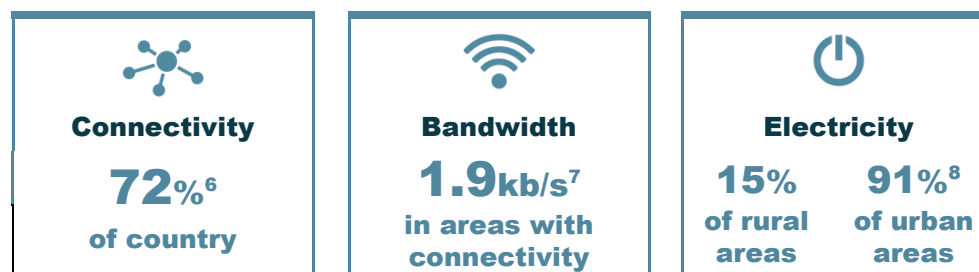


These digital tools do not connect directly to any government data systems.

Abbreviations: DHIS2, District Health Information Software 2; HMIS, health management information system; IDSR, Integrated Disease Surveillance and Response; leDA, Integrated e-Diagnostic Approach; IHRIS, Integrated Human Resources Information System; LMIS, logistics management information system; SMS, short message service.

Digitally enabling infrastructure

Limited electricity and telecommunications infrastructure in rural areas complicate the implementation of digital health tools for CHWs. Mali's primary supplier of electricity, *Energie du Mali SA*, does not cover the entire country. The Agency for the Development of Domestic Energy and Rural Electrification (*Agence Malienne pour le Développement de l'Énergie Domestique et l'Électrification Rurale*—AMADER) provides electricity in some rural areas, and some CSCoMs have electricity through solar panels. However, electricity access declines the further an area is from a large city. Three telephone operators are active in Mali: Orange, Malitel, and Telecel. Although Orange and Malitel have extensive coverage, and 72 percent of the population lives in an area with at least 3G coverage, network coverage is limited in northern and remote areas. In practice, CHWs must often travel to areas with electricity or mobile network coverage in order to use digital technology. However, most tools that have been introduced have offline functionalities that allow CHWs to collect data in areas without network coverage, enabling them to only have to travel periodically to upload data.



Digital health tools in use and functionality

Most digital tools used by CHWs are part of pilot projects managed by external partners. A lack of coordination between external partners and the Mali government on digital health initiatives has resulted in the introduction of multiple small-scale digital tools with overlapping functionalities related to malaria, including malaria case management, follow-up for malaria screening with referral, and training support for CHWs. The MOH strongly promotes the use of tools aligned with DHIS2, but most piloted tools are not interoperable with DHIS2. This lack of interoperability and alignment with national priorities significantly limits the potential of these tools to be scaled up to the national level. Among available tools, the *leDA* tool, which was developed by *Terre des Hommes* using the *CommCare* platform, focuses on the digitalization of medical protocols for iCCM and is used by DTCs, while *ASA*, developed by *Muso*, is used by dedicated supervisors to oversee CHWs. *Frontline SMS* is used by CHWs to report outbreaks (primarily hemorrhagic fever), and *Medic Mobile* is used by CHWs for data collection and case management, including for malaria.

USE CASE(S)	DHIS2 MOBILE	MEDIC MOBILE	ASA	leDA	FRONTLINE SMS
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 EPI visits	■	■	■	■	□

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

Abbreviations: ANC, antenatal care; DHIS2, District Health Information Software 2; EPI, Expanded Program on Immunization; leDA, Integrated e-Diagnostic Approach; LLIN, long-lasting insecticide-treated net; SMS, short message service.

CASE MANAGEMENT FUNCTIONALITIES	DHIS2 MOBILE	MEDIC MOBILE	ASA	leDA	FRONTLINE SMS
Aggregate case reporting and analytics Tool collects aggregate case data and has data analytic functions in tool or online	■	■	■	■	□
Individual case entry and analytics (important in low-burden or elimination settings) Tool collects individual case data and has data analytic functions in tool or online	■	■	■	■	□
Case geolocation (important in low-burden or elimination settings) Tool allows collection or use of geospatial data for individual cases	■	■	■	■	□
Interoperability with HMIS Tool sends information to the official national health information system	■	■	■	■	□
Offline capability Tool functions, at least partially, offline	■	■	■	■	■

Abbreviations: HMIS, Health Management Information System.

MANAGEMENT & SUPERVISION FUNCTIONALITIES	DHIS2 MOBILE	MEDIC MOBILE	ASA	leDA	FRONTLINE SMS
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	■	■	■	■	□

MANAGEMENT & SUPERVISION FUNCTIONALITIES	DHIS2 MOBILE	MEDIC MOBILE	ASA	leDA	FRONTLINE SMS
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Communication

Tool allows two-way communication between peer groups, associated health facilities, or supervisors

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

Abbreviations: CHW, community health worker.

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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APPENDIX A

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APPENDIX B

Abbreviations

ANC	antenatal care
ASACO	<i>Association de Santé Communautaire</i> (Community Health Association)
CHW	Community Health Worker
CSCoM	<i>Centre de Santé Communautaire</i> (Community Health Center)
DGSHP	<i>Direction Générale de la Santé et de l'Hygiène Publique</i> (General Directorate of Health and Public Hygiene)
DHIS2	District Health Information System 2
DTC	<i>Directeur Technique du Centre</i> (Health Center Technical Director)
EPI	Expanded Program on Immunization
FCFA	<i>Franc de la Communauté Financière Africaine</i> (African Financial Community Franc)
HMIS	health management information system
iCCM	integrated community case management
leDA	Integrated e-Diagnostic Approach
IHRIS	Integrated Human Resources Information System
LLIN	long-lasting insecticidal net
LMIS	logistics management information system
MOH	Ministry of Health
PMI	US President's Malaria Initiative
PNLP	<i>Programme National de Lutte Contre le Paludisme</i> (National Malaria Control Program)
RESAOLAB	<i>Réseau d'Afrique de l'Ouest des Laboratoires d'Analyses Biomédicales</i> (West African Biomedical Analysis Laboratory Network)
SAE	<i>Système d'Alerte Épidémiologique</i> (Epidemiological Alert System)
SEC	<i>soins essentiels dans la communauté</i> (essential community care)

SIH	<i>Système d'Information Hospitalier</i> (Hospital Information System)
SLIS	<i>Système Local d'Information Sanitaire</i> (Local Health Information System)
SNISS	<i>Système National d'Information Sanitaire et Sociale</i> (National Health and Social Information System)
UNICEF	United Nations Children's Fund
USAID	US Agency for International Development

APPENDIX C

Contributors

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APPENDIX D

Community digital health tools*

Name of Tool	Type of Digital Health Intervention†	Implementer (Funder)	Scale	Malaria Use Case
ASA Mali	<p>1.1 Targeted client communication</p> <p>2.1 Client identification and registration</p> <p>2.2 Client health records</p> <p>2.3 Healthcare provider decision support</p> <p>2.8 Healthcare provider training</p> <p>3.1 Human resource management</p> <p>3.2 Supply chain management</p> <p>3.6 Equipment and asset management</p> <p>4.1 Data collection, management, and use</p> <p>4.2 Data coding</p> <p>4.3 Location mapping</p> <p>4.4 Data exchange and interoperability</p>	<p>Ministry of Health, Global Fund, Muso, World Bank</p> <p>(World Bank, Global Fund, Muso)</p>	<p>National</p> <p>153 CHW supervisors and MOH officials</p>	<p>Malaria case management</p> <p>Malaria screening with referral</p> <p>Malaria active or reactive case detection (visiting communities to find additional cases)</p> <p>Communication/messaging to community on malaria</p> <p>Training of health workers</p>
DHIS2 Mobile	<p>4.1 Data collection, management, and use</p> <p>4.2 Data coding</p>	<p>Ministry of Health and Aga Khan Foundation</p> <p>(USAID, Aga Khan Foundation)</p>	<p>Subnational: Mopti Region (Djenne and Mopti)</p> <p>140 users</p>	<p>Malaria case management</p> <p>Malaria active or reactive case detection (visiting communities to find additional cases)</p> <p>Communication/messaging to community on malaria</p> <p>Training of health workers</p>
Frontline SMS	<p>1.1 Targeted client communication</p> <p>3.3 Public health event notification</p> <p>4.1 Data collection, management, and use</p>	<p>Direction Générale de la Santé et de l'Hygiène Publique</p> <p>(USAID / Global Health Security Agenda)</p>	<p>Subnational: Sikasso and Koulikoro</p> <p>160 users</p>	<p>None</p>

Name of Tool	Type of Digital Health Intervention [†]	Implementer (Funder)	Scale	Malaria Use Case
leDA	<ul style="list-style-type: none"> 1.1 Targeted client communication 2.1 Client identification and registration 2.2 Client health records 2.3 Healthcare provider decision support 2.4 Telemedicine 2.5 Healthcare provider communication 2.6 Referral coordination 2.7 Scheduling and activity planning for healthcare providers 2.8 Healthcare provider training 2.9 Prescription and medication management 3.1 Human resource management 3.4 Civil Registration and Vital Statistics (CRVS) 3.6 Equipment and asset management 4.1 Data collection, management, and use 4.2 Data coding 4.4 Data exchange and interoperability 	Terre des Hommes (Terre des Hommes)	Subnational: Segou (Macina and Markala districts) 102 DTC users	<ul style="list-style-type: none"> Malaria case management Malaria screening with referral Malaria active or reactive case detection (visiting communities to find additional cases) Training of health workers
Medic Mobile	<ul style="list-style-type: none"> 2.1 Client identification and registration 2.2 Client health records 3.4 Civil Registration and Vital Statistics (CRVS) 4.1 Data collection, management, and use 4.2 Data coding 4.3 Location mapping 	Muso (Muso)	Subnational: Bankass (Mopti), Bamako Commune VI More than 500 CHW users	<ul style="list-style-type: none"> Malaria case management Malaria screening with referral Malaria active or reactive case detection (visiting communities to find additional cases) Communication/messaging to community on malaria Training of health workers

*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.

Abbreviations: CHW, community health worker; DHIS2, District Health Information Software 2; leDA, Integrated e-Diagnostic Approach; MOH, Ministry of Health, SMS, short message service.

APPENDIX E

Next-generation digital health tool functionalities for malaria case management

CASE MANAGEMENT FUNCTIONALITIES	DHIS2 MOBILE	MEDIC MOBILE	ASA	leDA	FRONTLINE SMS
Notifications Tool sends and receives notifications	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input 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 type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interoperability with other national health systems Tool sends information to other national systems (iHRIS, LMIS, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Referral coordination Tool allows CHW to notify local health facility of referrals and track them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input 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"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MANAGEMENT & SUPERVISION FUNCTIONALITIES	DHIS2 MOBILE	MEDIC MOBILE	ASA	leDA	FRONTLINE SMS
Decision support Tool provides algorithms or checklists to guide CHW service provision	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Training materials & resources Tool provides access to training materials, policies, or other useful reference documents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input 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 checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Supervision

Tool can be used by supervisors to assess CHW skills and capacity



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

Abbreviations: CHW, community health worker; DHIS2, District Health Information Software 2; leDA, Integrated e-Diagnostic Approach; iHRIS, integrated human resources information system; LMIS, Logistics Management Information System; SMS, short message service.
