REVIEW OF MONITORING OF MALARIA IN PREGNANCY THROUGH NATIONAL HEALTH MANAGEMENT INFORMATION SYSTEMS: RESULTS FROM SIX COUNTRIES IN SUB-SAHARAN AFRICA

April 2014

William Brieger
Mary Drake
Vikas Dwivedi
Narjis Kazmi
Barbara Rawlins
Elaine Roman

The findings of this review are based on country-specific health management information system tools available in 2013. Every attempt was made to get the latest tools available. Each individual country report states the timing of the review in that country.

This report was made possible by the generous support of the American people through the United States Agency for International Development (USAID), under the terms of the Leader with Associates Cooperative Agreement GHS-A-00-08-00002-00 and Cooperative Agreement AID-OAA-A-14-00028. The contents are the responsibility of MCHIP and The Maternal and Child Survival Program (MCSP), and do not necessarily reflect the views of USAID or the United States Government.

MCHIP is the USAID Bureau for Global Health's flagship maternal, neonatal, and child health program. MCHIP supports programming in maternal, newborn, and child health, immunization, family planning, malaria, nutrition, and HIV/AIDS, and strongly encourages opportunities for integration. Cross-cutting technical areas include water, sanitation, hygiene, urban health, and health systems strengthening.

MCSP is a global USAID cooperative agreement to introduce and support high-impact health interventions in 24 priority countries with the ultimate goal of ending preventable child and maternal deaths (EPCMD) within a generation. MCSP supports programming in maternal, newborn and child health, immunization, family planning and reproductive health, nutrition, health systems strengthening, water/sanitation/hygiene, malaria, prevention of mother-to-child transmission of HIV, and pediatric HIV care and treatment. MCSP will tackle these issues through approaches that also focus on health systems strengthening, household and community mobilization, gender integration and eHealth, among others. Visit www.mcsprogram.org to learn more.

Table of Contents

Abbreviations

ACT	Artemisinin-Based Combination Therapy
AL	Artemether-Lumefantrine
ANC	Antenatal Care
CTX	Co-trimoxazole
DOMC	Division of Malaria Control
DQA	Data Quality Assessment
DQI	Data Quality Improvement
DRCHCo	District Reproductive and Child Health Coordinator
DRH	Division of Reproductive Health
GA	Gestational Age
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
Hb	Hemoglobin
HMIS	Health Management Information System
IFA	Iron/Folate
IPT/IPTp	Intermittent Preventive Treatment of Pregnant Women
LLIN	Long-Lasting Insecticide-Treated Bed Net
M&E	Monitoring and Evaluation
MCH	Maternal and Child Health
MCHIP	Maternal and Child Health Integrated Program
MERG	RBM Monitoring and Evaluation Reference Group
MIP	Malaria in Pregnancy
MNH	Maternal and Newborn Health
MOH	Ministry of Health
MSD	Medical Stores Department
NGO	Nongovernmental Organization
NMCP	National Malaria Control Program
OPD	Outpatient Department
PCV	Packed Cell Volume
PMI	President's Malaria Initiative
PMTCT	Prevention of Mother-to-Child Transmission
RBM	Roll Back Malaria
RDT	Rapid Diagnostic Test
RH	Reproductive Health
SP	Sulfadoxine-Pyrimethamine
TWG	Technical Working Group
UNICEF	United Nations Children's Fund
WHO	World Health Organization

Acknowledgments

An extensive group of Maternal and Child Health Integrated Program (MCHIP) staff and consultants contributed to this report on monitoring of malaria in pregnancy (MIP) programs in six countries supported by the President's Malaria Initiative (PMI). MCHIP would like to thank PMI for the review and feedback throughout the development of this report and for ongoing technical collaboration in MIP. Aimee Dickerson provided review and input. The following individuals are recognized for their work to draft the individual country reports, which were used to create this synthesis report: Innocent Atukunda and Scovia Mbalinda (Uganda); Giulia Besana, Ikupa Akim, and Marya Plotkin (Tanzania); Mame Khady BA (Mali); Sanyu Kigondu and Augustine Ngindu (Kenya); Chimwemwe Msukwa (Malawi); and Jim Ricca (Mozambique).

Introduction

BACKGROUND

MCHIP works closely with PMI and the Roll Back Malaria (RBM) Partnership community, including key stakeholders in maternal health and child health, to support reduction in the global burden of malaria morbidity and mortality. MCHIP supports this reduction by helping to improve the quality of malaria programs, strengthening health systems, and helping countries achieve sustained results. A critical aspect of health systems strengthening is ensuring that appropriate high-quality data on malaria service delivery is available to policymakers and program managers so they can monitor program implementation and make informed decisions to facilitate policy and program decisions for better health outcomes. One way MCHIP supports this is through the RBM MIP Monitoring and Evaluation Reference Group (MERG) to provide guidance on M&E of MIP interventions.

These are the three key MIP interventions for prevention and treatment of malaria: (1) intermittent preventive treatment in pregnancy (IPTp or IPT), which involves giving treatment doses of sulfadoxine-pyrimethamine (SP) from the beginning of the second trimester at monthly intervals during antenatal care (ANC) visits; (2) insecticide-treated bed nets or long lasting insecticide-treated bed nets (LLINs), which women should use/sleep under nightly throughout pregnancy; and (3) case management including promoting parasitological diagnosis, appropriate treatment with artemisinin-based combination therapies (ACTs) if tests are positive, and counseling to ensure adherence.

The World Health Organization (WHO) Evidence Review Group meeting, held in July 2012, resulted in new recommendations for frequency and timing of IPTp-SP dosing, based on review of the latest evidence of the efficacy of IPTp-SP. The recommendations were presented to the WHO Malaria Policy Advisory Committee in September 2012 and adopted as the *Updated WHO Policy Recommendation* on IPTp-SP in October 2012.[1] To help facilitate MIP program implementation, it is important to have harmonization of country policies, guidelines, training, and supervision materials between the national reproductive health (RH) units and national malaria control programs (NMCPs). In light of the *Updated WHO Policy Recommendation* and recognizing that many countries will need to revise their national-level documents to disseminate the new guidance, MCHIP conducted a systematic review of national-level MIP policies and guidance documents in Kenya, Mali, Mozambique, Tanzania, and Uganda.[2] The purpose of the policy review was to increase MCHIP's understanding of each country's MIP guidance for health workers and to find any inconsistencies that may exist between WHO and country guidance as well as between RH and malaria programs at the country level. The policy review recommends specific actions at the country level for removing inconsistencies and complements the health management information system (HMIS) review presented in this report.

Obtaining reliable, valid, and timely malaria service data, especially data related to the control of MIP, is challenging. While population-based MIP indicators in population-based surveys are useful, the timing of these surveys, which generally occur every two to five years, is too infrequent for effective program monitoring. National HMIS data are more frequently collected, complement survey data, and have the potential to be more useful for ongoing service improvement and decision-making. Yet the quality of HMIS data in low-income settings is

[1] World Health Organization and Global Malaria Programme. 2012. *Updated WHO Policy Recommendation (October 2012): Intermittent Preventive Treatment of Malaria in Pregnancy Using Sulfadoxine-Pyrimethamine (IPTp-SP).* http://www.who.int/malaria/iptp_sp_updated_policy_recommendation_en_102012.pdf.

[2] Gomez, Patricia, Aimee Dickerson, and Elaine Roman. 2012. *Review of National-Level Malaria in Pregnancy Documents in Five PMI Focus Countries*. Baltimore, MD: Jhpiego Corporation. http://www.mchip.net/sites/default/files/mchipfiles/MIP%20in%20Five%20African%20Countries.pdf.

poor;[3,4,5] often data are missing, report formats are outdated, and reporting is late. Furthermore, it is not widely known what data are being recorded at the facility level, what data are reported up through the health system, and whether those data are being used at the facility.

PURPOSE AND OBJECTIVES

MCHIP, with support from PMI, decided to conduct a review of national HMISs in a sample of six PMI focus countries to improve its understanding of how ministries of health (MOHs)—both NMCPs and RH units—are monitoring and reporting on their MIP-related program results and how the data are being used. PMI countries selected for this review are Kenya, Mozambique, Malawi, Mali, Tanzania, and Uganda. The current review was undertaken within a larger review by MCHIP of maternal and newborn health (MNH) service monitoring through national HMISs in the same six countries plus additional MCHIP-supported countries. The six countries were selected with input from PMI and harmonized with the countries included in the MIP document review.[6] These countries are among the 19 focus countries benefiting from PMI, implemented by the United States Agency for International Development in partnership with the Centers for Disease Control and Prevention.

This activity will provide specific recommendations for improving routine MIP-related data collection and use. Data on IPTp and LLINs are generally collected through ANC, while case management data can be collected in ANC, outpatient departments (OPDs), and inpatient or maternity wards. There are a variety of locations where MIP data can be found, thus this review will help readers learn about the various ways data are captured or not and the implications for service delivery. The review focuses on the public sector and aimed to:

- describe which MIP indicators and data elements (the content of the HMIS tools) are collected and reported in national HMISs in six countries,
- identify strengths and weaknesses in data collection and reporting systems that monitor MIP service delivery,
- identify opportunities to strengthen the MIP aspects of HMISs and provide recommendations, and
- inform recommendations to develop global consensus regarding routine monitoring of MIP.

This report presents findings from the review and recommendations on priority indicators that should be monitored at the facility level, data collection formats, and ways to interpret and use data to improve services and to report data up through the health system. Information from this report will be used to propose revisions to the WHO/RBM manual, *Malaria in Pregnancy: Guidelines for Measuring Key Monitoring and Evaluation Indicators*.[7]

The findings and recommendations from this review will be shared with the countries to help improve their routine monitoring systems. Findings and recommendations will also be shared with PMI, the RBM MIP Working Group, and the RBM MERG for further review, discussion, and development of final recommendations for global and country levels.

---

[3] Kihuba, Elesban, David Gathara, Stephen Mwinga, Mercy Mulaku, Rose Kosgei, Wycliffe Mogoa, Rachel Nyamai, and Mike English. 2014. "Assessing the Ability of Health Information Systems in Hospitals to Support Evidence-Informed Decisions in Kenya." *Global Health Action* 7: 24859. doi: 10.3402/gha.v7.24859.

[4] Mavimbe, João C., Jørn Braa, and Gunnar Bjune. 2005. "Assessing Immunization Data Quality from Routine Reports in Mozambique. *BMC Public Health* 5: 108. doi: 10.1186/1471-2458-5-108.

[5] Odhiambo-Otieno, George W. 2005. "Evaluation of Existing District Health Management Information Systems a Case Study of the District Health Systems in Kenya." *International Journal of Medical Informatics* 74 (9): 733–744.

[6] Gomez, Patricia, Aimee Dickerson, and Elaine Roman. 2012. *Review of National-Level Malaria in Pregnancy Documents in Five PMI Focus Countries*. Baltimore, MD: Jhpiego Corporation. http://www.mchip.net/sites/default/files/mchipfiles/MIP%20in%20Five%20African%20Countries.pdf.

[7] World Health Organization. 2007. *Malaria in Pregnancy: Guidelines for Measuring Key Monitoring and Evaluation Indicators*. Geneva, Switzerland: World Health Organization. http://whqlibdoc.who.int/publications/2007/9789241595636_eng.pdf.

Methods

DESK REVIEW

For each country review, MCHIP field offices collected HMIS forms. A content analysis was done on these forms to determine what was being monitored and reported related to MIP. Second, in each country, a review was conducted of national policies, strategies, and guidelines with information related to MIP monitoring and evaluation (M&E), as well as technical reports, publications, and Web materials related to MIP. The following types of documents were reviewed in all countries:

- **National policy/context**: National malaria strategies, malaria M&E plans, PMI operational plans, national surveys (Demographic and Health Surveys, Malaria Indicator Surveys).
- **HMIS tools**: ANC client card, ANC register and summary report, outpatient department register and report, community health worker register and report, maternal death notification forms and reports, stock management tools, district reports / DHIS 2, annual health sector reports, logistics management tools.

There may be other registers and forms not mentioned here that also report on aspects of the three main MIP interventions. In addition, there may be parallel reporting forms and procedures for MIP indicators based on funding source. For example, because of Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) reporting requirements, a country might have its own malaria forms separate from the normal HMIS. Part of this activity was to find out what actually is on the ground, including HMIS and parallel reporting processes (see "Data Flow and Reporting Process" section below). Table 1 summarizes indicators / data elements reviewed in each MIP area. The tools and documents reviewed included those available at the time. See Table 2 for the timing of review in each country.

Table 1. Summary of indicators/data elements reviewed

MIP AREA	INDICATORS FOR ROUTINE MONITORING[a]	DATA ELEMENTS REVIEWED
IPTp	▪ Percentage of pregnant women attending ANC who receive a first dose of IPT (IPT1) under direct observation ▪ Percentage of pregnant women attending ANC who receive IPT2 under direct observation	▪ IPTp dose given ▪ ANC visit ▪ Whether IPT was directly observed was not included in HMISs of countries in the review.
Promotion and distribution of LLINs	MIP M&E *Guidelines* do not include indicators in these areas for facility-based monitoring. Data elements in these MIP areas were, however, reviewed.	▪ LLIN distribution ▪ Asked if slept under net the previous night
Diagnosis		▪ Asked patient if currently has fever/malaria ▪ Temperature recorded ▪ Malaria testing done at ANC (recorded whether rapid diagnostic test [RDT] or microscopy) ▪ Test result
Treatment		Malaria treatment given / referral at ANC

MIP AREA	INDICATORS FOR ROUTINE MONITORING[a]	DATA ELEMENTS REVIEWED
Maternal health indicators[b]		▪ ANC visit ▪ Gestational age (GA) ▪ Provision of iron/folate (IFA) ▪ Hemoglobin (Hb), packed cell volume (PCV) recorded ▪ HIV testing done—pregnant woman ▪ Prevention of mother-to-child transmission (PMTCT)—on co-trimoxazole (CTX; prevention of opportunistic infections)
MIP training	Number and/ or percentage of ANC staff (pre-service, in-service, or at supervisory visits) trained in control of MIP in the past 12 months (including IPTp, counseling on LLIN use, and case management for pregnant women)	Although cited in WHO guidance as routine, this is not reported routinely in the HMIS of countries included in this review.
MIP commodities/stock management	Percentage of health facilities reporting stock-out of the recommended drug for intermittent preventive treatment (currently SP) in the past month	Logistics management information system forms assessed.

[a] Column lists indicators collected as part of routine monitoring as opposed to surveys. Source: World Health Organization. 2007. *Malaria in Pregnancy: Guidelines for Measuring Key Monitoring and Evaluation Indicators*. Geneva, Switzerland: World Health Organization. http://whqlibdoc.who.int/publications/2007/9789241595636_eng.pdf.

[b] Maternal health indicators were reviewed in the overarching MNH indicator review. The scope of that review included client cards, ANC registers, and facility monthly reports. Reports from district, provincial, and national level were not reviewed.

Table 2. Timing of review in each country

COUNTRY	DATES HMIS FORMS COLLECTED AND REVIEWED	DATES OF IN-COUNTRY INTERVIEWS
Kenya	October 2012–March 2013	May–September 2013
Mozambique		June 2013
Uganda		September 2013
Malawi		October–November 2013
Mali		October–November 2013
Tanzania		November 2013–January 2014

KEY INFORMANT INTERVIEWS

The findings of the desk review were used to develop and customize in-depth key informant interview guides for each country context. The purpose of the interviews was to find out more about the quality of the MIP data elements being collected through the national HMIS, how the information was being reported and shared, and how the information was being used at different levels of the health system.

In-country interviews were conducted with key stakeholders at national, district, and facility levels. At each level, efforts were made to glean the perspective in three key areas: malaria, RH, and HMIS. At national level, interviews were held with staff from NMCPs, RH units, and HMISs, as well as with malaria partners including PMI, WHO, the Global Fund, and nongovernmental organizations (NGOs) funded to support the MOH in strengthening malaria programs. A list of interviewees for each country can be found in annexes of the individual country reports.

In a dynamic and iterative process such as the one undertaken for this review, certain limitations should be noted. In Mozambique, no site visits were conducted. MCHIP/Mozambique had recently participated in a similar review of reproductive, maternal, newborn, and child health HMIS procedures and the MOH was not receptive to this review of similar scope so soon afterward.

MCHIP staff conducted the review in four countries and consultants were hired for the in-country work in two countries. For the country visits, an orientation was conducted which included review of the scope of work, review of the initial HMIS content analysis, interview questions, and template for final country reports. Specific emphasis was placed on the importance of eliciting perspectives from different levels of the health system and NMCP, RH unit, and HMIS stakeholders, as well as on the importance of documenting data flow that reflected actual care practices in the health facilities.

Findings

The findings of this review are organized into themes:

- HMIS structure and function
- MIP indicators in national plans, HMIS registers, and reports
- Data flow and reporting process
- MIP data quality
- Use of MIP data
- Stock management

HEALTH MANAGEMENT INFORMATION SYSTEM STRUCTURE AND FUNCTION

The HMIS operates at national level under the MOH in all six countries and is not exclusively used or run by a vertical program such as NMCP or the Division of Reproductive Health (DRH). In each country, there are HMIS focal points at the national and provincial or district levels. All six countries are using an electronic HMIS, four of which (Kenya, Uganda, Malawi, and Tanzania) use the Web-based database DHIS 2.[8] In Mozambique and Mali, there are also electronic platforms, but these are distinct from DHIS 2.

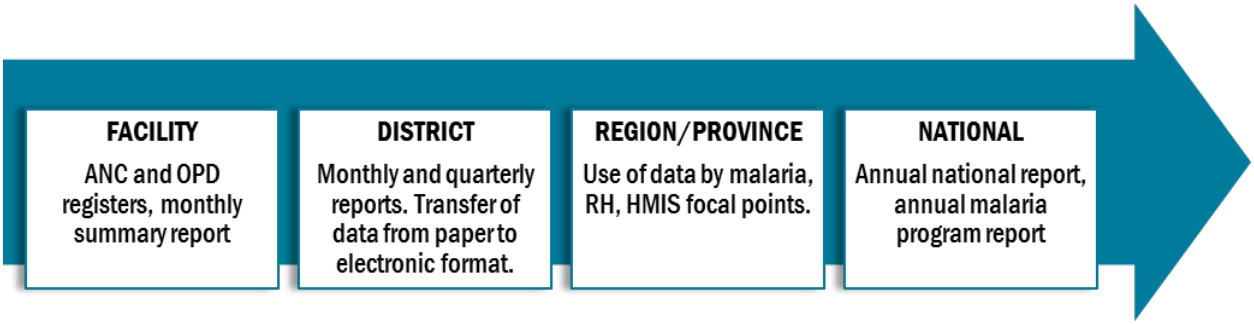
The collection and flow of data in the HMIS generally start at facility level. In some cases, such as Kenya and Mali, community-level data are summarized and reported in facility monthly reports, but these do not include MIP data. The HMIS in all six countries relies on paper forms at facility level. District-level data are generally reported to provincial and national levels through the electronic data platform (e.g., DHIS 2).

Once data is entered into electronic format, it can be accessed at district, regional, and national levels by malaria and RH programs as well as national M&E units in all six countries. There remain, however, challenges in data accessibility. In Uganda, for example, RH and NMCP staff reported that they are unable to access data directly without going through M&E or HMIS focal persons. Another challenge mentioned in Uganda is getting paper reports up to the next level, due to lack of funds for transport.

[8] DHIS 2 is being used as the primary HMIS in 30 countries across four continents. DHIS 2 helps governments in developing countries and health organizations to manage their operations, monitor processes, and improve communication. See http://www.dhis2.org/.

District-level reports are generated through DHIS 2 / other electronic format in country and reported to provincial and national levels. National-level reports are prepared by NMCPs and the HMIS unit of the MOH. The Figure describes the general flow of HMIS data.

Figure. General flow of HMIS data



MALARIA IN PREGNANCY INDICATORS IN NATIONAL PLANS, HEALTH MANAGEMENT INFORMATION SYSTEM REGISTERS, AND REPORTS

National Reports

Although various indicators are described in national malaria M&E plans for routine collection and reporting from HMIS data (as described in each country report), at national level the indicator reported across the six countries is the percentage of pregnant women who received IPTp2 as a proportion of ANC visits. In most countries the denominator is in line with the globally recommended denominator—first ANC visits—but this is not always consistent across M&E guidance documents. For example, in Tanzania, the NMCP M&E plan notes that number of pregnant women is the denominator for IPTp indicators, while at district level they are using the correct denominator.

In each of the countries, the national M&E plan of the NMCP includes the percentage of health facilities reporting no stock-outs of the recommended drug for IPTp.

Data on distribution of LLINs through ANC is reported in the ANC registers and facility monthly reports in all countries, but in national reports in Kenya, Mali, and Mozambique only; there is also inconsistency across countries in terms of the indicators monitored. This inconsistency may be due to differences in policies across countries, such as some distributing LLINs at the household level and not through ANC. Another contributing factor may be that the WHO MIP M&E Guidelines do not provide guidance for an indicator on LLINs to be measured at health facility level.

Case management data for pregnant women are lacking in national reports. Data are not available in national reports on number of pregnant women screened for MIP, number diagnosed, or number treated.

Health Management Information System Tools and Reports

In general, data on first ANC visits and IPTp1 and 2 can be found in the woman's health card and ANC register, and are reported up each level and appear in national reports. LLIN data can be divided into two types: (1) provision of an LLIN and (2) use of an LLIN. LLIN provision to pregnant women is generally noted in the ANC register and is reported up the system. In contrast, use of an LLIN by ANC clients is generally not collected or reported in facility, district, or national reports. Not surprisingly, data on diagnosis and treatment of MIP is generally lacking both in data collection tools and reports, with a few exceptions. The findings are

summarized in Table 3. Description of the findings by data element, across countries, is included below.

Intermittent Preventive Treatment of Pregnant Women

IPTp variables reviewed included whether IPTp was given and if the dose was noted.

- *Women's health cards* were available and reviewed in five of six countries. IPTp1 and IPTp2 were recorded in the women's health cards in four countries (not Malawi); IPTp3 was recorded in only two countries (Kenya, Mozambique).
- *ANC registers* were reviewed in all six countries. Data on IPTp1 and IPTp2 are included in the ANC register in five of six countries (not Mali); IPTp3 is only captured in Malawi and Mozambique.
- *Health facility monthly reports* generally included only IPTp1 and 2, with just Mozambique reporting IPTp3.
- District, regional/provincial, and national reports:
  - IPTp1 and 2 are included in district reports of each country except Malawi. Mozambique also includes IPTp3. No country is reporting any additional doses beyond IPTp3.
  - Mali and Mozambique are the only countries with a regional/provincial report (data flows from districts to national level in the other four countries). In Mali, IPTp1 and 2 are reported, but 3 is not. In Mozambique, IPTp3 is reported.
  - At national level
    - IPTp1 is reported by Kenya, Mali, Tanzania, and Uganda;
    - IPTp2 is reported by each country except Malawi; and
    - IPTp3 is reported only by Mozambique.

Intermittent Preventive Treatment of Pregnant Women and Linkages with HIV

The area of malaria prevention among HIV-positive pregnant women is shifting terrain. The review of HMIS tools initially considered linkages between HIV and malaria to see if reporting via the HMIS was in line with the guidance that HIV-positive pregnant woman should get three doses of IPTp unless they are taking CTX. Those who are taking CTX should not receive IPTp-SP.[9] It is clear in Uganda that women receiving CTX are not being counted among those receiving IPTp; this is contributing to underreporting of malaria prevention coverage. Although it is not a huge number, it is a factor contributing to the data showing stagnating IPTp2 coverage in Uganda. Other countries are reporting on CTX as part of HIV indicators, but the consideration of this data to round out the picture of IPTp coverage was not mentioned in any other country.

Long-Lasting Insecticide-Treated Bed Nets

LLIN variables explored include if an LLIN was provided during ANC or if the woman was asked if she slept under an LLIN.

- *Women's health cards:* LLIN provision was not tracked in the women's health cards in the five countries reviewed. In Mozambique, it is noted whether the woman has an LLIN but not if she was provided one. LLIN use is tracked in the woman's health card in Uganda. In Tanzania it was noted if the woman was given a voucher for LLIN. Vouchers are redeemed in private sector retailers; monitoring the redemption process is a challenge.

[9] World Health Organization. 2014. *WHO Policy Brief for the Implementation of Intermittent Preventive Treatment of Malaria in Pregnancy using Sulfadoxine-Pyrimethamine (IPTp-SP): April 2013 (Revised January 2014).* http://www.who.int/malaria/publications/atoz/iptp-sp-updated-policy-brief-24jan2014.pdf?ua=1.

- *ANC registers*: Provision of an LLIN is in the ANC register in each country.
- *Health facility monthly reports:* Provision of an LLIN is in the facility monthly report in each country.
- *District, regional/provincial, and national reports:* LLIN distribution is in each of the country's district reports; in Mozambique's provincial report; and in the national reports of Mali, Kenya, and Mozambique. LLIN use is not noted in any of the ANC registers and is not reported up. LLIN use is generally tracked through population-based surveys.

Case Management of Malaria in Pregnancy

Use of HMIS tools to document and report on case management of malaria in pregnant women was a key focus of this review. A common challenge across countries is data collection and reporting on case management wherever the woman is seen. Case management protocols are not always clear, which limits provision of HMIS guidance regarding data collection, reporting, and flow. Additional findings are described below, divided into diagnosis and treatment.

Diagnosis

Diagnosis-related variables reviewed include whether the pregnant woman was asked if she has fever or malaria, if a temperature was recorded, if malaria testing was done, if diagnosis was made using an RDT or microscopy, and if a malaria test result was listed. These variables were generally not available in the HMIS tools.

The woman's health card in Uganda was the only one to document in a specifically labelled area if the woman has fever/malaria and that temperature was recorded. The Uganda HMIS contains number of people with MIP diagnosis, but it is not clear from the HMIS tools whether diagnoses are confirmed with a test. The diagnosis of MIP is reported in the facility monthly report and is entered into DHIS 2 at the district level, but it is not part of district or national reports.

The ANC register in Tanzania is the only one where malaria testing and malaria test result were clearly documented. Tanzania and Mali are the only countries where number of pregnant women tested for malaria and number of pregnant women testing positive for malaria were reported in the facility monthly report. These data are not, however, reported in the district reports.

Treatment

Treatment for MIP is not systematically reported in any country. The HMIS tools were reviewed for areas that could be used to document treatment of malaria in pregnant women. MIP cases may be seen in ANC, the OPD, or inpatient or maternity wards, either because of limited operating hours of the ANC area, lack of ANC area due to size of the facility, or the type of malaria diagnosed and treatment required. It is not always clear from clinical guidelines where the MIP cases should be treated; subsequently, the HMIS guidelines are not always clear what the data flow should be, which in turn affects recording and reporting of MIP. While there is space in some of the ANC registers to note treatments, the treatments were not coded and treatment for MIP was not reported. Again, in Uganda, the diagnosis of MIP is reported but data on treatment is not reported. Treatment data for MIP, such as the percentage of ANC clients with confirmed malaria that were treated, are not routinely tracked.

Table 3. HMIS tools review: summary of data captured in pregnant woman's health card, registers, and reports

	COUNTRY	IPTp RECORDED	IPTp1	IPTp2	IPTp3	LLIN PROVISION TO PREGNANT WOMEN	PREGNANT WOMAN ASKED IF SLEPT UNDER LLIN	PREGNANT WOMAN ASKED IF CURRENTLY HAS FEVER/ MALARIA	TEMPERATURE RECORDED FOR PREGNANT WOMEN	MALARIA TESTING DONE AT ANC	DIAGNOSIS BY RDT FOR PREGNANT WOMEN	DIAGNOSIS BY MICROSCOPY FOR PREGNANT WOMEN	MALARIA TEST RESULT FOR PREGNANT WOMEN	MALARIA TREATMENT GIVEN TO PREGNANT WOMEN/REFERRAL AT ANC
Woman's health card	Malawi													
	Kenya													
	Uganda													
	Mozambique					Asks if woman has one but does not note if she is given one								
	Tanzania					Noted if voucher given								
ANC register	Malawi													
	Kenya													
	Uganda										There is specific MIP diagnosis but test and test result not coded.			
	Mozambique													
	Tanzania													
	Mali													
Health facility report to district	Malawi													
	Kenya													
	Uganda													
	Mozambique													
	Tanzania													
	Mali													

	COUNTRY	IPTp RECORDED	IPTp1	IPTp2	IPTp3	LLIN PROVISION TO PREGNANT WOMEN	PREGNANT WOMAN ASKED IF SLEPT UNDER LLIN	PREGNANT WOMAN ASKED IF CURRENTLY HAS FEVER/ MALARIA	TEMPERATURE RECORDED FOR PREGNANT WOMEN	MALARIA TESTING DONE AT ANC	DIAGNOSIS BY RDT FOR PREGNANT WOMEN	DIAGNOSIS BY MICROSCOPY FOR PREGNANT WOMEN	MALARIA TEST RESULT FOR PREGNANT WOMEN	MALARIA TREATMENT GIVEN TO PREGNANT WOMEN/REFERRAL AT ANC
District summary	Mozambique													
	Kenya													
	Malawi													
	Mali													
	Tanzania													
	Uganda													
Regional summary	Mozambique													
	Kenya	Data are entered into DHIS 2 at the district level; referral facilities at the country/province/national levels enter data directly into DHIS 2.												
	Malawi	District data goes directly into DHIS 2												
	Mali													
	Tanzania	District data goes directly into DHIS 2												
	Uganda	District data goes directly into DHIS 2												
National Summary	Mozambique													
	Kenya													
	Malawi													
	Mali													Treatment field available
	Tanzania													
	Uganda													

Note: Green=data collected or reported. Red=data not collected or reported.

Table 4 summarizes other data elements relevant to the control of MIP that can be used to provide a fuller picture of MIP service quality. ANC visit is generally recorded in the ANC register and/or the monthly report, making available data on first ANC visit to be used as the denominator for IPTp coverage by dose. If used, this data can help assess at which visit coverage drops. There is a limitation to using first ANC visit, however: it does not clearly indicate if subsequent visits did not occur and for this reason there was no further IPTp administration, or if there was a true gap in service delivery. GA is also recorded in the woman's health card and register in most cases. The administration of IFA was reviewed, but the review did not provide details on which dose of IFA was provided. This information can generally be found in the clinical guidelines but was not in the HMIS registers and reports. Hb is noted in women's health cards and registers, and low Hb is reported in Kenya, Mozambique, and Tanzania.

Table 4. Other ANC indicators relevant to MIP

	COUNTRY	ANC VISIT	GESTATION OF PREGNANCY AT VISIT (IN WEEKS)	IRON/FOLATE GIVEN	Hb, PCV RECORDED	HIV TESTING DONE—PREGNANT WOMAN	PMTCT—ON CTX
Woman's health card	Malawi						
	Kenya						
	Uganda			Recorded as given separately			
	Mozambique						
	Tanzania						
ANC register	Malawi			IFA together			
	Kenya			Recorded as given separately			
	Uganda			Recorded as given separately			
	Mozambique			IFA together	Column checked if Hb <8		
	Tanzania	First and return visits		Recorded 90+ tabs of IFA together			
	Mali	1, 2, 3, 4+		Binary (yes/no)	[a]		
Health facility report to district	Malawi		[a]	Recorded 120+ tabs of IFA together	[a]		
	Kenya	Records four visits only	[a]		[a]		
	Uganda	Recorded for ANC 1, 4, and total ANC visits	[a]	# of IFA given together	[a]		
	Mozambique	▪ Total first ANC ▪ Total follow-up	[a]		Hb <8		
	Tanzania	First, follow-up, and fourth visits	GA <16 or 16+	Recorded 90+ tabs of IFA together	▪ Number of women who were tested for Hb on first ANC ▪ Hb <8.5g/dl (anemia) first visit		
	Mali		[a]		[a]		

Note: Green=data collected or reported. Red=data not collected or reported.
a. GA and Hb not expected in monthly reports unless divided into categories.

DATA FLOW AND REPORTING PROCESS

Data on MIP prevention (IPTp, LLIN) is routinely collected and reported through ANC registers and reports, and MIP data generally flows through the HMIS processes outlined in the "Health Management Information System Structure and Function" section. There are some cases that fall outside of the usual data flow, however, and that include challenges and successes.

Parallel versus Integrated Systems

In Mali, the NMCP has developed, in collaboration with its partners, a parallel tool to report number of confirmed MIP cases. This collection tool includes suspected cases and confirmation of cases using RDT or microscopy. It also takes into account data on distribution of LLINs to pregnant women. There is no information on doses of SP in this data collection tool, which is called "canevas mensuel de collecte des données des activités de lutte contre le Paludisme" and is composed of 30 indicators monitored by the Global Fund. Information is collected monthly and reported on a quarterly basis. Data monitored by the Global Fund remain at NMCP and are not included in the HMIS system at the level of National Health Directorate.

In contrast, in Tanzania, the NMCP created the malaria health facility summary form, which is compiled monthly. Until recently, this was a parallel system of reporting, but it has now been integrated into the DHIS 2 and has been rolled out in approximately half of the country. The report is prepared by facility staff, who fill out the forms using information recorded in the HMIS registers, as well as laboratory and pharmacy records. As of January 2014, approximately half of the regions had been trained on this new malaria monthly summary form.

Another successful example is in Mozambique, where IPTp4 and case management data elements (malaria testing, test result, treatment, and referral) were integrated into the HMIS.

Monitoring of case management data is a particular challenge because care can be provided and reported through ANC, OPD, the inpatient ward, or the maternity ward. The variety of places a pregnant woman can be treated makes monitoring of case management more complex than preventive measures, which are generally provided in ANC.

MALARIA IN PREGNANCY DATA QUALITY

The key informant interview results highlight that MIP data in the countries reviewed suffer from issues of timeliness, completeness, and accuracy. Some solutions for data quality improvement (DQI) have emerged. Although facility providers felt they had sufficient data quality for decision-making, there was concern at district/county level about completeness and timeliness of reports. A snapshot of the data quality issues and DQI strategies are presented in Table 5. More detailed information can be found in the narrative following the table and in the individual country reports.

Table 5. Summary of data quality issues and DQI strategies

COUNTRY	DATA QUALITY ISSUE	SOURCE	DQI STRATEGIES
Kenya, Malawi	Incomplete instructions to record MIP data in facility registers lead to poor reporting	Key informant interviews	▪ Improve instructions of HMIS tools. ▪ Train and supervise staff.
Mozambique	Data not submitted in timely manner	Key informant interviews	▪ Institutionalize new schedule of reporting.
Uganda, Kenya	Limited reporting from private sector facilities, which may contribute to underreporting	Key informant interviews	▪ Consider covering the costs of transport for delivery of reports. ▪ Train managers in private sector on HMIS tools.

From the key informant interviews, it was discerned that data quality issues were mainly due to lack of training, work overload, poor understanding of indicators by facility staff, difference in reporting format, and lack of coordination between data entry personnel and service providers. In two of the countries (Kenya and Malawi) it was noted that incomplete instructions to record MIP data in OPD/facility registers lead to inaccurate data. Specifically, where there is no code to record MIP and the service provider mentions it in the comment section or in the woman's health card, the data entry person is sometimes unable to transcribe it as MIP. In Uganda, it was noted that often ANC providers make tally sheets and plan to transcribe the data into the ANC registers, but due to busy service provision schedules, they do not transcribe the data and even sometimes use estimates to complete the reports. Another issue highlighted in Kenya and Uganda was limited data collection from private facilities, which is considered a big challenge for completion of monthly district reports.

Intermittent Preventive Treatment of Pregnant Women

In Kenya and Tanzania, stakeholders had concerns about IPTp2 data quality and completeness of reporting. In Malawi, where a rapid data review was conducted (the only country where this was done in addition to the key informant interviews), it was noted that MIP data can be affected by transcription, recording, and aggregation errors. To assess data quality, during the review in Malawi, the number of women who were reported to have received first dose of SP in the monthly summary was compared to the ANC register in four facilities, and it showed overreporting of data for these facilities. Common sources of errors included incorrect summaries and missing register pages.

Long-Lasting Insecticide-Treated Bed Nets

While no specific examples were given, teams at district/county level in Kenya and Tanzania mentioned that completeness of data is a problem. In Malawi, the provision of LLIN is recorded in an ANC cohort register and is also captured in the woman's health passport and an LLIN register, which also has a space for acknowledgment of receipt from the woman. When this data was checked for quality in the health facilities visited, it showed underreporting of information. Common sources of error noted were incorrect summaries and missing register pages.

Case Management

In Kenya, the completeness of data on case management was noted as an issue. It was mentioned by Division of Malaria Control (DOMC) staff that there are no clear instructions for providers to record pregnancy status in the comments section of the OPD register and there is no separate column for recording pregnancy status, therefore it is not confirmed that all providers are inquiring about patients' pregnancy status. Another informant from subcounty level noted that confirmed and unconfirmed cases of malaria are completely filled out but not accurate. In Tanzania, the district reproductive and child health coordinator (DRCHCo) held the view that, although there is a shift in policy to confirm all malaria cases, there are still too many clinical malaria diagnoses. In Malawi, key informant interview results highlighted that there is a sense that transcription errors significantly affect quality of case management data. No specific code has been assigned to record case management of MIP and, during aggregation, it is presented as malaria in adults. At some of the facilities, providers were trying to use custom codes for MIP that they had created at the facility level, but when the data gets aggregated, this leads to contamination and inaccuracy.

Efforts to Improve Data Quality

Efforts to improve the quality of HMIS data have been reported in several countries (Mozambique, Kenya, Uganda, Tanzania, and Mali). Mozambique was working on a new schedule to address timeliness issues which will ensure that information will reach national level by the 30th of each month. To improve data quality in Uganda, one of the districts was

instituting a mandatory verification and sign-off of the data by each section head before data was entered into the monthly health facility report. In Tanzania, the facility-level malaria report is also sent to the district HMIS focal person, who shares it with the district focal persons for malaria and Integrated Management of Childhood Illness for validation. These reports are then entered into the DHIS 2 malaria module. Another level of validation is during data entry: the DHIS 2 has in place predetermined minimum and maximum parameters for certain indicators. In Mali, data is analyzed and checked at district level before it is sent to regional level in hard copy and also in electronic form.

In Kenya, IPTp is one of the indicators in data quality assessments (DQAs) conducted by the MOH that compare source documents (e.g., registers) with summary reporting tools and look for any discrepancies. Also in Kenya, one informant at facility level mentioned that facilities hold internal data review meetings before sending a report to higher level and also receive feedback on how to improve their reporting on LLIN provision and ANC visits. DQAs are also conducted in Uganda by the MOH Resource Center on indicators that show extreme variation. However, currently IPTp data in Uganda do not show any extreme variation and most facilities are reporting data. See Uganda's country report for additional details.

In Malawi, the ANC cohort register, if well understood by the data entry clerk who completes it, is easy to use and provides a way to cross-check the number of SP doses taken by comparing the register to the woman's health card.

USE OF MALARIA IN PREGNANCY DATA

This review sought to describe how MIP data is used at each level of the health system for planning, monitoring, and decision-making. Overall, the most commonly mentioned use of information at facility level was for management and procurement of commodities. There is facility-level use of IPTp and LLIN data and use of data at district and national level for performance monitoring.

At facility level, MIP-related data (on ANC clients using IPTp1, IPTp2, and LLINs) was used in Kenya, Mali, and some facilities of Malawi. However, in Kenya, the data of malaria cases among pregnant women was also used at facility level. In Malawi, some of the facilities (Mtosa Health Centre, Nkhotakota district hospital, and Chankhungu Health Centre) were analyzing the data and using it to compare against targets and for planning, including development of health education topics for clients. Other facilities (Mvera Mission) were just compiling the data and sending it to district level. In Kenya, a dispensary nurse mentioned the use of HMIS data to monitor nurses' progress.

At district level, MIP-related data is used for monitoring and planning in Kenya, Tanzania, Malawi, Mali, and Mozambique, whereas in Uganda, malaria data, but not specifically MIP data, is analyzed and used. Graphs and charts are generated and three of the countries (Tanzania, Malawi, and Mali) were also giving feedback to facilities / community health centers to monitor performance. In Tanzania, DRCHCos also use the Reproductive and Child Health Section reports to track SP availability and to communicate with the Medical Stores Department (MSD). One of the districts in Uganda also reported systematic use of data, including quarterly review meetings involving all staff members.

At national level, MIP data is used by programs (malaria control, RH units) in all six countries for quantification of performance and to provide information for program improvement. In Tanzania, NMCP generates monthly summaries of the malaria reports which include the number of pregnant women who test positive for malaria by RDT or blood serum, whereas the Department of Reproductive and Child Health produces an annual report, which is a

compilation of annual zonal reports, which are in turn compiled from HMIS reports including the ANC and labor and delivery reports. The HMIS unit publishes the annual Health Performance Profile which provides an overview of progress in health sector. Under RH, the proportion of maternal deaths attributed to malaria is reported. The malaria section reports the proportion of mothers receiving two doses of SP during pregnancy and the proportion of pregnant women sleeping under a net. In Kenya, data from different sources is also put into a dashboard for the Global Fund. The dashboard information is only available from DOMC with authorization from the DOMC Director. In Malawi, data is aggregated and reported through the biannual and annual report produced by the MOH's Central Monitoring and Evaluation Division. Moreover, starting in the first quarter of 2014, the program intended to implement routing quarterly and annual data quality reviews with the aim of improving the quality of malaria, including MIP, data. In Uganda, due to limited access to DHIS 2 by NMCP and RH units, data use at national level was limited. However, MIP data is included in the Annual Health Sector Performance Report.

STOCK MANAGEMENT

The most commonly reported use of HMIS data was for stock management. All countries have procedures to record stock availability and ways to ensure that MIP-related commodities are managed accordingly. In Mali, the available and unexpired commodities related to malaria (ACTs, RDTs, SP, LLINs, serious malaria kits) are reported in monthly and quarterly reports of NMCP. Data is also collected by monthly/annual special surveys for proportion of health facilities with no known stock-outs over a week in the main inputs (ACT, RDT, SP, LLIN, serious malaria kits) per month.

In Tanzania, commodities information collected includes stock of ACT, malaria RDT, artesunate injection, SP tablet, and quinine injection and tablet. At health facility level, a paper-based system is in place to collect patient and pharmaceutical inventory data on a routine basis. Nationally, the MSD receives directions from the NMCP, which provides the information on quantities of products, delivery schedules, and product specifications for procurement purposes. In addition, since September 2010, Tanzania has implemented the SMS for Life program with initial support from the Novartis Foundation for Sustainable Development and, more recently, the Global Fund. This program provides the district medical officer, the zonal and central MSD, and the NMCP with weekly data on the stocks of essential malaria-related commodities (ACT and quinine) via text messaging sent from the health facility to a central database. Prospectively, SP and RDT will also be included in the list of stock items that will be reported on.

In Kenya, data is collected on the quantities of malaria drugs received (artemether-lumefantrine [AL], quinine, and SP), the quantities dispensed, the number of doses that expired, and the number of days out of stock, if any. However, the Health Facility Monthly Summary Report for Malaria Medicines does not provide any client information. The AL Dispenser's Book and DHIS 2 also track number of doses dispensed, but do not segregate by pregnancy status. Logistic management data is integrated at district level and an integrated RH monthly facility report is sent to district headquarters, in addition to the Health Facility Monthly Summary Report for Malaria Medicines.

In both the districts visited in Uganda, availability and management of SP and general management of medications appear to be strong. The districts have built the capacity of health care workers to manage stock and also redistribute among facilities if needed. However, LLIN management is not adequate and one district reported stock-outs. Mobile data collection is

being routinely conducted nationwide in Uganda through mTrac, but does not capture any information specific to MIP.[10]

In Malawi, facility registers, SP, quinine, ACT, and LLINs were reviewed during site visits. The registers and SP were available in all health facilities; however, quinine tablets and IV infusions had reported stock-outs and ACT stock was also very low. LLINs were available at the time of review but records showed there had been stock-outs in the previous six months.

Discussion

Effective M&E of MIP indicators includes multiple facets: gaining consensus regarding the priority indicators for tracking at the global and national levels; defining these indicators and providing guidance on how to collect/record them; correct and reliable recording of data by service providers; inputting data into the national electronic health information system, such as DHIS 2; and using data for program decision-making. The oversight of these processes ultimately rests with NMCPs and national RH programs, yet all stakeholders—health workers, program managers, and supporting NGOs—play an important role in making sure data are available, correct, and used.

The WHO IPTp 2012 updated policy marks an opportune time for countries not only to examine their own national-level MIP policies and guidelines but also to look at all components of the health system that affect MIP service delivery and outcomes. This review of six countries (Kenya, Malawi, Mali, Mozambique, Tanzania, and Uganda) yields important insights to MIP M&E, including strengths, opportunities, and weaknesses. MCHIP hopes the review will provide insight and guidance to the six focus countries as they aim to accelerate MIP programs and improve MIP M&E. In addition, this review serves as an important reference for all countries aiming to address MIP M&E and MIP programs. It is also important to note that, while the WHO MIP M&E *Guidelines* provide key information to support M&E of MIP, there is not currently guidance to support countries on routine health facility monitoring of IPTp doses three and higher (IPTp3+), LLIN provision, and case management of MIP. Hopefully, the findings in this report can contribute to the discussions as well as updated WHO MIP indicators.

STRENGTHS AND OPPORTUNITIES

Strong political will across countries is an important factor in advancing MIP M&E systems and improving MIP programming. In countries like Kenya and Tanzania, where RH and malaria control departments have worked together to improve HMIS weaknesses as well as update key MIP indicators, this has helped to advance MIP programs. In Mali, political will has supported efforts to update MIP policies, a first step in improving MIP M&E tools and guidance; this process is also beginning in Uganda. Malawi's plans to update the M&E strategic plan and indicators, including MIP, highlight the importance of the issue in country.

As outlined in the section "Health Management Information System Structure and Function," HMIS systems are generally well-defined units and provide support to monitoring MIP. Countries are generally monitoring IPTp2 and LLIN distribution, and the systematization of these efforts can be applied to integrate other key MIP indicators.

[10] mTrac is implemented by the MOH in collaboration with the United Nations Children's Fund (UNICEF), WHO, and the Department for International Development and consists of weekly data collection via mobile phone by community health workers on issues of epidemic concern. mTrac reports all malaria cases (not by age, sex, or pregnancy status), data on stock-outs of RDTs and ACTs, and number of maternal deaths (not by cause).

DHIS 2 and other electronic data platforms have provided great access to and scrutiny of MIP data in the countries assessed here and have the potential to help improve data quality and use. Emerging mHealth technologies offer the opportunity to more rapidly notify higher levels of the health system regarding stock-outs of MIP commodities.

In Tanzania and Mozambique, MIP is integrated into ANC registers and reports, rather than as a parallel reporting system. Countries like Mali, where parallel reporting takes place, can look to these countries to overcome the lack of integration in MIP reporting.

There are valuable perspectives at subnational level that can be leveraged to improve data collection, reporting, and use. For example, Uganda stakeholders suggest integrating private sector providers into HMIS trainings and supervision, integrating MIP indicators into performance-based financing already happening, and exploring provision of a stipend for the transport of paper reports from facility to district level.

Promising Practices for Effective Monitoring and Evaluation of Malaria in Pregnancy

This review highlights some promising practices for effective M&E of MIP. For example, in **Malawi**, some of the facilities (Mtosa Health Centre, Nkhotakota district hospital, and Chankhungu Health Centre) analyze MIP data and compare it against targets, then plan development of health education topics for clients. **Mozambique**, while participating in this MIP M&E review, successfully integrated MIP case management data elements (malaria testing, test results, treatment, and referral) into the HMIS. In **Tanzania**, a malaria health facility summary form was created, which is compiled monthly. This has now been integrated into the DHIS 2 and had been rolled out in approximately half of the country as of January 2014, reducing the delay of data traveling through the health system. To improve data quality in **Uganda**, one of the districts instituted a mandatory verification and sign-off of the data by each section head before data was entered into the monthly health facility report. In **Mali**, monitoring is institutionalized, which allows the community health center, with the participation of the community and community health association's peer community worker, to measure progress in achieving agreed-upon objectives and identify shortcomings and to locate and seek solutions. Participatory and educational dimensions of this ongoing monitoring contribute to the effective implementation of solutions.

WEAKNESSES

Related to improving M&E of MIP case management, a major issue highlighted in all countries was lack of case management protocols for malaria in pregnant women. MIP cases may be seen in ANC, the OPD, or inpatient or maternity wards, either because of limited operating hours of the ANC area, lack of ANC area due to size of the facility, or because of the type of malaria diagnosed and treatment required. It is not always clear from clinical guidelines where the MIP cases should be treated and, subsequently, from the HMIS guidelines, it is not always clear what the data flow should be, which in turn affects recording and reporting of MIP. There is also work to be done to make the national MIP M&E guidance documents consistent for IPTp and LLIN distribution, using the same indicator definitions.

The coordination of HMIS units with technical units, including NMCP and Maternal and Child Health / RH (MCH/RH) departments, is critical to ensure that indicators that reflect the latest clinical guidelines can be captured through HMIS tools. For case management indicators, coordination of HMIS inputs for inpatient care represents a different set of actors that have not typically been involved in MIP monitoring, creating gaps in information and lack of understanding among partners. In Mozambique, for example, development of registers and reports for inpatient care is led by the National Directorate for Medical Assistance, which does not include either MCH or NMCP.

While facility-level providers are generally satisfied with data quality, district/county and national stakeholders are concerned about completeness and timeliness. Use of existing data can drive DQI, among other purposes (such as documenting quality of services and informing program improvement). In Kenya, a DOMC staff person reported seeing that the proportion of clients receiving IPTp2 was higher than those receiving IPTp1 and going to the districts to review their data and correct the problem. The problem was with the numerator, with doses of IPTp3 and above being counted together with IPTp2. Countries are using data to assess program performance at district and national level, but there is room for focusing data collection and use on MIP by integrating and monitoring a cascade of MIP indicators.

Coordination of NMCP and MCH/RH units also contributes to both data quality and use. It is not always clear which unit is responsible for program performance. Where there is clarity, for example in Uganda, key staff do not have direct access to MIP data, even though it is theoretically available in electronic format (DHIS 2 in the case of Uganda).

At policy level, malaria M&E plans outline indicators, data sources, and methods, but across countries there is a lack of guidance on how to review and use the data to monitor program progress. Related to this, there is almost no MIP-specific guidance for DQA and DQI (except in Kenya).

RECOMMENDATIONS

Global Policies and Guidelines

While the WHO MIP M&E *Guidelines* provide key information to support M&E of MIP, there is not currently global guidance to support countries on routine health facility monitoring of IPTp3+, LLIN provision to pregnant women, during ANC and case management of MIP.

The section "Indicators to be measured at health facilities" in the WHO MIP M&E *Guidelines* should be updated to include guidance on IPTp3+, LLIN provision, and case management and should serve as a reference document for countries to standardize MIP indicators. The RBM MIP Working Group and MERG should play key roles in these efforts. This report should be disseminated to these working groups and global recommendations discussed and addressed.

Countries should develop and/or refine guidance to standardize where and how MIP testing and treatment should be provided, and work to update the HMIS to assure that it captures data collection and reporting required to provide effective monitoring of these interventions.

Additionally, countries could benefit from strengthening malaria M&E plans by including guidance on DQA and DQI, and data use for documenting program quality and informing program refinement. There is also an opportunity to improve indicator definitions in existing national plans and HMIS tools so that data collection and reporting are further standardized.

Key Steps

- Engage RBM MIP Working Group and MERG to review findings and update the MIP M&E guidance.
- Work with countries to review and validate additional guidance.
- Finalize guidance and disseminate to countries.
- Support countries to integrate guidance into national M&E processes.

Strengthen Health Management Information Systems

- *IPTp:* IPTp3+ should be integrated into HMIS tools alongside existing data on IPTp1 and IPTp2 for improved MIP monitoring, into paper and electronic facility monthly reports, and into national NMCP and DRH reports. Indicators' definitions should be explicit in guidance documents and be standardized nationally and globally. National targets should be updated to include IPTp3+ coverage. Many countries are in the process of updating national clinical guidelines to reflect the WHO 2012 recommendations for IPTp; the HMIS should reflect these changes in order to measure program performance and progress toward targets. Additionally, NMCP and RH units should be engaged to quantify the proportion of all pregnant women who are getting CTX alongside data on IPTp, since SP should not be administered concurrently with CTX.
- *LLIN provision:* LLIN provision (number and percentage of ANC clients receiving an LLIN) is not documented through women's health cards. It may be useful to track distribution of this resource as women may receive ANC services from different health facilities and providers can verify receipt of an LLIN. It is good, however, that LLIN provision is documented in ANC registers and facility and district reports. As countries prioritize universal coverage of LLINs, continued emphasis on delivery through ANC to ensure pregnant women are protected should remain a priority. Continued recording of net provision across countries will become increasingly important to justify procurement and distribution to ANC.
- *LLIN use*: The woman's health card generally is the only source of information in the HMIS for noting whether a woman slept under an LLIN the previous night. This is a behavior that is noted in the woman's health card, but is not summarized in the ANC register or in reports going up the system. Use of a bed net is a behavior and is not an intervention delivered directly at the health facility. Given the need to integrate indicators on case management, which is directly provided at the health facility, while minimizing additional data elements, perhaps LLIN use can be removed from the woman's health card and replaced with something directly delivered by the health service. It is also of note that there did seem to be some confusion about LLIN use data in Uganda in one health facility, where the provider described the column on LLIN provided as LLIN use. If LLIN use is maintained in the routine HMIS, training and supervision should reinforce the distinctions between the data on LLIN provision and LLIN use.
- *Case management:* There is a real opportunity and need to improve recording and reporting of diagnosis and treatment of malaria among pregnant women. As more and more countries move from high to low malaria transmission levels, this will become (and already is) increasingly important. Countries should be engaged to add malaria test results to the ANC (as well as OPD) register and to monthly reports from facility to district and district upward. To help gauge quality of MIP care, it is recommended to explore expanding data collected at sentinel sites to include pregnancy status as a key disaggregator and monitor the following cascade of case management indicators:
  - Number of pregnant women presenting with fever
  - Proportion of pregnant women presenting with fever that were tested for malaria
  - Proportion of pregnant women tested for malaria with positive test result
  - Proportion of pregnant women tested for malaria with positive test result that were treated
- An HMIS procedure manual with clear instructions on data collection and reporting formats should be developed and/or updated as HMISs are updated to reflect updated clinical guidelines. Given the widespread use of electronic HMISs, it is recommended that uniform tools be made available on the MOH website for all district offices to download, print, and

use for data collection. NMCPs and RH units should be supported to improve their capacity to conduct DQAs and should train staff at facility and district levels in data validation.

Key Steps

Based on HMIS revisions in Tanzania, where new MIP indicators were integrated, it is suggested that the MOH be supported to (1) call all partners together to meet and discuss tool revisions, (2) propose changes and revise tools together, (3) pilot the tools, (4) allow for a good period of time for the tools to be piloted, and (5) meet with stakeholders again and adapt tools to respond to challenges and suggestions seen during the piloting. Coordination is essential throughout the life of the review process: sometimes revision meetings happen over stages, so different partners turn up, and sometimes people from different organization turn up each time with different ideas. Furthermore, piloting should include a wide variety of settings where the tools are tested so that later, in the national rollout process, new issues can emerge.

Maximize Opportunities for Updating Health Management Information Systems

During the completion of this scope of work, MCHIP engaged the country stakeholders during ongoing HMIS reviews in four countries (Malawi, Uganda, Tanzania, and Mozambique). M&E for MIP was improved in Tanzania and Mozambique by integrating additional key data elements which can be used for constructing indicators on case management. See country reports for details.

Capacity Development

- As HMIS tools are updated per the previous recommendations to strengthen the HMIS, staff at community (as applicable), facility, district, regional/provincial, and national level should be trained in their use.
- Training of health workers in data use can ensure accurate, complete, and timely data.
- Facility and district capacity should be built for data analysis and use of data for monitoring, decision-making, and quality. Facilities and districts should not be just the points for data collection: they should be able to monitor their progress and redirect efforts accordingly. The facility and district staff should be involved in data management, review, and reporting to ensure timely and accurate information is passed on to the national level. It is also recommended that facility staff have access to DHIS 2 so that they can benefit from the system too. However, this requires trainings and capacity building at each level.
- Support the NMCP and RH units to ensure data are reviewed at facility and district levels and work plans are developed to improve programs and data quality.

Key Steps

- Identify supporting NGO and/or program to support MOH (e.g., coordination, technical input) or integrate MIP focus into existing M&E capacity-building efforts. Work with this group to
  - incorporate data use strategies into ongoing training and supervision efforts,
  - adapt country best practices for application across countries, and
  - develop an MIP DQA module.
- Meet with NMCP, DRH to discuss the importance of addressing data quality and data use.
- Hold meeting workshop to develop key tools. This should include sharing of promising practices.

- Review and update key tools, including MIP DQA module.
- Accompany review and finalization process with key stakeholders.
- Finalize inputs and support official in-country adoption process.

Coordination

It is important that a mechanism of coordination between the HMIS unit and NMCP with the MCH/RH unit is improved and/or established for improved monitoring and use of MIP data. NMCP and RH units can benefit from working closely to develop, disseminate, and train in updated policies, clinical guidelines, HMIS, data quality, and data use that include MIP. This is not unique to MIP. Promotion of comprehensive care and data quality and use applies across the maternal, neonatal, and child health continuum; hence, engagement with HIV/AIDS and TB partners is also important as country HMIS and routine monitoring systems are updated and strengthened. Additionally, global and in-country malaria stakeholders must engage units responsible for inpatient care and HMIS units to ensure that HMIS data and processes can help assess performance in case management of MIP.

Key Steps

- Discussions with MOH—NMCP, DRH, inpatient unit stakeholders/planners—to develop national technical working group (TWG) or subgroup of existing national task force to support coordinated implementation efforts and review for effective monitoring of MIP indicators.
- Development of draft terms of reference. This can be adapted from other countries with existing TWGs, in context of each country.
- Support of routine meetings with key stakeholders.

Data on MIP service delivery are crucial for understanding progress toward goals. The six countries reviewed may not be representative of all endemic countries, since they receive support from both PMI and the Global Fund, but the challenges and best practices found in their MIP M&E processes offer valuable lessons.

Overall, a more robust and comprehensive M&E system for MIP interventions requires the full and regular collaboration of at least three units within an MOH—NMCP, MCH/RH, and HMIS—plus the donors that support these programs. Only by accurately tracking the use of prevention and control services will we be able to gauge the success of efforts to eliminate malaria.

To review these findings, tailor the recommendations to country context, and mobilize resources to act upon them, it is recommended that WHO, PMI, UNICEF, country MOHs (including NMCPs and DRHs), and implementing/supporting partners meet to discuss the findings of this report, the individual country reports, and the stated recommendations and identify and prioritize steps for moving forward.