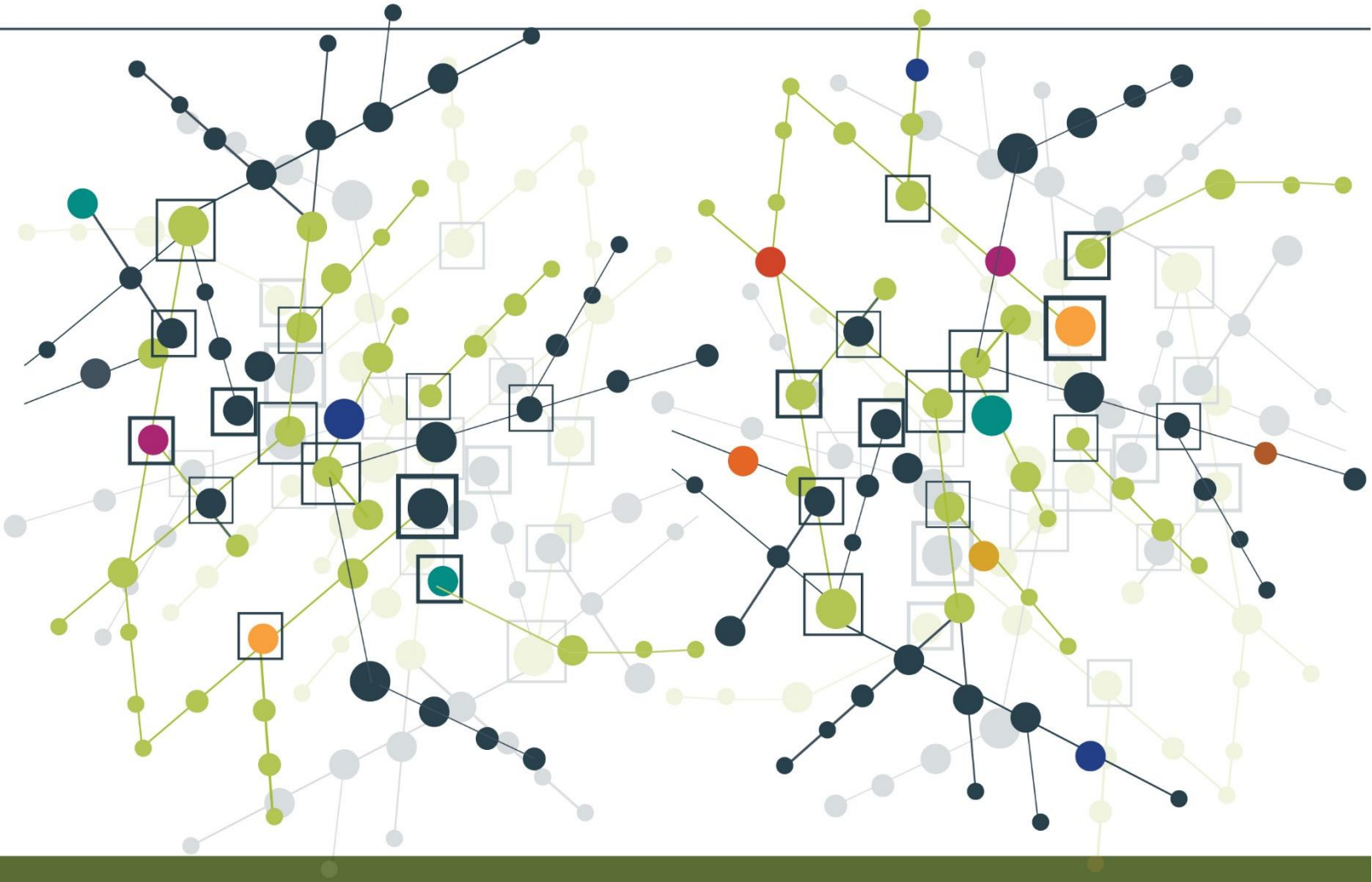

Synthesis of Routine Health Information System Architecture Profiles of the U.S. President's Malaria Initiative (PMI) Priority Countries

September 2019

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U.S. President's Malaria Initiative

MEASURE Evaluation

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CONTENTS

LIST OF TABLES

ABBREVIATIONS

ACT	artemisinin-based combination therapy
CHW	community health worker
DQA	data quality assessment or audit
DHIS2	District Health Information Software, version 2
HMIS	health management information system(s)
iCCM	integrated community case management
IDSR	integrated disease surveillance and response
IMCI	Integrated Management of Childhood Illness
IPTp	intermittent preventive treatment in pregnancy
M&E	monitoring and evaluation
MOH	Ministry of Health
n/a	not applicable
NA	not available
NGO	nongovernmental organization
NMCP	national malaria control program
PMI	U.S. President's Malaria Initiative
RDT	rapid diagnostic test
RHIS	routine health information system(s)
SP	sulfadoxine pyrimethamine
WHO	World Health Organization

BACKGROUND

MEASURE Evaluation developed two-page summary profiles of routine health information systems (RHIS) that capture malaria data in 17 of the countries supported by the U.S. President's Malaria Initiative (PMI): Angola, Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Kenya, Liberia, Madagascar, Mali, Mozambique, Niger, Rwanda, Senegal, Sierra Leone, Uganda, and Zambia. Looking across the profiles, this synthesis identifies the commonalities, strengths, challenges, and gaps, and suggests priority areas to focus on further strengthening.

KEY CHARACTERISTICS OF RHIS

Tables 1–6 summarize the following:

(1) characteristics of national-level health management information systems (HMIS) that capture routine malaria data across PMI countries
(2) data on malaria case captures in national-level RHIS across PMI countries
(3) data on malaria deaths captured in each PMI priority country's RHIS and integrated disease surveillance and response (IDSR) system
(4) commodity data tracked and reported in each PMI priority country's RHIS
(5) completeness of intermittent preventive therapy in pregnancy (IPTp) doses tracked and reported in each PMI country's RHIS
(6) whether the completeness of reporting is captured in each PMI priority country's RHIS and IDSR

Most countries (13 of the 17) have two routine reporting systems: the RHIS and the IDSR (Table 1). Angola, Cameroon, and Senegal have a third, parallel RHIS for malaria data only; however, Cameroon integrates malaria data from this parallel system in the District Health Information Software, version 2 (DHIS2). Rwanda has four reporting systems: in addition to the RHIS and IDSR, the country also uses a RapidSMS system that collects real-time data on severe malaria cases and drug stockouts, and a community information system for community health worker (CHW) data.

Nearly all countries have transitioned to electronic platforms—and specifically the DHIS2—for their national-level RHIS. Angola remains the only country among those included in the portfolio of profiles that uses a paper-based system at the national level. Nearly all countries continue to use paper-based reporting at the facility and community levels; Rwanda is the one exception, and some high-volume facilities in Kenya report directly in the DHIS2. Excel remains the predominant platform for the IDSR among these countries. Madagascar primarily uses Excel as the IDSR platform but has begun rolling out a web-based platform in some regions. Most countries have partially integrated their IDSR and RHIS platforms, bringing some disease data into the DHIS2; however, only some IDSR systems collect malaria data (Table 3). Côte d'Ivoire, Madagascar, and Senegal do active malaria surveillance at sentinel sites, and Angola reports malaria cases weekly in the provincial-level IDSR. The countries with some integration of IDSR and RHIS are Cameroon, Côte d'Ivoire, Kenya, Mali, Mozambique, Niger, Rwanda, Senegal, Sierra Leone, Uganda, and Zambia. Although Côte d'Ivoire, Niger, and Senegal have integrated data platforms, they also maintain them in parallel, presumably because the office in charge of managing each system is different and because sentinel surveillance site data are not intuitively integrated in the DHIS2. For example, Côte d'Ivoire maintains the parallel Excel platform for sentinel surveillance, whereas other routine data are input in the DHIS2.

DATA ELEMENTS

Overall, as shown in Table 2, most national RHIS examined in this portfolio of PMI priority countries capture many of the data elements needed to calculate and track key malaria indicators. All countries disaggregate malaria cases by age and all ,except Angola, capture the number of cases tested and the number of confirmed cases. Fifteen of the 17 countries capture IPTp completion data. However, the number of IPTp doses captured varies by country, and is not always clearly specified (Table 5). All countries capture the completeness of reporting in the national RHIS, and 12 capture this in the IDSR (Table 6).

Although many key data elements are captured routinely across the countries, several data gaps remain. The World Health Organization (WHO) recommends that countries in the burden reduction phase collect 10 indicators for malaria surveillance.[1] Many of the countries included in this synthesis do not routinely collect the data needed to calculate five of these indicators: percentage of cases due to *P. falciparum*, percentage of inpatients with a discharge diagnosis of malaria, percentage of inpatient deaths due to malaria, annual blood examination rate, and completeness of reporting. Eleven of the 17 countries specify the number of cases that were clinical, presumed, or unconfirmed. WHO highlights the need to report these data separately for comparison over time. Few countries disaggregate malaria data by sex in any RHIS (Table 3). Most countries capture key malaria commodity availability and consumption data (Table 4). Liberia and Mozambique stand out as having significant gaps in reporting and tracking malaria commodity data. Moreover, some countries note in the additional context of their RHIS profiles that malaria indicators are not appropriately captured in the DHIS2, highlighting the need for strengthening data quality assurance. As Niger transitions from using a parallel malaria reporting system to the DHIS2, it lacks a routine malaria data collection tool that enables the collection and calculation of the key indicators needed by the National Malaria Control Program (NMCP) for decision making.

DATA QUALITY AND USE

There are different approaches to quality assurance of data across the 17 PMI priority countries included in this synthesis. Some countries report conducting regular data quality assessments or audits (DQAs), and others do not. Those countries that are conducting DQAs regularly report implementing them mainly at higher levels (regional or district). Many data quality issues are found at the district level and below, where data collection and aggregation are done on paper and then transferred from paper into the electronic system.

Data demand and use, especially at subnational levels, emerge as a challenge across the PMI priority countries. The same is also critical at subnational levels as transmission decreases. The MEASURE Evaluation Health Information System Strengthening Model shows the interconnectedness of data use, data quality, and health information system performance, which work together to directly affect improved health systems and improved health outcomes. Looking across the RHIS profiles, critical points for country action that align with the Health Information System Strengthening Model are better integrating CHW data in the RHIS and improving data quality assurance activities at the facility level, where most data entry remains on paper.

[1] World Health Organization (WHO). (2012). *Disease surveillance for malaria control: An operational manual.* Geneva, Switzerland: WHO. Retrieved from https://apps.who.int/iris/bitstream/handle/10665/44851/9789241503341_eng.pdf?sequence=1.

LIMITATIONS

The RHIS profiles, and this synthesis of their contents, are not exhaustive descriptions of each country's routine data collection systems. The profiles do not list all malaria data components captured across the systems, but rather focus on key indicators important for monitoring and programmatic decision making. Catchment area population data are needed as a denominator to calculate nearly all the WHO-recommended indicators, which are proportions and rates. This synthesis did not examine whether countries have robust catchment area population data, although this is a known challenge for many countries.

Table 1. Key characteristics of RHIS across PMI priority countries

Country	Number of routine reporting systems	National-level RHIS reporting platform	National-level RHIS management	Scale of the DHIS2	System level at which data from paper forms are entered in the DHIS2 or other electronic form	Community data integration in RHIS	Community-level RHIS management	National-level IDSR reporting platform	National-level IDSR management	Frequency of DQA
Angola	Three	National HMIS	Departamento de Estatística do Gabinete de Estudos, Plano e Estatística in the MOH	n/a	n/a	No	iCCM data collected by CHWs	Excel	Departamento de Higiene e Vigilância Epidemiologica in the MOH	Quarterly, semiannually, and annually at the national level
Benin	Two	DHIS2	Direction de la Programmation et de la Prospective	National	Health zone	Yes	CHWs report to host NGO, and NGOs share data with the Direction de la Programmation et de la Prospective staff, who enter them in the DHIS2	Epi Info	Direction Nationale de la Santé Publique	Quarterly data validation workshops and DQAs every six months at department level
Burkina Faso	Two	DHIS2	Direction des Statistiques Sectorielles	National	District	Yes	CHWs report to facility national health information system point person	Excel	Direction de la Protection de la Santé de la Population team led by an epidemiologist	Every two years
Cameroon	Three	DHIS2	Health Information Unit in the MOH	National	Some facilities; others at district level	Yes	At the end of each month, CHWs submit data to the lead facility in the health area; data are validated and compiled by the health facility under the	DHIS2	Health Information Unit	Data quality assurance done as part of monthly reporting. Further DQA analysis is conducted separately by each program.

Country	Number of routine reporting systems	National-level RHIS reporting platform	National-level RHIS management	Scale of the DHIS2	System level at which data from paper forms are entered in the DHIS2 or other electronic form	Community data integration in RHIS	Community-level RHIS management	National-level IDSR reporting platform	National-level IDSR management	Frequency of DQA
							supervision of district-level GOs and implementing partners			
Côte d'Ivoire	Two	DHIS2	Direction de l'Informatique et de l'Information Sanitaire	National in all districts and reference hospitals	Reference hospitals and districts	No	n/a	DHIS2 and Excel for sentinel surveillance at 36 facilities	Direction de l'Informatique et de l'Information Sanitaire for the DHIS2 and NMCP for Excel at sentinel sites	Quarterly data validation meetings and annual integrated routine DQA
Ghana	Two	DHIS2	MOH and Center for Health Information Management of the Ghana Health Service	National	District; some hospitals and health centers	No	Some subdistricts validate CHW data	DHIS2	MOH and Center for Health Information Management of the Ghana Health Service	Semi-annually
Kenya	Two	DHIS2	Division of Health Informatics and M&E in the MOH	National	Subcounty	Yes	Entered in the DHIS2 using integrated community reporting tools	Integrated in the DHIS2 in 2016	Division of Health Informatics and M&E in the MOH	Annually
Liberia	Two	DHIS2	MOH Health Information Systems, Monitoring & Evaluation and Research	National	County and some districts	Yes for iCCM	CHWs submit to the Community Health Services supervisor for review and onward submission to the health facility	eIDSR	MOH	Quarterly data verification, quarterly data review meetings, and training in data use for action

Country	Number of routine reporting systems	National-level RHIS reporting platform	National-level RHIS management	Scale of the DHIS2	System level at which data from paper forms are entered in the DHIS2 or other electronic form	Community data integration in RHIS	Community-level RHIS management	National-level IDSR reporting platform	National-level IDSR management	Frequency of DQA
Madagascar	Two	Access-based Gestion de Système d'Information Sanitaire	Service de la Statistique Sanitaire et Démographique / Direction des Etudes et de la Planification	n/a	District	Yes	Centres de Santé de Base Chief	Excel, with web-based reporting in some regions	Direction de la Veille Sanitaire et de la Surveillance Epidémiologique et Riposte	Quarterly meeting on the quality of malaria data organized by the NMCP
Mali	Two	DHIS2	Direction Nationale de la Santé, Division of Health Information and Planning	National deploy-ment in all Centre de Santé Commun-autaire	District	Yes	Centre de Santé Commun-autaire Technical Director	DHIS2	Direction Nationale del la Santé, Disease Surveillance Unit in Division of Disease Prevention and Control	Data reviews are conducted monthly by Centre de Santé Commun-autaire, quarterly by districts, and semiannually by regions
Mozambique	Two	DHIS2	MOH Department of Health Information	National	District	Yes	Health workers or managers at the facility level	DHIS2	MOH Department of Epidemiology	Not done routinely
Niger	Two	DHIS2	MOH	National	Facility (Centre de Santé Intégré)	Yes	Head of Centre de Santé Intégré	Excel and the DHIS2 used in parallel	Direction de la Surveillance et de la Riposte aux Epidémies	Health regions conduct biannual data reviews with health districts
Rwanda	Four	DHIS2	Six-person M&E and health information system teams in the Planning, M&E and Business Strategy Division at the	National	Facility	Yes	Health facility data manager	eIDSR in the DHIS2	Planning, M&E and Business Strategy Division at the Rwanda Biomedical Center	Biannually

Country	Number of routine reporting systems	National-level RHIS reporting platform	National-level RHIS management	Scale of the DHIS2	System level at which data from paper forms are entered in the DHIS2 or other electronic form	Community data integration in RHIS	Community-level RHIS management	National-level IDSR reporting platform	National-level IDSR management	Frequency of DQA
			Rwanda Biomedical Center							
Senegal	Three	DHIS2	Systeme d'Information Sanitaire et Social team	National	Facility	NA	NA	Excel and DHIS2	Director of Prevention	Quarterly
Sierra Leone	Two	DHIS2	Directorate of Policy Planning and Information at the MOH	National	District	Yes	Peripheral Health Unit In-Charge	DHIS2	Directorate of Policy Planning and Information at the MOH	Not done routinely
Uganda	Two	DHIS2	MOH Division for Health Information	National	District	Yes	Facility Records Officer with oversight from the Facility In-Charge	DHIS2	MOH Division for Health Information	Quarterly
Zambia	Four	DHIS2	MOH M&E Directorate	National	District	No	n/a	DHIS2	Zambia National Public Health Institute	Monthly district malaria data review meetings, quarterly malaria supervisory visits to provinces and their respective districts

CHW: community health worker

iCCM: integrated community case management

M&E: Monitoring and Evaluation

MOH: Ministry of Health

n/a: not applicable

NA: not available

NGO: nongovernmental organization

NMCP: National Malaria Control Program

Key for Tables 2–6	
No	
Yes	

Table 2. Malaria cases captured in the national RHIS, by country

Country	Suspect (calculated) or fever cases	Tested (diagnostically)	Diagnostically confirmed (positive)	Clinical, presumed, or unconfirmed	Outpatient	Inpatient	Uncomplicated	Severe	Cases by age categories (e.g., <5, 5+)	Cases disaggregated by sex	Pregnant women
Angola											
Benin											
Burkina Faso											
Cameroon											
Côte d'Ivoire											
Ghana											
Kenya								§		*	
Liberia											
Madagascar											
Mali											
Mozambique											
Niger											
Rwanda	IMCI only								†		
Senegal											
Sierra Leone											
Uganda								§		NA	
Zambia										Hospital data only	

§ All inpatient cases are presumed severe.

* Outpatient reporting only disaggregates by age groups (<5, 5+), whereas inpatient reporting is disaggregated by sex and additional age groups (<1, 1–4, 5–14, 15–44, 45+).

† Outpatient department categories include 2–59 months, 5–19 years, and 20+ years.

IMCI: Integrated Management of Childhood Illness

NA: not available

Table 3. Malaria deaths captured by country and routine reporting system

Country	Number of malaria deaths by age		Number of malaria deaths disaggregated by sex		Number of malaria deaths among pregnant women	
	RHIS	IDSR	RHIS	IDSR	RHIS	IDSR
Angola						
Benin		NA	NA	NA		
Burkina Faso						
Cameroon						
Côte d'Ivoire						
Ghana			NA	NA		
Kenya						
Liberia					NA	
Madagascar						
Mali						
Mozambique	Hospital inpatient only					
Niger						
Rwanda						
Senegal						
Sierra Leone						
Uganda			NA	NA		
Zambia						

NA: not available

Table 4. HMIS commodity data tracking and reporting, by commodity and country

Country	Commodity availability				Commodity consumption			
	RDT	ACT	Quinine or injectable artemisinin	SP	RDT	ACT	Quinine or injectable artemisinin	SP
Angola								
Benin								
Burkina Faso								
Cameroon								
Côte d'Ivoire								
Ghana								
Kenya								
Liberia								
Madagascar								
Mali								
Mozambique								
Niger								
Rwanda								
Senegal								
Sierra Leone								
Uganda								
Zambia*								

* Captured in electronic logistics management information system

ACT: artemisinin-based combination therapy

RDT: rapid diagnostic test

SP: sulfadoxine pyrimethamine

Table 5. IPTp completion tracking in RHIS, by country

Country	Completion				
	IPTp (any)	IPTp 1	IPTp 2	IPTp 3+	IPTp 4+
Angola					NA
Benin					NA
Burkina Faso					NA
Cameroon					
Côte d'Ivoire					NA
Ghana					NA
Kenya					NA
Liberia					NA
Madagascar					NA
Mali					NA
Mozambique					
Niger					NA
Rwanda	NA	NA	NA	NA	NA
Senegal					NA
Sierra Leone					NA
Uganda					NA
Zambia*					

* Captured in electronic logistics management information system

NA: not available

Table 6. Completeness of reporting, by reporting system and country

Country	Completeness of reporting	
	RHIS	IDSR
Angola		
Benin		
Burkina Faso		
Cameroon		
Côte d'Ivoire		
Ghana		
Kenya		
Liberia		NA
Madagascar		
Mali		
Mozambique		
Niger		
Rwanda		
Senegal		
Sierra Leone		
Uganda		
Zambia		

NA: not available

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