# MOZAMBIQUE

Executive Summary

As 1 of 11 countries with the highest malaria burden in the world, Mozambique is considered a high-priority country in the World Health Organization's high burden to high impact malaria approach.[1] Malaria prevalence in Mozambique varies significantly by province, with higher rates in Cabo Delgado (57%) and Inhambane (35%) compared to Sofala (29%) and Maputo City (1%), as of 2019.[2]

The national community health worker (CHW) program comprises several community-level groups. This report focuses on the primary group Agentes Polivalentes Elementares (APEs; Elementary Multipurpose Agents), who provide malaria services; it briefly discusses *activistas*, another cadre with a role in malaria treatment. APEs serve under the Ministry of Health (MISAU) in 10 of 11 provinces to disseminate malaria messages, perform rapid diagnostic tests, provide artemisinin-based combination therapy for uncomplicated malaria cases, and make referrals for complicated cases.[1]

Several digital tools are deployed at community level with APEs (upSCALE, DHIS2 Tracker, U-Report). The government also has plans to expand APE use of digital tools. However, these efforts are hindered by the lack of digital strategy and architecture documents as well as relatively low Internet availability (21%) among the population.[3]

Malaria case incidence per 1,000 (2019)

0.0 |——————————————————| 594.0
Min   Max

Digital tools currently in use, by Region
- 🟡 Malaria case management
- 🔴 Other health program
- 🟠 Both

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MALARIA

Incidence per 1,000 people in 2019[1]

358
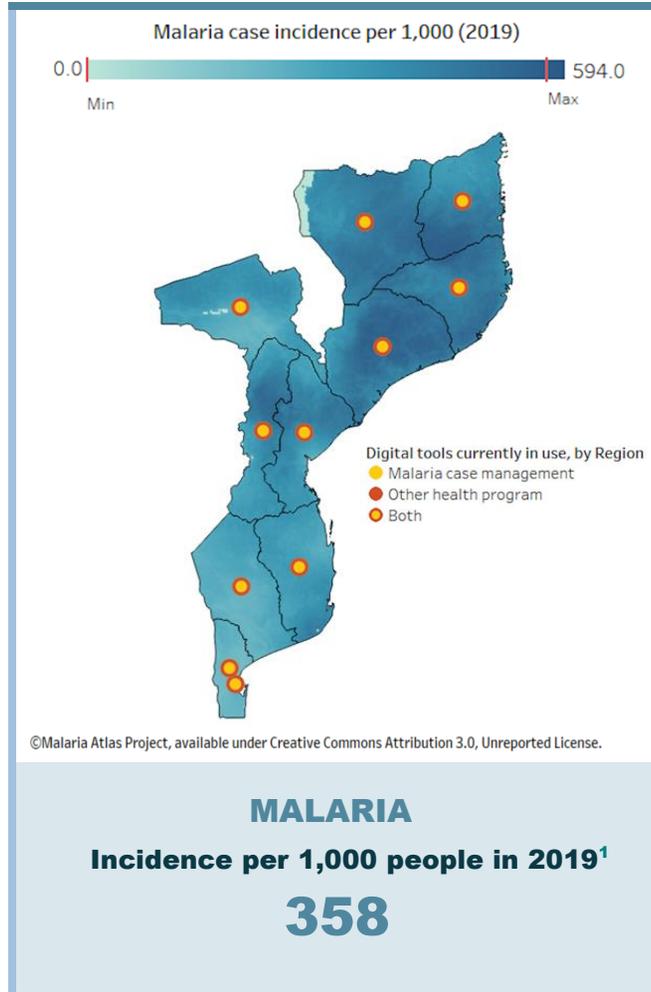
PEOPLE

Community Health Worker (CHW)

> 45,653 CHWs[4]

> 15 per 10,000 people

GOVERNANCE

National Digital Health Strategy

NO

SYSTEMS

Digital Health Index[5]

SCORE: 1

▲

Recommended Actions

PEOPLE

Community health workers (CHWs) and other decision-makers

Improve Agentes Polivalentes Elementares (APE) program retention rates and compensation models

Conduct an assessment of the reasons for high turnover in the APE program. Develop a strategic guidance document for reducing turnover which also includes best practice information from other country CHW policies.

Develop scenario tables on APE expansion and digital inclusion

Key informant interviews suggested that more APEs are needed. The World Health Organization stated that 2.5 CHWs per 1,000 people would be adequate CHW.[6] Mozambique currently has 0.15 APEs per 1,000 people.[4] This document will detail various expansion plans and contain decision points for the inclusion of digital health in the community health system.

Describe the role of activistas and understand how to incorporate them into general CHWs

Activistas work across many health verticals, including malaria. They are deployed by regional supervisors to treat households with known malaria. Through the scenario table recommended above, MISAU can better understand routine tasks of Activistas, and where and how activistas could fit into broader CHW efforts.

GOVERNANCE

Strategies and policies

Support the technical working group for community health

The Mozambique Ministry of Health (MISAU) created a Sector Wide Approach (SWAP) working group that has been focusing on strengthening the community health system. Support SWAP by participating and ensuring digital tools are on the agenda.

Support the development of data platforms and policies

MISAU is developing a new CHW strategy. Ensure that this strategy includes policies for any new or existing platform, including policies on data reporting and the periodicity of data collection, as well as standard data definitions and a strategy for sustainability.

Provide input into the new CHW plan based on findings from the APE assessment and support MISAU in presenting the findings to partners and SWAP

The new MISAU CHW strategy has the potential to address several recommendations outlined in the "People" section below. Use the results from the assessment of CHWs to inform the strategy document drafted by MISAU.

SYSTEMS

Processes and digital tools

Develop the digital health enterprise architecture for CHWs

Work with the SWAP program to develop a clear and accessible document that outlines the APEs and activistas' digital data strategies in the current digital health enterprise architecture.

Support the interoperability of the Sistema de Informação de Saúde para Monitoria e Avaliação (SIS-MA) and community health system

Community data management platforms are not currently interoperable with the National Health Information System (SIS-MA). MISAU has an interoperability layer that is used to share data with other systems, but this interoperability layer does not include sharing of community data. Expand the MISAU interoperability layer to include SIS-MA directly with community health platforms

Advocate for the expanded use of existing digital tools for CHWs

Work with the SWAP program to support the expanded use of existing digital tools used by APEs to all provinces and districts, including developing a plan for device replacement. Support the SWAP program in discussions with funders, implementing partners, and MISAU to determine opportunities and challenges in expanding the current pilot activities in a sustainable manner.

Create job aids/roles and responsibilities for activistas

Activistas are a large contingent of CHWs in Mozambique. Yet their roles are not clearly defined. A document should be created displaying activistas' links to the formal health system and other cadres of CHWs; the end goal would be to standardize and formalize roles and responsibilities.

Evaluate ways to increase data use among APEs and the communities, and develop recommendations on how to scale up decision-making

Malaria data are used for decision-making at the community level to identify outbreaks and mobilize support to communities (i.e., mobile clinics and communication messaging), as well as provide information for supply chain management. To reinforce and standardize this culture of data use, a thorough review of the CHW strategy, job aids, and trainings needs to be completed. Supervisors should also be factored into this review, as they play a critical role in data quality.

Expand the Sistema de Informação de Gestão Logística das Unidades Sanitárias (SIGLUS) as part of SIMAM

SIGLUS, a cloud-based digital commodity stock management system, and part of SIMAM, the logistic and stock management system in the country, is only available at the facility level, should be expanded to the community level. Many digital tools have the functionality to manage stock digitally and deploy resources accordingly.

Incorporate supervision information in digital platforms

Information on supervision of quality of care, data quality assurance, and stock should be included in a digital platform for review and action. There is currently no standardized form for supervision or action plans.

Methodology

To develop this profile, PATH consulted various data sources (desk review, survey, interviews) and reviewed findings at a workshop in June 2020. The entire processes took place between July 2020 and June 2021. Documents consulted are listed in Appendix A, and interviewees / workshop participants are listed in Appendix C.

DESK REVIEW	SURVEY	INTERVIEWS	WORKSHOP	ANALYSIS
In **JULY 2020, 48** documents were reviewed to establish a foundation of knowledge on the malaria strategy, community health program(s), governance, data systems and architecture, role of data in decision-making, and infrastructure. See Appendix A.	In **NOVEMBER 2020**, a survey was sent to **40** stakeholders at all levels of the health system, global policymakers, funders, and private-sector partners. The survey was open for **4** weeks and received **11** responses.	Interviews were conducted with **6** individuals from organizations such as the **United States President's Malaria Initiative, National Malaria Control Program, and Malaria Consortium** between **NOVEMBER 2020** and **JANUARY 2021**.	A workshop was conducted with **9** participants in **JUNE 2021.** The workshop aimed to validate results from previous steps and identify opportunities for digital tools to increase malaria program impact.	Following the workshop, the team reviewed outputs from each step and developed a country profile highlighting recommendations developed in consultation with the **Ministry of Health and United States President's Malaria Initiative staff.** Data were last collected on **JUNE 2021**.

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 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

APEs are the primary CHW program supported by MISAU.[4] APEs work in 10 of 11 provinces and provide both preventative services (health talks) and curative services[2,8,9] for malaria, diarrhea, and pneumonia.[2] Additionally, APEs provide services such as basic health care (basic first aid, primary health care, diagnosis of general diseases), integrated community case management (iCCM), family planning, maternal and neonatal health, and nutrition.[10] There are 6,673 APEs currently; the country has a goal of having 8,000 APEs trained by December 2021[11] and 8,800 APEs by December 2022.[8,12]

For malaria, APEs visit households, perform rapid diagnostic tests, provide artemisinin-based combination therapy treatment to those who test positive for uncomplicated malaria, and refer patients with complicated malaria to health facilities.[2] APEs receive a monthly stipend of 1,200 meticais (US$20) per month. Stipends are provided by MISAU, with funds from the Global Financing Facility of the World Bank.[8,11] Implementing partners include the U.S. President's Malaria Initiative (PMI), World Bank, UNICEF, the Irish Embassy, and the Global Fund to Fight AIDS, Tuberculosis and Malaria.[8,9,11] In this report, as visualized in the boxes to the right, we define compensation as "paid" when the funds come directly by the government. Those who are listed as "unpaid" may be receiving funds from other partner organizations, however as they are not on the official government payroll are not considered "paid" in this report.[7]

45,653 Community health workers in country[4]	Compensation Policy: PAID Payment varies by cadre
6,673 Providing malaria community case management[4]	Compensation Policy: PAID Paid by government

UNICEF and MISAU started a Sector Wide Approach to strengthen the community health information system.[13] This initiative was established during the COVID-19 pandemic to improve community surveillance of COVID-19 outbreaks. As a result of this initiative, MISAU and other partners began exploring the APEs' role and opportunities to include digital tools to be sent directly into the health management information system.[7] Additionally, NGO partners are advocating for APEs to be recognized as MISAU staff.[7] SWAP SOPs and guidance tools are being designed and developed now (they were not complete as of the publication of this report).

In addition to APEs, activistas (activists)[7] and lay counselors provide community-level services. Activistas and lay counselors contingent is about 38,980. They differ from APEs in that activistas and lay counselors are funded through community-based organizations for specific disease areas. Both activistas and lay counselors work in various disease areas, including HIV, family planning, tuberculosis, sexually transmitted infections, and leprosy. The majority of activistas do not provide community case management services or diagnostics; instead, they focus on information, education, and communication. In the south of Mozambique, some activistas are deployed to test households when malaria is suspected through reactive focal mass drug administration using community-level data. Activistas are deployed by regional APE supervisors to treat entire households for malaria.

There are also an estimated 109,000 traditional medicine practitioners in the country.[4] However, as the services they provide are not always linked to the formal health system, they have not been included in this report.

Community health worker digital readiness

Some APEs are already using digital tools. upSCALE is a tool used for malaria case management in 6 of 11 total provinces in the country.[7] The implementer of the tool, the Malaria Consortium, provides upSCALE training for two weeks in addition to the standard APE training, and some supervisors provide refresher trainings.[7] The Malaria Consortium also provides APEs with smartphones for the upSCALE tool,**Error! Bookmark not defined.** as well as APE supervisors with tablets to view and validate APE data.[9] In addition, the Malaria Consortium provides support for tools at the national level. At the health facility, district, provincial, and national levels, health professionals are trained to use District Health Information Software 2 (DHIS2), which disaggregates data reported from the health facility into community- and facility-level data.[7]

Data-driven decisions at each level of health system

NATIONAL LEVEL	Community health worker (CHW) data are disaggregated from outpatient health facility data at the national level. The community-level data are used to track malaria case management and progress toward indicators through the Sistema de Informação de Saúde para Monitoria e Avaliação (SIS-MA). Additionally, the data are used to determine stock needs and the rate of use among CHWs versus health facilities. The COVID-19 pandemic has increased the popularity of CHWs and data indicated a preference for CHW diagnosis over traditional health care visits. The National Malaria Control Program (NMCP) also provides malaria bulletins that are distributed to provinces. Aside from bulletins, the NMCP works with the Departamento de Informação para a Saúde (Department of Health Information) to provide feedback to district and provincial levels on a monthly basis regarding data quality, timeliness, or completeness, giving the health facilities and districts a chance to correct any errors in their data.[9]
PROVINCIAL LEVEL	Provincial Department of Health Information managers review and analyze all health facility data through SIS-MA. This review takes place each quarter, and results are commonly presented through provincial managers to the National Directorate of Planning and Cooperation.[9]
DISTRICT LEVEL	District offices play a crucial role of compiling all paper data and transferring them to a DHIS2 World Health Organization data quality assessment tool. Additionally, data officers within the district offices conduct data quality checks and create data summary reports using aggregated data for provincial- and national-level decision-makers. Clear guidelines are needed for how districts can better use data for program planning and supervision.
HEALTH FACILITY LEVEL	Regional Agentes Polivalentes Elementares (APE) supervisors review community-level data monthly during APE visits to the health facilities for stock replenishment. Health facility supervisors are responsible for reviewing data and providing feedback at a monthly CHW meeting. These data can also trigger mobile clinics and outbreak notification. At the health facility level, supervisors collect and share data to the district level in paper-based forms. A select few health facilities conduct data validation and analysis. In the south of the country, in areas supported with reactive focal mass drug administration, when an outbreak is detected, regional APE supervisors contact activistas who perform household-wide treatment.
COMMUNITY LEVEL	CHWs by themselves rarely use data for decision-making; they are mainly required to report information to their supervisors through data summaries.[11,14,15] The APE training curriculum trains APEs to ask for feedback on their work to understand how they can improve, though this could be strengthened in practice.[15]

Governance

	DIGITAL	COMMUNITY HEALTH	MALARIA
Name	Two strategic plans under development: *Política de Informação de Saúde* (*Health Information Policy*) and *Política de Sistema de Informação de Saúde* (*Health Information System Policy*)	*Programa de Revitalização dos Agentes Polivalentes Elementares – 2010* (*Plan for the Revitalization of the APE Program – 2010*)	*Plano Estratégico da Malária* (*National Malaria Strategic Plan*)
Current strategy dates	Currently being drafted	2010	2017–2022
Coordinating body	Departamento de Informação para a Saúde	Agentes Polivalentes Elementares Program	National Malaria Control Program
Funding strategy	Information not available	Yes	Yes

Digital health efforts are underway in Mozambique, but they are fragmented. Mozambique currently has no unified digital health strategy. The e-governance structure is complex, as several governing bodies are involved—the Instituto Nacional do Governo Eletrónico (National e-Government Institute), Departamento de Tecnologia, Informação e Communicação DTIC (Department of Technology, Information and Communication) and Direcção de Planificação e Cooperação DPC (Directorate of Planning and Cooperation). However, the DPC of the Departamento de Informação para a Saúde (Department of Health Information) has the mandate to govern all aspects of health data. In collaboration with MISAU, the Department of Health Information is developing two digital health documents that will cover data management and governance: *Política de Informação de Saúde* (*Health Information Policy*) and *Política de Sistema de Informação de Saúde* (*Health Information System Policy*).[7] Interview participants described the limited available documentation as a barrier to adaption and long-term sustainability of digital tools in the country.

In 2010, MISAU relaunched the Programa Nacional dos Agentes Polivalentes Elementares, the national APE program, along with the Programa de Revitalização dos Agentes Polivalentes Elementares – 2010 (*Plan for the Revitalization of the APE Program – 2010*).[9] This document highlighted APEs as an important part of the progress in primary health care and malaria burden. The APEs' importance can be seen through the planned expansion of the APE program through 2022. All APEs provide malaria services in alignment with the malaria strategy set forth by the National Malaria Control Program. In 2019, APEs were responsible for identifying 10% of malaria cases.[2]

At the time of this review, several documents were under development. In 2020, the Global Fund sponsored the development of a plan that aligned all community health indicators, including malaria indicators. There are early indications that the government has renewed interest in supporting digital tool advancement with specific focus on tools that will assist in efforts to understand and reduce the malaria burden.[7] The *National Malaria Strategic Plan* included plans to investigate the use of digital tools in 2018 and implement recommendations in 2019; the status of this work is unknown.[9] Due to COVID-19, there is heightened interest in malaria surveillance and COVID-19 outbreak tracking.

GOVERNANCE Policies define digital health and health data governance roles, responsibilities, and structures.	The Instituto Nacional do Governo Eletrónico (National e-Government Institute) within the Ministério de Ciência e Tecnologia (Ministry of Science and Technology) revised the *Informatics Policy of 2000* in the form of three documents: *A Política para a Sociedade de Informação* (*Information Society Policy*) outlines general goals for information technology in all sectors in Mozambique.[9] O Plano Estratégico para a Sociedade de Informação (*Strategic Plan for the Information Society 2019–2028*) provides specific indicators for each year for the goals outlined in the *Information Society Policy*.[8] Finally, *O Plano Operacional para a Sociedade de Informação* (*Operational Plan for the Information Society*) covers the same information as the *Strategic Plan* but includes a timeline for all of the activities proposed.[5] The health activities outlined in the *Strategic Plan* include building a monitoring and evaluation plan, implementing platforms for communication, each patient receiving a unique identifier, developing a health center management system and a pharmaceutical management system, forming a digital health policy, and establishing a local network in health centers.[16] The three policies do not outline the responsible ministries and departments.
DATA MANAGEMENT Policies provide specifications for data access, privacy, security, and confidentiality and outline stipulations for data sharing.	While no digital health strategies are in place currently, there are two information technology laws that also apply to digital health: Política de Difusão da Informação Estatística (Statistical Information Dissemination Policy) includes information on data sharing.[9] This is supplemented by Lei de Transacções Eletrónicas (Electronic Transactions Law), which covers "the protection and utilization of information technology," as well as any electronic transactions, including the transfer of information via digital tools.[9] Together, these laws cover data management in general, but do not include specific plans for the health sector. The two digital health strategies that are being developed, mentioned above, may contain specific data management information.
STANDARDS AND INTEROPERABILITY Policies describe an enterprise architecture, normative standards—such as health information standards—and digital identity.	In 2017, the country developed the *Regulamento do Quadro de Interoperabilidade de Governo Electrónico* (*Regulation of the e-Government Interoperability Framework*). The *Regulation* was established to guide data sharing and use between "infrastructure, information technology, and information systems of public institutions."[9] In addition, the *Information Society Policy* outlines interoperability and security of digital systems.[17] The *Regulation* is general; similar to other policies listed in this section, it does not specifically cover the health system.
INFRASTRUCTURE Policies define data hosting and storage (e.g., local or cloud), mobile device management, and telecommunications access.	The two digital health plans being drafted by the Departamento de Informação para a Saúde (Department of Health Information) may contain information related to infrastructure for health. While there is no digital health strategy, the *Strategic Plan for the Information Society 2019–2028* includes plans for all government agencies; for instance, one of the objectives is that 100% of data from public institutions should be stored in government data centers, and the average bandwidth of the Rede Eletrónica do Governo, or GovNet (Electronic Government Network) will be at least 64 Mbps.[17]
WORKFORCE Policies describe workforce job structures and descriptions, plans for training, digital literacy expectations, and incentives for digital adoption.	The *Strategic Plan for the Information Society 2019–2028* calls for the development of training programs for public workers in information technology that target both basic and advanced users.[18] This plan also recommends that the government create a free program to increase the digital literacy of the general population. The plan does not specifically mention training health professionals in digital tools, though the Ministry of Health may have a human resources document that covers this material.

Systems

Data Flow

Paper-based reporting
The APE program uses paper-based reporting for the entire country.[14] APEs report data monthly to their supervisor, who fills out a form called Form A (Ficha A) and sends it to the district Direcção de Saúde, Mulher e Acção Social Health, Women, and Social Action Directorate).[7,15] Form A lists data such as the numbers of families the APE visited, people that received health promotion interventions, rapid diagnostic tests conducted, treatments administered for malaria, and referrals to the health center, broken down by reason for referral.[10] Supervisors at the nearest health facility meet with APEs on a monthly basis to review register books, distribute new commodity kits, provide feedback on performance, and provide technical support. Supervisors also make periodic supervisory visits to APEs in their communities every few months.

The District Health, Women, and Social Action Directorate is responsible for transferring data into the Sistema de Informação de Saúde para Monitoria e Avaliação (SIS-MA; Health Information System for Monitoring and Evaluation), Mozambique's electronic DHIS2 platform. All districts, as well as some health facilities, have access to SIS-MA. There are two levels of data quality assurance: The first occurs before data are entered into SIS-MA at the Serviços Distrital de Saúde, Mulher e Acção Social (District Services for Health, Women's Affairs, and Social Action) office. The second is at the national level, in the DHIS2 World Health Organization Data Quality Assessment application within SIS-MA that assists with the data validation process and detects errors in the data.[7]

In a 2018 assessment, CHWs turned in 42% of reports by the deadline and with 95% of the mandatory portions of the report completed.[19] In addition, health facilities turned in reports with 98% of required sections completed and 90% of districts completed SIS-MA reports on time.[19] However, according to the National Malaria Control Program's *Mid-Term Review of the Malaria Strategic Plan (2017–2022)*, surveillance system assessments found that data accuracy remains a challenge.[19]

Digital reporting
In the same 2018 assessment, CHWs who reported that they used digital tools also continue to report through a paper-based system.[14,19] Using smartphones, CHWs enter community information into the upSCALE application, then their supervisor uses an application on a tablet provided by the upSCALE project to analyze data and make corrections.[7] Once the data are entered into CommCare, automatic routines allow for upload.**Error! Bookmark not defined.** upSCALE collects the same indicators that are on Form A—the form used for paper-based reporting.[7] Currently, upSCALE data are stored on the cloud, though there is a plan to purchase a server and migrate all the APE data to the MISAU data center in a format interoperable with DHIS2.[13] The APE program at the Malaria Consortium has access to the upSCALE cloud-based warehouse and to SIS-MA.[7] upSCALE is not interoperating with SIS-MA, since data are entered manually into both platforms, but there are plans to make these interoperable.[11,13,20]

In the future, CHW data will be sent to the MISAU community health information system (CHIS).[7] The CHIS module has not been expanded outside of leprosy. Leprosy supervisors are entering data into DHIS2 Tracker, which flows directly into CHIS. The intention is to expand this to other programs so that other data can flow into CHIS. The Department of Health Information is responsible for larger integration efforts. CHIS is based on DHIS2 and is within the SIS-MA environment.[13]

SIS-MA only collects two malaria indicators,[8] so the National Malaria Control Program uses the Integrated Malaria Information Storage System (iMISS), another national database. It collects additional indicators on cases and testing, entomology, vector-control interventions, surveys, indoor residual spraying, and all other available malaria data.[7] It is built on DHIS2 and is able to upload data from SIS-MA. This system is now available at the district level and in select health facilities.[19]
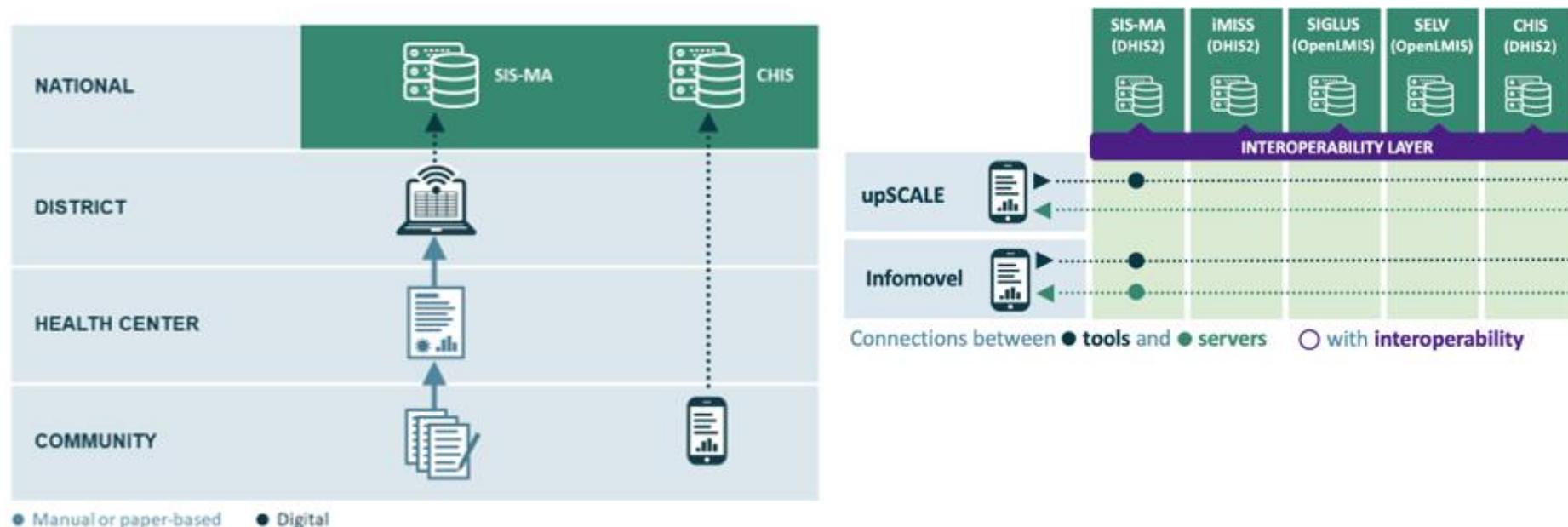
Digitally enabling infrastructure

One strength of the landscape is the National e-Government Institute's *Information Society Policy*, developed in 2018, which states that digitization is increasing in almost all sectors, including health, education, and agriculture.[18] The document calls for increased information technology education in schools (adding information technology to curricula and providing equipment), development of more research and learning resources (i.e., creating a national e-learning site for public administrators), as

Connectivity	Bandwidth	Electricity
72% of country[21]	**9.16** kb/s in areas with connectivity[22]	**4.9%** of rural areas[23] **72.5%** of urban areas[24]

well as training for human resources and for citizens (using digital tools for communication). The document also states that enterprise architecture exists and should be used and adopted by government institutions. For instance, the government has already set up data centers to be used by ministries to host digital solutions. In addition, the COVID-19 pandemic has led institutions in Mozambique to institute teleworking and adopt e-learning platforms.**Error! Bookmark not defined.** Major cell phone operators are Vodacom, MCel, and Movitel. As of 2020, 50 % of the population had mobile connections. The major barrier is that access to the Internet is low, at 21% nationally[3]9/14/2021 4:24:00 AM and ranging from 2% in Zambézia to 34% in Maputo City Province. Access to electricity has improved from 24% in 2015 to 28% in 2018, though it varies widely in terms of rural (10%) or urban (69%) location.[25] Access to the Internet may be a challenge in terms of the implementation of digital tool. However, the government has been encouraging organizations and institutions to improve infrastructure in order to carry out routine activities during the pandemic; CHWs will also benefit from that advocacy.**Error! Bookmark not defined.** To improve Internet access, the Instituto Nacional de Communicões INC National Institute of Communications supported 73 "digital squares," which are areas with free Wi-Fi, in districts spread across seven provinces.[5]
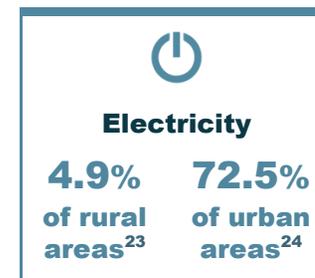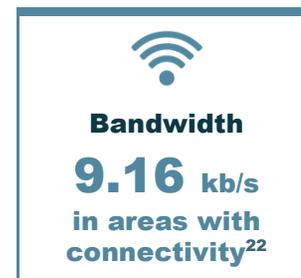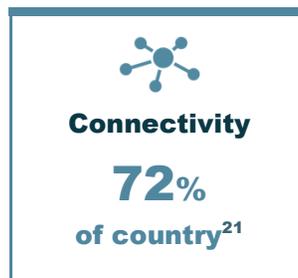
Digital health tools in use and functionality

upSCALE, built on CommCare, is one of the main tools being used for malaria case management in the country. It has been implemented in six provinces, and there were plans to scale up in 2021.[20] The Malaria Consortium provides the mobile devices for the tool. The phones are physically durable and can last up to two years. One notable challenge was battery life, but the Malaria Consortium now provides power banks in addition to the mobile device to address this issue. DHIS2 Tracker is used for malaria case management at the health facility level.[7] Other applications in use include Infomovel, which is used to track HIV patients; Health Network Quality Improvement System (HNQIS), used in health facilities to improve the quality of the health system; and U-Report, used for communicating health risks to the public.

Some of the tools are interoperable with some of the national data systems, including DHIS2 Tracker and U-Report. There is a DHIS2 instance, which Malaria Consortium supports, that syncs data from DHIS2 into their database.**Error! Bookmark not defined.** It is expected that, in the future, the national APE program will have a local server that will store all the data.[13] Regarding national data systems, iMISS (malaria indicators data platform) is interoperable with SIS-MA and pulls from SIS-MA data.[7] The Sistema de Informação de Gestão Logística das Unidades Sanitárias (SIGLUS) (stock platform) data are automatically sent to SIS-MA.[7] MISAU, with support from Saudigitus and the University of Oslo, is also developing an interoperability layer to allow mortality data collected by SIS-MA to be accessed by e-RCEV the electronic system of Civil Registration and Vital Statistics (Registo Civil e Estatísticas Vitais)), an electronic system of the Direcção Nacional dos Registos e Notariado DNRN National Office of Notary and Registration.[7] Other interoperability layers send data automatically from Sistema Electronica de Logistica de Vacinas (SELV), an OpenLMIS system, to SIS-MA.

USE CASE(S)	upSCALE	Infomovel
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; EPI, Expanded Programme on Immunization; LLIN, long-lasting insecticidal net.

CASE MANAGEMENT FUNCTIONALITIES	upSCALE	Infomovel
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 health management information system Tool sends information to the official national health information system	■	■
Offline capability Tool functions, at least partially, offline	■	■

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

MANAGEMENT & SUPERVISION FUNCTIONALITIES	upSCALE	Infomovel
CHW identification Tool uniquely identifies CHWs	▪	▪
CHW facility catchment location Tool identifies CHWs' 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	▪	▪
Communication Tool allows two-way communication between peer groups, associated health facilities, or supervisors	☐	▪

■ = Current use   ▪ = Possible, but functionality not currently in use   ☐ = Does not meet use case

Abbreviations: CHW, community health worker.

Appendices

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Abbreviations

APE	Agentes Polivalentes Elementares (Elementary Multipurpose Agents)
CHIS	community health information system
CHW	community health worker
DHIS2	District Health Information Software 2
HNQIS	Health Network Quality Improvement System
iMISS	integrated Malaria Information Storage System
MISAU	Ministério da Saúde (Ministry of Health)
SELV	Sistema Electrónico de Logística de Vacinas
SIGLUS	Sistema de Informação de Gestão Logística das Unidades Sanitárias
SIS-MA	Sistema de Informação de Saúde para Monitoria e Avaliação
SWAP	Sector Wide Approach
UNICEF	United Nations Children's Fund

Contributors

Informant Name	Organization
Baltazar Candrinho	Programa Nacional de Controlo da Malária, Ministério da Saúde
Rita Chico	Clinton Health Access Initiative
Helder Macul	Ministério da Saúde
Emilio Mosse	Saudigitus
Helio Penicela	United States Agency for International Development
Joaquim Rebelo	Malaria Consortium
Humberto Rodrigues	Ministério da Saúde
Pankti Shah	Everwell Hub
Flávio Wate	United States Agency for International Development/United States President's Malaria Initiative
Edson Zandamela	Malaria Consortium

Community digital health tools*

Name of Tool	Type of Digital Health Intervention†	Implementer (Funder)	Scale	Malaria Use Case
upSCALE	**1.1** Targeted client communication **1.3** Client to client communication **1.4** Personal health tracking **1.5** Citizen based reporting **1.6** On demand information services to clients **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 **2.10** Laboratory and diagnostics imaging management **3.1** Human resource management **3.2** Supply chain management **3.3** Public health event notification **3.4** Civil registration and vital statistics (CRVS) **3.7** Facility management **4.1** Data collection, management, and use **4.3** Location mapping **4.4** Data exchange and interoperability	Malaria Consortium Programa Nacional dos Agentes Polivalentes Elementares Inhambane Provincial Health Authority Cabo Delgado Provincial Health Authority MISAU London School of Hygiene & Tropical Medicine University College London Institute for Global Health Dimagi Malaria Consortium UNICEF (UNICEF, United Kingdom FCDO, USAID-Nutrition)	Inhambane, Cabo Delgado, Zambézia, and Nampula	Malaria case management Malaria screening with referral Routine long-lasting insecticidal net distribution during antenatal care or Expanded Programme on Immunization visits Intermittent preventative therapy in pregnancy Malaria active or reactive case detection (visiting communities to find additional cases) Communication/messaging to community on malaria Training of health workers

Name of Tool	Type of Digital Health Intervention†	Implementer (Funder)	Scale	Malaria Use Case
Infomovel	**2.1** Client identification and registration **2.2** Client health records **2.3** Healthcare provider decision support **2.5** Healthcare provider communication **2.6** Referral coordination **2.7** Scheduling and activity planning for healthcare providers **2.8** Healthcare provider training **3.1** Human resource management **4.1** Data collection, management, and use **4.2** Data coding **4.4** Data exchange and interoperability	FGH, Ariel, EGPAF, CCS, ICAP (CDC, many others)	National	Not used for malaria
DHIS2 Tracker	**1.1** Targeted client communication **1.2** Untargeted client communication **1.4** Personal health tracking **2.1** Client identification and registration **2.2** Client health records **2.3** Healthcare provider decision support **2.5** Healthcare provider communication **2.6** Referral coordination **2.7** Health worker activity planning and scheduling **2.9** Prescription and medication management **2.10** Laboratory diagnostics and imaging Management **3.2** Supply chain management **3.4** Civil registration and vital statistic **3.5** Health financing **3.6** Equipment and asset management **3.7** Facility management **4.1** Data collection, management and use **4.2** Data coding **4.3** Location mapping **4.4** Data exchange and interoperability	MISAU, CHAI, Saudigitus (Global Fund, Bill & Melinda Gates Foundation, USAID, World Bank)	National	Malaria case management Malaria screening with referral Routine long-lasting insecticidal net distribution during antenatal care or Expanded Programme on Immunization visits Malaria active or reactive case detection (visiting communities to find additional cases)

Name of Tool	Type of Digital Health Intervention[†]	Implementer (Funder)	Scale	Malaria Use Case
U-Report	**1.1** Targeted client communication **1.2** Untargeted client communication **1.5** Citizen based reporting	(UNICEF)	National	Not used for malaria
mNutrition		(DFID)	National	Not used for malaria
HNQIS	**2.3** Healthcare provider decision support **2.8** Healthcare provider training	PSI (DFID, USAID)	Maputo, Gaza, Inhambane, Sofala, and Nampula	Malaria case management Intermittent preventative therapy in pregnancy
National Health System Platform	**3.1** Human resource management **3.2** Supply chain management **3.3** Public health event notification **3.5** Health financing **3.7** Facility management **4.1** Data collection, management, and use **4.2** Data coding **4.3** Location mapping **4.4** Data exchange and interoperability	Zenysis, Direcção de Planificação e Cooperação, Departamento de Informação para a Saúde, Direcção Nacional de Saúde Pública, Expanded Programme on Immunization (Global Fund; Gavi)	National	Not used for malaria
mVaccination		Mezzanine (Vodafone, GSK, USAID, Gavi, UNICEF, Amref)		Not used for malaria

*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.

Next-generation digital health tool functionalities for malaria case management

CASE MANAGEMENT FUNCTIONALITIES	upSCALE	Infomovel
Notifications Tool sends and receives notifications	◻	◻
Stock reporting & analytics Tool collects stock data and has analytic functions to support stock and logistics data analysis and decision-making	■	◻
Interoperability with other national health systems Tool sends information to other national systems (iHRIS, LMIS, etc.)	◻	◻
Referral coordination Tool allows CHW to notify local health facility of referrals and track them	■	■
Scheduling & work planning Tool allows CHW to plan and schedule key activities in the community	■	■

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

MANAGEMENT & SUPERVISION FUNCTIONALITIES	upSCALE	Infomovel
Decision support Tool provides algorithms or checklists to guide CHW service provision	■	■
Training materials & resources Tool provides access to training materials, policies, or other useful reference documents	■	■
CHW geolocation Tool allows collection or use of CHW geolocation data for monitoring and planning distribution	■	◻
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