ANGOLA

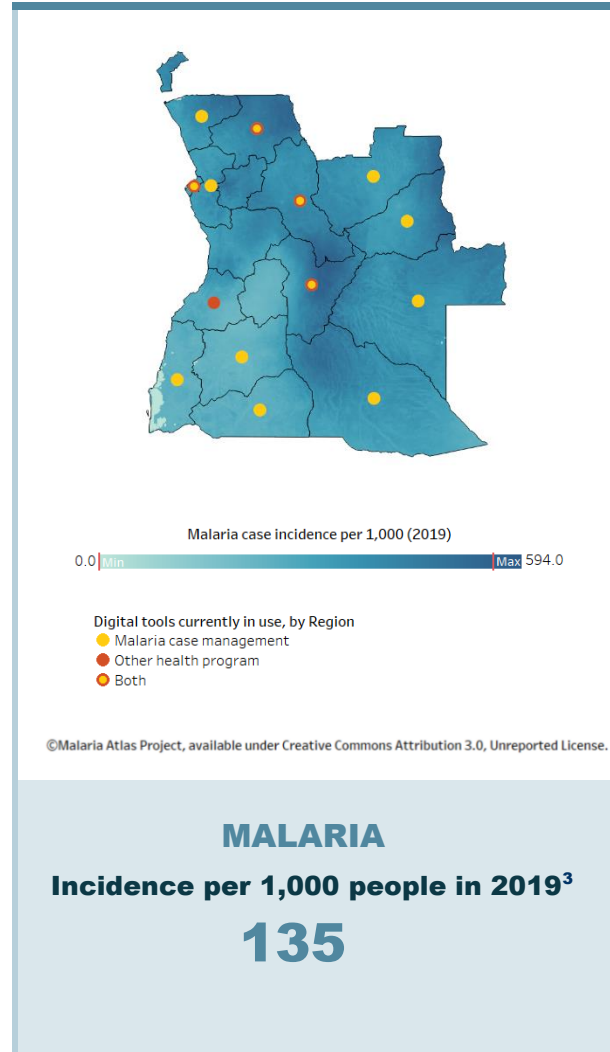## Executive Summary

Angola has a high malaria burden, with more than seven million cases reported in 2019.[1] The burden has been historically highest in the northeastern provinces; however, demographic and health surveys data indicate there may have been a provincial shift in malaria endemicity with increased transmission in central and southern provinces.[2]

The Community Health and Development Agents (*Agentes de Desenvolvimento Comunitário e Sanitário;* ADECOS) program was established in 2016. It has garnered significant government support and aims to expand in size and coverage from 2,682 to 14,100 agents if funding can be secured. ADECOS conduct malaria prevention communication, perform rapid diagnostic tests, and treat uncomplicated malaria. ADECOS also support community initiatives such as girls' education, access to social services, and agricultural development.

The National Development Plan 2018–2022 indicated that digitalization of community-level data should be a key focus area focus for the Angolan Ministry of Health (*Ministério da Saúde de Angola*; MINSA). Currently, ADECOS primarily collect data through paper reporting, though have begun collecting digital data through KoboCollect or Sistema Comunitário de Saúde. These platforms have not been rolled out cohesively due to limited digital governance. To advance digital solutions in Angola, the government and stakeholders need to

Malaria case incidence per 1,000 (2019)

0.0 | Min ———————— | Max 594.0

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[3]
135

PEOPLE
Community Health and Development Agents (ADECOS)

2,682[4]
0.9 per 10,000 people

GOVERNANCE
National Digital Health Strategy

NO

SYSTEMS
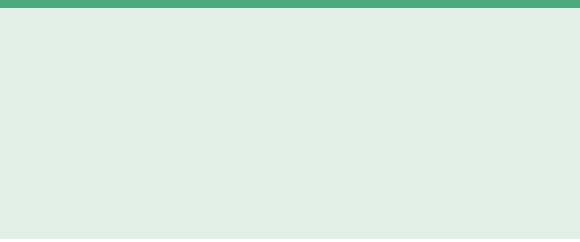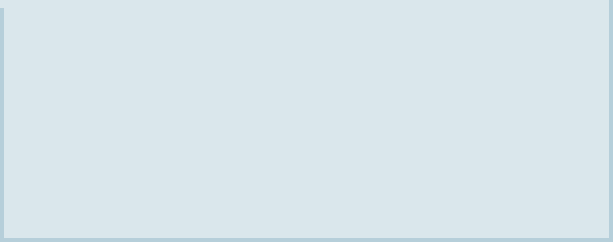**Digital Health Index[5]**

SCORE: 1

evaluate the current governance structure and identify areas for improvement.

Recommended Actions

PEOPLE
Community health workers and other decision-makers

Support the expansion of the Community Health and Development Agents (ADECOS) program
Support MINSA and Ministry of Territorial Administration (*Ministério da Administração do Território;* MAT) to secure funding to expand the number of ADECOS from 2,682 to 14,100 and facilitate the inclusion of digital tools in planning for this expansion. This is particularly important given that the ratio of health workers in Angola is 0.09 per 1,000 people, far lower than what the World Health Organization has advised (2.5 per 1,000).[6]

Evaluate current ADECOS training modules and provide recommendations
In coordination with MINSA, review and provide input on a one-month ADECOS training and associated tools provided by MAT. Review trainings to ensure the use of digital tools.

Evaluate malaria data used at each level of the health system
Conduct an assessment to examine how community data are used at every level of the health system. This assessment will also investigate data flows and where ADECOS fit into the broader health system. Data is used regularly at the national level, but data use for

GOVERNANCE
Strategies and policies

Support MINSA in conducting a workshop to relaunch the ADECOS technical working groups (TWGs)
An ADECOS TWG was established to improve ADECOS policy. This group met regularly in the early development phase, but participation has since declined for a myriad of reasons including COVID-19. To strengthen the ADECOS TWG, a workshop is needed to understand the TWG structures and efficiencies, and propose solutions that will help improve participation and streamline TWGs.

Support the creation of a single digital health roadmap
The roadmap will assist in connecting all government entities (MINSA, MAT, and the Digital Health TWG (*Gabinete Tecnologias de Informação; Gabinete de Estudos, Planeamento e Estatística;* and partners)) involved in digital health and outline roles and responsibilities of each organization and TWG as well as ensure alignment on malaria, community health, and digital health policies.

Support development of a mobile device management plan
The current National Policy for Community Health and Development Agents does not detail necessary components of a digital health program, including installation, maintenance, and interoperability. During a site visit, the

SYSTEMS
Processes and digital tools

Support the creation of an enterprise architecture process
There are multiple digital tools and databases in Angola with little interoperability. Create an enterprise architecture process for DHIS2, which would detail tools that can be useful within the national system. This document should emphasize interoperability with Sistema Comunitário de Saúde (MINSA's preferred tool) and DHIS2.

Support development of an interoperability layer, and ensure clear guidance around health data governance
Standard operating procedures and guidelines exist for some of these platforms, but challenges remain in implementation and interoperability. MINSA, UNICEF, and World Vision are working with Saudigitus, the University of Oslo's Lusophone partner, to develop an interoperability layer to share data between KoboCollect and DHIS2. Support the implementation and expansion of this process to include other data systems.

Advocate for context appropriate tools that can be used in places with low electricity and internet connectivity
In some provinces, there are issues with connectivity and electricity. There is a need to advocate for the use of solar panels, satellite

decision making at the sub-national level is unclear.

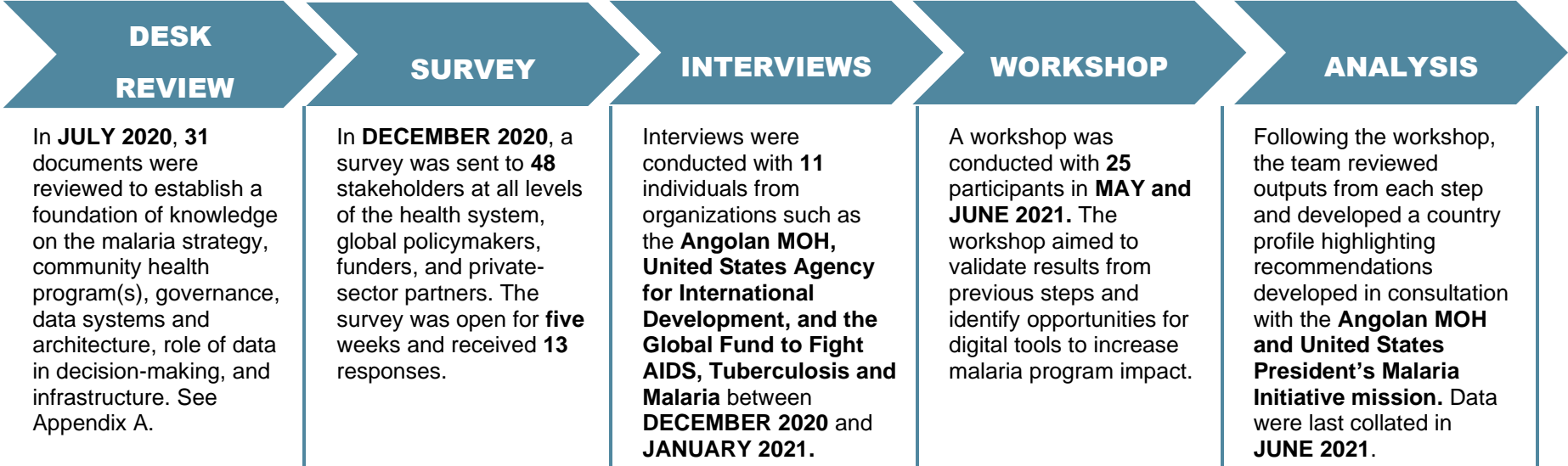**Support MINSA to strengthen digital tool adoption and sustainability**

Support MINSA in developing content for MINSA personnel trainings on general information technology topics, digital troubleshooting, and tools deployed at the community level, with the goal of strengthening capacity for data-based decision making and long-term tool and software maintenance.

Elimination Eight Initiative found that digital tool maintenance capacity was low, mobile phones were either not charged enough, damaged, or lost altogether. Collaborate with the ADECOS TWG to create specifications for devices in the National Policy for Community Health and Development Agents policy, including specifications on what brand to use in various contexts, maintenance, and how often to replace devices.

phones, and low-battery phones to facilitate use of digital platforms.

Methodology

A desk review, survey, and key informant interviews were conducted to develop this profile. Findings from these activities were validated during a workshop and used to develop the recommendations. Documents reviewed in the desk review are listed in Appendix A, and interview/workshop participants are listed in Appendix C.

DESK REVIEW	SURVEY	INTERVIEWS	WORKSHOP	ANALYSIS
In **JULY 2020**, **31** 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 **DECEMBER 2020**, a survey was sent to **48** stakeholders at all levels of the health system, global policymakers, funders, and private-sector partners. The survey was open for **five** weeks and received **13** responses.	Interviews were conducted with **11** individuals from organizations such as the **Angolan MOH, United States Agency for International Development, and the Global Fund to Fight AIDS, Tuberculosis and Malaria** between **DECEMBER 2020** and **JANUARY 2021.**	A workshop was conducted with **25** participants in **MAY and 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 **Angolan MOH and United States President's Malaria Initiative mission.** Data were last collated in **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 community health workers' (CHWs) 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

The ADECOS program (established in 2016[7]) model is distinct from other countries' CHW programs in that it is a joint initiative between MAT, through the Social Support Fund (*Fundo de Apoio Social*) and MINSA.[3] The ADECOS program is in the pilot phase, with 2,682 ADECOS currently. MINSA desires to have 14,100 ADECOS if funding can be secured.[8]

ADECOS affiliated with World Vision and Population Services International (PSI) provide community malaria prevention lectures, perform rapid diagnostic tests, and treat uncomplicated malaria for children under five years of age; they refer severe cases to the nearest health facility. Additionally, Elimination Eight Initiative–affiliated ADECOS provide community malaria prevention lectures, perform rapid diagnostic tests, and treat uncomplicated malaria (and other febrile symptoms) for all ages, except pregnant women, in three provinces: Cuando Cubango, Cunene, and Namibe.[9–11]

ADECOS primarily provide malaria services, but they are also community development agents in promoting the education of girls, securing social services for minors, and helping with agricultural development.[11] ADECOS' priorities may vary based on their organizational affiliation. Due to the COVID-19 pandemic, ADECOS are now prepared to address malaria and COVID-19 simultaneously.[11]

2,682 Community health workers in the country[4]	**Compensation Policy:** **PAID** Paid by government
1,185 Providing malaria community case management[4]	**Compensation Policy:** **PAID** Paid by government

To become ADECOS, individuals must live within the community in which they will work, be literate, complete 12 years of schooling, and be at least 18 years old. ADECOS are considered public-sector workers. MINSA provides the resources for training and supervision so that the program will be sustainable.[11] The National Strategic Plan for Malaria Control in Angola 2021–2025 (*Plano Estratégico Nacional de Controlo da Malária em Angola 2021–2025*) recommends that MINSA negotiate with MAT to expand ADECOS to municipalities that lack access to health services rather than just those with high disease burden.[12] The Social Support Fund pays ADECOS a stipend of 35,370 Angolan kwanza per month (about $50 US dollars), though often there are delays in payment.[13]As a result, some municipalities in the provinces of Cuando Cubango, Cunene, and Malanje pay ADECOS' stipends up front and receive a Social Support Fund reimbursement.[14]

Community health worker digital readiness

Key informants who were interviewed for this profile had various perceptions of community health workers' digital literacy, but they tended to perceive community health workers to have limited digital readiness. Some indicated that ADECOS have a low level of digital literacy.[15] Others mentioned that ADECOS are relatively young and have the ability to learn digital tools quickly.[7]

MAT provides ADECOS a one-month training covering all activity areas, as well as refresher training as offered by management. The one-month training is split evenly between malaria and community health. Digital tool training is likely not emphasized because ADECOS consistently use paper-based data

collection methods. One of the challenges is that the ADECOS need to have a certain level of digital literacy to use phones.[11] In many interviews, key informants suggested training and capacity building of ADECOS and supervisors as mitigating solutions.

Currently, most information technology expertise is housed in global community-based organizations such as PSI and World Vision.[15] World Vision and PSI provide ADECOS with Android 6.0 devices as well as training on how to use, maintain, charge, and enter data into the phone. When the Elimination Eight Initiative conducted site visits in 2020, they found that some ADECOS had not charged the battery enough and some phones had been broken, lost, or taken by the ADECOS' family. Stakeholders also noted that ADECOS have limited access to communication technology such as phones and Internet. Stakeholders suggested three areas of focus to address these challenges: training, access to communication technology, and policy enforcement.

Data-driven decisions at each level of health system

Data are collected and used at the national level for programming, resource deployment, and malaria situational awareness. At the subnational level, the key decision-makers are municipal administrators and provincial governors. The supervisors at the municipal level use ADECOS data to ensure data accuracy, verify commodity stock against data records, and give feedback. These same data are available at the sub-municipal level where the provincial supervisors use the information for planning and decision-making at the provincial level. More information is needed about how data are being used at and below the provincial level in decision-making.[12] At the community level, when there is a large increase in malaria cases in an ADECOS area, the supervisors ask the ADECOS to conduct community mobilization activities, including demonstrations and lectures, to increase drug adherence, net use, and other mitigation measures.

NATIONAL LEVEL	The Angolan Ministry of Health (MINSA) uses community data to understand ADECOS' detection and management of malaria, including the total number of cases of malaria in the province/municipality that are detected and treated by ADECOS. This allows calculations of the number of people who would have been too far from a health center to receive services if not for the ADECOS.[7] ADECOS' data are also used to understand commodity needs.[11] MINSA analyzes and produces monthly reports to aid in decision-making at the various levels of the health system.[16] These reports often include a section on ongoing ADECOS activities. Within the National Strategic Plan for Malaria Control in Angola 2021–2025, the National Malaria Control Program has identified the ADECOS program as a critical component of expanding health care coverage, strengthening data collection and reporting in District Health Information Software 2 (DHIS2), and subsequent decision-making.[17] Canopy Discover is a data management dashboard used for malaria case management and intermittent preventative therapy in pregnancy data.
PROVINCIAL LEVEL	The provincial level of the health system has access to KoboCollect, DHIS2, and Health Network Quality Improvement System data. Provincial-level decision-makers use data for decision-making.[11] At the provincial level, there is an intermunicipal meeting every trimester. Provincial centers that have ADECOS come to the meeting to present difficulties and listen to a presentation about the status of indicators—for instance, testing, patient referral, and management of commodities.[18]
MUNICIPAL LEVEL	The municipal level of the health system primarily receives data through monthly malaria reports. Stakeholders who were interviewed for this profile indicated that the municipal level may have access to KoboCollect, DHIS2, and Health Network Quality Improvement System data, but access varies across municipalities. The stakeholders did not provide information regarding use of these data for programmatic decision-making. Aggregated case data as well as stock data are used for developing, implementing, and supervising health plans. However, limited communication between municipal-level decision-makers and MINSA at the national level constrains the ability to make decisions at the local level based on these data, except for community mobilization activities.[19] MINSA is working on strengthening data use by recommending steps the municipal level can take immediately should they see a surge in malaria cases and stockouts of key commodities.[11] In municipalities where PSI is implementing the United States Government–funded project Health for All, there is a monthly meeting at the municipal center to present the work completed during the month. Supervisors, representatives from the provincial office, and the Municipal Health Director are all invited.[18]
HEALTH FACILITY LEVEL	The information collected for this profile yielded limited information regarding how data are used for decision-making at the health facility level. Stakeholders noted that each health facility employs a statistician who collates and shares data with the Municipal Health Public Directorate statistics manager.
COMMUNITY LEVEL	Data collected from the community are sent to the National Malaria Control Program and MINSA through DHIS2. The focus has mainly been on reporting rather than using the data for decision making. Additionally, reports are generated only at the national level; they are not widely used at lower levels to improve health within villages.[20]

Governance

	DIGITAL	COMMUNITY HEALTH	MALARIA
Name	Health Information System Strategic Plan (*Plano Estratégico do Sistema Informática da Saúde*) and DHIS2 Roadmap	National Policy for Community Health and Development Agents "ADECOS" (*Politica Nacional de Agentes de Desenvolvimento Comunitário e Sanitário "ADECOS"*)	National Strategic Plan for Malaria Control in Angola 2021–2025 (*Plano Estratégico Nacional de Controlo da Malária em Angola 2021–2025*)
Current strategy dates	Expired; new draft currently in development	Does not list specific dates	2021–2025
Coordinating body	Ministry of Telecommunications, Information Technology and Social Communication (*Ministério das Telecomunicações, Tecnologias de Informação e Comunicação Social*)	Ministry of Territorial Administration (*Ministério da Administração do Território) and Ministry of Health (Ministério da Saúde*)	National Malaria Control Program, Ministry of Health
Funding strategy	Yes	Yes	Yes

Through the National Development Plan 2018–2022, the Government of Angola has proposed broad and ambitious goals to expand the reach of ADECOS and use District Health Information Software 2 (DHIS2) platforms in the country. One of the goals is that by 2022, 95 percent of the country's municipalities will have access to the integrated disease surveillance system, which will be integrated into DHIS2.[20] To support this goal, MINSA has refined the ADECOS' position. The ADECOS Policy outlines ADECOS' job qualification requirements and responsibilities. It also describes data collection systems, including the data flow into the national DHIS2 and the use of smartphones to capture household geolocations. The *ADECOS Policy* does not delve into how digital tools will be deployed, but through key contributor conversations, this document will discuss how the data will be shared between the ministries involved in the ADECOS program.[21] The ADECOS program is further supported by an ADECOS technical working group that meets on an ad hoc basis and discusses challenges and solutions for all ADECOS.

The Health Information System Strategic Plan expired, and another version has been developed. At the time of this report, the Studies, Planning, and Statistics Office (*Gabinete de Estudos, Planeamento e Estatística*) was not able to make the new version available for external viewing. Based on knowledge of the past document and key informant interviews, the latest version is likely to detail insights on priorities for the next five years as well as ADECOS' malaria surveillance activities and digital health for all health areas. In 2017, the *Gabinete de Estudos, Planeamento e Estatística* developed a DHIS2 roadmap in coordination with PSI. It is unclear how these documents might address enterprise architecture, interoperability, data storage and privacy, and access.

The National Strategic Plan for Malaria Control in Angola 2021–2025 focuses on four components of malaria prevention: insecticide-treated bed nets, prevention of malaria in pregnancy, indoor residual spraying, and larvicide. In addition, ADECOS are central to case management efforts and progress toward 2030 elimination. Surveillance through digital tools remains a continued priority for the National Malaria Control Program.

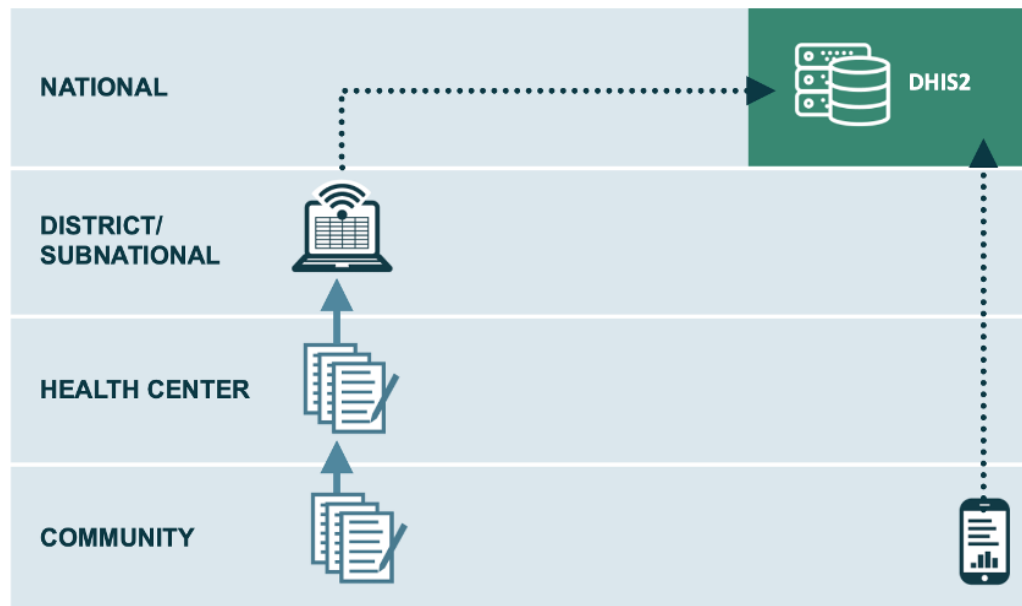|	
GOVERNANCE Policies define digital health and health data governance roles, responsibilities, and structures.	The Ministry of Telecommunications, Information Technology and Social Communication (*Ministério das Telecomunicações, Tecnologias de Informação e Comunicação Social*) is responsible for coordinating activities in the information technology domain.[21] As part of this duty, it is responsible for creating policy documents that regulate the adoption and use of digital infrastructure in the country.[21] For digital health, the Office of Information and Communications Technology in the Ministry of Health was tasked with writing the Health Information System Strategic Plan (*Plano Estratégico do Sistema Informática da Saúde*).[21]
DATA MANAGEMENT Policies provide specifications for data access, privacy, security, and confidentiality and outline stipulations for data sharing.	The Government of the Republic of Angola, through the Ministry of Telecommunications, Information Technology and Social Communication, developed the *Law for the* Protection of Computer Networks and Systems (*Lei de Protecção das Redes e Sistemas Informáticos*).[22] This document includes a section on Methods for Publicly Accessible Cyberspace Protection Measures (*Medidas de Protecção do Ciberespaço Acessíveis ao Público*)[22] and guidelines for cyberspace security and information technology systems. Within the information technology systems guidelines, there are sections on security in information society systems, informatics infrastructure, internet security, an information technology emergency, a security emergency, and management of information technology incidents. Angola has a Personal Data Protection Law, which was drafted in 2011,[7] and a National Statistics System Law.[7] The enactment of both of these laws created foundational standards for the protection of health data.
STANDARDS AND INTEROPERABILITY Policies describe an enterprise architecture, normative standards—such as health information standards—and digital identity.	*The National Plan for the Global Interoperability Architecture of Central and Local State Administration* (*Plano Nacional da Arquitectura Global de Interoperabilidade da Administração Central e Local do Estado*) is a set of guiding principles, rules, and common norms that can be applied to the exchange information between public organizations and other sectors.[23] *The National Plan of Global Architecture (Plano Nacional da Arquitectura Global)* outlines the Governmental Interoperability Framework as well as the National Enterprise Architecture (*Plano Nacional da Arquitectura Global*).[23]
INFRASTRUCTURE Policies define data hosting and storage (e.g., local or cloud), mobile device management, and telecommunications access.	The National Institute for the Promotion of the Information Society (*Instituto Nacional de Fomento da Sociedade da Informação*) provides cloud services to government organizations and is responsible for interoperability norms (*Projeto de Governo*). In 2014, the Government of Angola created the Communication and Electronic Infrastructure Sharing Law Regulation (*Regulamento de Partilha de Infraestruturas de Comunicações Electrónicas*), which encourages organizations to create synergies to share their resources. The Government of Angola has set up a government data center that is available to all public organizations to host their data.[21]
WORKFORCE Policies describe workforce job structures and descriptions, plans for training, digital literacy expectations, and incentives for digital adoption.	The ADECOS Policy outlines what ADECOS are, the qualifications required for their position, and their responsibilities, as well as data flow into the national District Health Information Software 2 (DHIS2) and smartphone use to register data for households for geolocation. At their orientation, ADECOS complete a one-month training program that covers all required tasks. Some managers provide additional refresher trainings, but this not enforced throughout all the cadres. Digital experience and literacy remain low among community health workers.

Systems

Data flow

The primary method of data reporting at the community level in Angola is through paper reports, and there are challenges with the timeliness of data reporting and lack of supplies (reporting booklets). It is not until the municipal level of the health system that data are widely available in a digital format. At this time, data feedback at the community level is limited. MINSA is leading efforts to digitalize data reporting using a DHIS2 mobile app called Sistema Comunitário; however, this system does not currently collect malaria data.

All ADECOS record data through the *Caderno da Familiar,* a paper booklet for each patient. This booklet contains many indicators, including but not limited to health data.[1] Malaria has its own section—Block I of the booklet.[18] Each month, ADECOS summarize information collected from each *Caderno da Familiar* and complete the paper-based monthly malaria report (*Ficha Resumo*). This report contains information on all health indicators as well as how many malaria cases are referred to health clinics. The monthly malaria report is then sent to the ADECOS' supervisor at the health center of reference. The director of the health center compiles the summaries and writes a regional report to the municipality level. A stand-alone section for ADECOS data is included in each regional report.[1] At the municipal level, data points are manually entered into Angola's national health management information system, the Sistema de Informação em Saúde,[7,21] a DHIS2-based platform that is managed by MINSA.[21]

Through the Sistema de Informação em Saúde, the data are accessible to municipal-, provincial-, and national-level health personnel.[21] These data are intended to be reviewed by municipalities on a day-to-day basis.[21] However, the actual access and frequency of review are unclear. Stakeholders interviewed for this profile suggested that each level (provincial, municipal, national) has varying access to the data, depending on their position in the health system.[9,24]

Having high-quality data is a priority of MINSA. Through health facility data quality audits, MINSA is deploying quality assurance checks in every level of the health system. Those who work at the health center are trained to check and verify ADECOS' data monthly. The supervisor confirms that the consumption of commodities lines up with the data that the ADECOS report. At the municipal level, a second review ensures that data are accurately attached to the health facility. In addition, the health facility reviews the ADECOS' data.[11]

In recent years, there has been an effort to streamline data at the national level, with the primary focus on the Sistema de Informação em Saúde. However, many other platforms have been developed to monitor malaria transmission in Angola. There are two additional platforms of significance that present malaria data—the National Malaria Control Program's Epidemiological Surveillance System and MINSA's Integrated Disease Surveillance and Response System. The process for collecting malaria data are consistent with those described above (paper booklets for all ADECOS); however, the purpose and ownership of the data vary. The Epidemiological Surveillance System pulls data from DHIS2. This system is primarily used to monitor four epidemic-prone provinces in the south—namely, Cuando Cubango, Cunene, Huila, and Namibe.[3,25] The Integrated Disease Surveillance and Response System also pulls data from DHIS2, but it covers all disease areas. A component of the Integrated Disease Surveillance and Response System is the Malaria Early Warning System, a vital registry data that alerts MINSA about outbreaks and excessive mortality.[26]
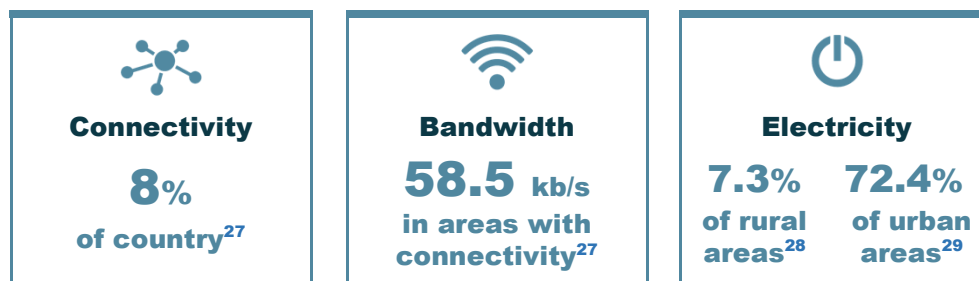
NATIONAL — DHIS2

DISTRICT/SUBNATIONAL

HEALTH CENTER

COMMUNITY

● Manual or paper-based   ● Digital

NHMIS (DHIS2) | **NMSS** | **CHIS** | **SIGLOFA (OpenLMIS)**

INTEROPERABILITY LAYER

KoboCollect

Sistema Comunitário

Connections between ● **tools** and ● **servers**   ○ with **interoperability**

Abbreviations: CHIS, Community Health Information System (DHIS2 Tracker); DHIS2, District Health Information Software 2; NHMIS, National Health Management Information System; NMSS, National Malaria Surveillance System; SIGLOFA, Sistema Informática de Gestão de Logística Farmacêutica de Angola.
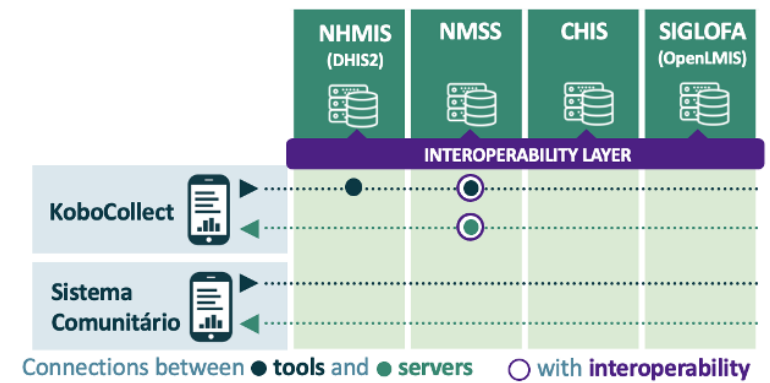
Digitally enabling infrastructure

The Government of Angola is laying the framework for rapid uptake of digital infrastructure. Policies such as the Law for Protection of Informatics Systems (*Lei de Protecção das Redes e Sistemas Informáticos*), National Plan for Global Interoperability Architecture for the State Central and Local Administration (*Plano Nacional da Arquitectura Global de Interoperabilidade da Administração Central e Local do Estado*), and Communication and Electronic Infrastructure Sharing Law Regulation (*Regulamento de Partilha de Infraestruturas de Comunicações Electrónicas*) will support future digital activities.

Connectivity

8%

of country[27]

Bandwidth

58.5 kb/s

in areas with connectivity[27]

Electricity

7.3% of rural areas[28]

72.4% of urban areas[29]

The digital infrastructure is nascent currently. Electricity and mobile coverage rates remain low and may hinder digital uptake. Disparities in coverage also have been noted between urban and rural areas. The National Development Plan 2018–2022 proposes ambitious steps to improve electricity and mobile coverage; for example, it aims to increase electricity access to 50 percent and mobile coverage to 99 percent by 2022.[20] The mobile network covers a large portion of the country. About 8 percent of the population is supposed to be covered by a 4G mobile network, but stakeholders interviewed for this profile reported having only 2G or 3G.[16,27] The major mobile network operators are UNITEL and Movicel.[16] As of January 2021, slightly under half of the population (15.45 million) of Angola has a registered cell phone.[30]

Digital health tools in use and functionality

Currently, KoboCollect is being used in 32 municipalities in Benguela, Cabinda, Cuanza-Norte, Cuanza-Sul, and Huambo provinces.[31] KoboCollect is supported by World Vision and PSI. A dual reporting system exists in that reporting is done through paper as well as digital devices. The ADECOS use three modules within KoboCollect to collect data, including data on five malaria indicators (active/passive detection), commodities used, and referrals. Information inputted into KoboCollect is stored on a cloud-based server owned by a community-based organization.

Sistema Comunitário de Saúde (*Sistema Comunitário*) is a mobile phone–based application used to collect community-level HIV/AIDS data. The tool was first introduced through Linkages across the Continuum of HIV Services for Key Populations Affected by HIV (LINKAGES), a project led by FHI360 and funded by the United States Agency for International Development and the US President's Emergency Plan for AIDS Relief.[32] The LINKAGES project ended in 2019, and Sistema Comunitário is now managed by the Instituto Nacional de Luta Contra a SIDA and United Nations Development Programme. Sistema Comunitário is still in use by ADECOS in Luanda, Bié, and Benguela.[21] MINSA has been clear in their desire to expand Sistema Comunitário to other health sectors outside of HIV/AIDS. However, Sistema Comunitário has not been fully embraced by all stakeholders, which has resulted in confusion over digital tools. ADECOS who are affiliated with community-based organizations are continuing to receive additional training on digital tools, but they are awaiting a decision on Sistema Comunitário rollout. Additionally, stakeholders noted that with any uptake of digital tools there are procurement concerns related to tablets and software.[7]

Many stakeholders in Angola have identified the integration of systems into DHIS2 as a priority. In 2020, Saudigitus started developing an interoperability layer, with support from UNICEF. The aim is to link community health information data systems into an integrated national community health information platform, developed on top of DHIS2 Tracker, which will interoperate with KoboCollect.[21] At the moment, MINSA—with support from Saudigitus, World Vision, and UNICEF—is sending KoboCollect data to the DHIS2 Tracker in seven municipalities.[33] Health For All, a project funded by the United States Agency for International Development through 2022, developed *Plataforma de Interoperabilidade Analise e Estatística*, which is linked to KoboCollect for instant analysis and reporting. As noted earlier, KoboCollect does not directly flow into DHIS2, so *the Plataforma de Interoperabilidade Analise e*

*Estatística (*PIAE) serves as a bridge for community-based organization–supported ADECOS to review data in real time. Discussions are in progress to determine how PIAE should be integrated into DHIS2 given recent restructuring of the platform.[7]

USE CASE(S)	KoboCollect (ADECOS)	Sistema Comunitário
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: ADECOS, Agentes de Desenvolvimento Comunitário e Sanitário; ANC, antenatal care; EPI, Expanded Programme on Immunization; LLIN, long-lasting insecticidal bednet.

CASE MANAGEMENT FUNCTIONALITIES	KoboCollect (ADECOS)	Sistema Comunitário
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

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

Abbreviations: ADECOS, Agentes de Desenvolvimento Comunitário e Sanitário; HMIS, health management information system.

MANAGEMENT & SUPERVISION FUNCTIONALITIES	KoboCollect (ADECOS)	Sistema Comunitário
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	■	■
Communication Tool allows two-way communication between peer groups, associated health facilities, or supervisors	□	□

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

Abbreviations: ADECOS, Agentes de Desenvolvimento Comunitário e Sanitário; CHW, community health worker.

Appendices

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Abbreviations

ADECOS	Community Health and Development Agents (*Agentes de Desenvolvimento Comunitário e Sanitário*)
COVID-19	coronavirus disease 2019
DHIS2	District Health Information Software 2
LINKAGES	Linkages across the Continuum of HIV Services for Key Populations Affected by HIV
MAT	Ministry of Territorial Administration (*Ministério da Administração do Território*)
MINSA	Angolan Ministry of Health (*Ministério da Saúde de Angola*)
PSI	Population Services International
TWG	technical working group
UNICEF	United Nations Children's Fund

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Community digital health tools*

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

Name of Tool	Type of Digital Health Intervention[†]	Implementer (Funder)	Scale	Malaria Use Case
KoboCollect	**1.1** Targeted client communication **4.1** Data collection, management, and use	World Vision, Elimination Eight Initiative, The MENTOR Initiative, Population Services International (PSI) (Global Fund to Fight AIDS, Tuberculosis and Malaria; World Vision)	Zaire, Uige, Luanda, Bengo, Malange, Lunda Norte, Lunda Sul, Moxico, Cuando Cubango, Cunene, Huila, and Namibe	Malaria case management
Sistema Comunitário	**1.1** Targeted client communication **1.2** Untargeted client communication **2.1** Client identification and registration **2.2** Client health records **3.7** Facility management **4.2** Data coding **4.4** Data exchange and interoperability	Instituto Nacional da Luta Contra SIDA and United Nations Development Programme	Malange, Uige, and Benguela	Malaria case management Malaria screening with referral
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	Angolan Ministry of Health (Ministério da Saúde de Angola, MINSA), Clinton Health Access Initiative, Saudigitus (Global Fund to Fight AIDS, Tuberculosis and Malaria; Bill & Melinda Gates Foundation; United States Agency for International Development; World Bank)	National	Malaria case management Malaria screening with referral Routine long-lasting insecticidal bednet distribution during antenatal care or Expanded Programme on Immunization visits Malaria active or reactive case detection (visiting communities to find additional cases)

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			

*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	KoboCollect (ADECOS)	Sistema Comunitário
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

Abbreviations: ADECOS, Agentes de Desenvolvimento Comunitário e Sanitário; CHW, community health worker; LMIS, logistics management information system.

MANAGEMENT & SUPERVISION FUNCTIONALITIES	KoboCollect (ADECOS)	Sistema Comunitário
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

Abbreviation: ADECOS, Agentes de Desenvolvimento Comunitário e Sanitário; CHW, community health worker.