REVIEW OF MONITORING OF MALARIA IN PREGNANCY THROUGH NATIONAL HEALTH MANAGEMENT INFORMATION SYSTEMS: KENYA

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The findings of this review are based on Kenyan health management information system forms that were collected and reviewed during the period of October 2012–March 2013. Every attempt was made to get the latest tools available. Qualitative information included in this report was collected during key informant interviews conducted May–September 2013. This report was compiled by the Maternal and Child Health Integrated Program (MCHIP) for review by the President’s Malaria Initiative and Roll Back Malaria Initiative.

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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.
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Abbreviations

ACT  Artemisinin-Based Combination Therapy
AL  Artemether-Lumefantrine
ANC  Antenatal Care
CDC  Centers for Disease Control and Prevention
CHEW  Community Health Extension Worker
CHW  Community Health Worker
DDSR  Division of Disease Surveillance and Response
DHS  Demographic and Health Survey
DMCC  District Malaria Control Coordinator
DOMC  Division of Malaria Control
DQA  Data Quality Assessment
DQI  Data Quality Improvement
DRH  Division of Reproductive Health
DSS  Demographic Surveillance System
Global Fund  The Global Fund to Fight AIDS, Tuberculosis and Malaria
HIS  Health Information System
HMIS  Health Management Information System
IDSR  Integrated Disease Surveillance and Response
IPTp  Intermittent Preventive Treatment of Malaria in Pregnancy
ITN  Insecticide-Treated Net
KEMRI  Kenya Medical Research Institute
LLIN  Long-Lasting Insecticide-Treated Net
LMIS  Logistics Management Information System
M&E  Monitoring and Evaluation
M&E Plan  *Kenya Malaria Monitoring and Evaluation Plan 2009–2017*
MCH  Maternal and Child Health
MCHIP  Maternal and Child Health Integrated Program
MIP  Malaria in Pregnancy
MIS  Malaria Indicator Survey
MOH  Ministry of Health
MOP  *Malaria Operational Plan*
MOPHS  Ministry of Public Health and Sanitation
N/A  Not Applicable
NMS  *National Malaria Strategy*
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPD</td>
<td>Outpatient Department</td>
</tr>
<tr>
<td>PMI</td>
<td>President’s Malaria Initiative</td>
</tr>
<tr>
<td>RBM</td>
<td>Roll Back Malaria</td>
</tr>
<tr>
<td>RDT</td>
<td>Rapid Diagnostic Test</td>
</tr>
<tr>
<td>RH</td>
<td>Reproductive Health</td>
</tr>
<tr>
<td>SP</td>
<td>Sulfadoxine-Pyrimethamine</td>
</tr>
<tr>
<td>TB</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>TWG</td>
<td>Technical Working Group</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
Acknowledgments

The Maternal and Child Health Integrated Program (MCHIP) is grateful for the support provided by Jhpiego staff in Kenya and for their participation in this work. The authors would also like to express our gratitude to the key informants who spared time to enrich this review, which was made possible by the informants’ efforts. Finally, the authors’ gratitude goes to the President’s Malaria Initiative (PMI) and the many reviewers who provided helpful comments at several stages of the review.
Introduction

MCHIP works closely with the President’s Malaria Initiative (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 are available to policymakers and program managers so they can monitor program implementation and make informed policy and program decisions to facilitate better health outcomes.

Obtaining reliable, valid, and timely malaria service data, especially data related to the control of malaria in pregnancy (MIP), is challenging. While MIP indicators in population-based surveys are useful, the timing of these surveys, generally every two to five years, is too infrequent for effective program monitoring. National health management information system (HMIS) data are more frequently collected, complement the population-based 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 poor; 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.

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 national malaria control programs and reproductive health (RH) units—are monitoring and reporting on their MIP-related program results and how the data are being used. The review will provide specific recommendations for improving routine data collection and use for MIP-related activities.

This review fits within a larger review of routine maternal and newborn data collection systems being conducted by MCHIP in the same six countries and additional non-PMI/non-malaria-endemic countries. PMI countries selected for this review are Kenya, Mozambique, Malawi, Mali, Tanzania, and Uganda. Each of these countries is one of the 19 focus countries benefiting from PMI. The review focuses on the public sector and examines how HMISs and supplemental routine data collection and reporting strategies are used at different levels of the health system to capture MIP indicators. The review describes MIP information and data quality gaps and best practices.

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 Kenyan health system.

Information from this report, along with the other five country reviews, will be used to propose revisions to the World Health Organization (WHO)/RBM manual, *Malaria in Pregnancy: Guidelines for Measuring Key Monitoring and Evaluation Indicators*.1

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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, as well as the RBM MIP working group and the RBM Monitoring and Evaluation Group, for further review, discussion, and development of final recommendations for global and country levels.

A note on language: When referring to key informants, the authors will be using “they” and so forth in place of the third-person singular.

**Background**

**MALARIA SITUATION IN KENYA**

About 76% of Kenya’s population of 43 million is currently at risk of malaria. Transmission of malaria in Kenya varies greatly by geographic area, with high levels of transmission on the coast and around Lake Victoria but little or no transmission in highland areas above 1,500–2,000 meters. Malaria prevalence is higher in rural areas (12%) than urban areas (5%). A decline in malaria transmission has been documented in recent years. Moderate to high levels of transmission remain in some endemic zones, while prevalence in nonendemic zones is less than 5%. See Figure 1 for a map of the malaria burden in Kenya.

Recent Demographic and Health Survey (DHS) and Malaria Indicator Survey (MIS) household surveys show improvements in coverage of malaria prevention and control interventions (see Table 1), which may help explain reductions in the malaria burden in the country.

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The MOH has recently appointed district malaria control coordinators (DMCCs), who have been part of this process, some MOH staff, including those in the Division of Malaria Control.  

Review of Monitoring of MIP through National HMISs: Kenya

Table 1. Population-based malaria indicators for Kenya

<table>
<thead>
<tr>
<th>MALARIA INDICATORS</th>
<th>DHS 2008–09a</th>
<th>MIS 2010b</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-cause under-five mortality rate</td>
<td>74/1,000</td>
<td>–</td>
</tr>
<tr>
<td>Proportion of households with at least one ITN [insecticide-treated net]</td>
<td>56%</td>
<td>48%</td>
</tr>
<tr>
<td>Proportion of children under five years old who slept under an ITN the previous night</td>
<td>47%</td>
<td>42%</td>
</tr>
<tr>
<td>Proportion of pregnant women who slept under an ITN the previous night</td>
<td>49%</td>
<td>41%</td>
</tr>
<tr>
<td>Proportion of women who received two or more doses of IPTp [intermittent preventive treatment of malaria in pregnancy] during their last pregnancy in the last two years</td>
<td>14%</td>
<td>25%</td>
</tr>
</tbody>
</table>


Data on availability of antimalarial medications at health facilities were collected as part of the 2010 Kenya Service Provision Assessment, as were observational data on antenatal care (ANC) service delivery, including provision of IPTp and ITNs for new ANC clients.

Kenya is currently undergoing a “devolution” process, whereby the geopolitical/administrative units of the country are changing. The country is dropping provinces in favor of a smaller administrative unit—the county—each of which consists of several subcounties or districts. As part of this process, some MOH staff, including those in the Division of Malaria Control (DOMC) and the Division of Reproductive Health (DRH), began being transferred from Nairobi to the field in April/May 2013—to counties, subcounties, and health facilities. Recently these transfers have been halted because it was found that by transferring one national MOH person to each district, all health areas could not be supported, according to one key informant. Therefore, national MOH staff will be maintained at the central level but will be available on request for technical assistance to counties.

The Ministry of Public Health and Sanitation (MOPHS) supported a malaria program performance review in 2009, which found that the DOMC functioned well at the national level, but had a weak coordinating capacity at provincial and district levels, leading to inadequate support for malaria control interventions and monitoring and evaluation (M&E). The PMI 2012 Malaria Operational Plan (MOP) suggests that moving to a county structure will likely not resolve all challenges the DOMC faces in supervising the national malaria control program. The MOH has recently appointed district malaria control coordinators (DMCCs), who have been supporting malaria control activities. The DMCCs have challenges in guiding the districts on choice of effective malaria control interventions for the various epidemiological areas because they have not undergone a basic malaria course.

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World Health Organization and Kenya Malaria Monitoring and Evaluation Recommendations

The WHO Evidence Review Group meeting, held in July 2012, resulted in new recommendations for frequency and timing of IPTp-SP (that is, IPTp using sulfadoxine-pyrimethamine) 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 2012.6 To help facilitate MIP program implementation, it is important to have harmonization of country policies, guidelines, training, and supervision materials between RH and malaria control. 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.7 The purpose of the policy review was to increase our 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 programs and malaria programs at the country level. The report of the national-level MIP policies and guidance review recommends specific actions at the country level for removing inconsistencies and complements the HMIS review presented in this report.

Given variations in malaria transmission across the country, the Government of Kenya’s DOMC 2009–2017 National Malaria Strategy (NMS) directs malaria prevention and control interventions according to malaria risk.8 In line with Kenya’s NMS, PMI supports four malaria prevention and treatment measures:

- ITNs
- Indoor residual spraying
- IPTp-SP
- Diagnosis with rapid diagnostic tests (RDTs) or microscopy and treatment with artemisinin-based combination therapy (ACT)

In malaria-endemic areas (14 counties), the main strategies for controlling MIP are ITNs and IPTp. Malaria-epidemic areas (9 counties) are not providing IPTp but are providing ITNs to pregnant women through ANC services. These areas are also supposed to be promoting “accurate parasitological diagnosis of malaria using microscopy or rapid diagnostic tests for all persons with fever and/or other symptoms of malaria,” according to the National Malaria Policy 2010. With the increased availability of malaria RDTs and the observed reductions in malaria transmission in many parts of Kenya, screening for infection is becoming a key feature of MIP control in both

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epidemic and endemic areas. However, a fire in December 2012 destroyed a central supply depot in Nairobi that contained thousands of RDTs that were on the verge of being shipped out to lower-level facilities, creating a nationwide shortage. PMI has ordered more.

**Methods**

**DESK REVIEW**

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

**Data Collection and Reporting Formats**

- ANC register
- Maternal and Child Health (MCH) booklet
- Maternal Death Notification form
- Outpatient department (OPD) register
- Community health worker (CHW) registers (MOH forms 513–516)
- Health Facility Monthly Summary Report for Malaria Medicines
- Artemether-Lumefantrine (AL) Dispenser’s Book
- MOH 711A—National Integrated Form for Reproductive Health, HIV/AIDS, Malaria, TB [Tuberculosis] and Child Nutrition

**MIP-Related Documents**

- *NMS 2009–2017*
- Kenya Malaria Monitoring and Evaluation Plan 2009–2017 (M&E Plan)
- National Malaria Policy 2010
- 2012 PMI MOP
- Malaria supportive supervision manual and tools
- National Monitoring and Evaluation Guidelines and Standard Operating Procedures (Pillar One)

In addition, the authors reviewed the online DHIS 2 database, an open-source database for warehousing, aggregating, and reporting on routine health information.

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9 The MCH booklet is an individual client card that stays with the pregnant woman/mother and records information during pregnancy through age five of the child.


12 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. In September 2011, Kenya became the first country in sub-Saharan Africa to deploy a completely online national health information system (HIS). All districts and selected health facilities are connecting to the DHIS 2 national server using mobile Internet (dongles / USB modems) on their computers. Kenya allows self-registration of personal user accounts. Over 2,000 users are entering data and using the data analytics features in DHIS 2 to improve management of health districts and other administrative areas. See http://www.dhis2.org/ and https://hiskenya.org/dhis-web-commons/security/login.action.
KEY INFORMANT INTERVIEWS

Annex 1 contains questions used to guide the desk review as well as key informant interviews. The findings of the desk review were used to tailor interviews that were conducted in each country. In-country interviews were conducted with key stakeholders at national, district, and facility level. At each level, efforts were made to glean the perspective from three key areas: malaria, RH, and HMIS. At the national level, interviews were held with staff from malaria control programs, RH units, and HMISs, as well as with malaria partners including PMI; WHO; the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund); and nongovernmental organizations funded to support the MOH in strengthening malaria programs. A list of interviewees is in Annex 2.

Findings

HEALTH MANAGEMENT INFORMATION SYSTEM STRUCTURE AND FUNCTION

A technical assistance project funded by the United States Agency for International Development (USAID), AfyaInfo, is supporting the Government of Kenya’s single, integrated Internet-based national HIS. This project was started in June 2011 with a five-year implementation period ending in May 2016. The system will make a difference to the health sector mainly by bridging the gap between public and private sector health reporting, integrating information systems from all the health system building blocks, and providing health information to all stakeholders, which should facilitate policy and program decisions for better health outcomes.

Routine community service delivery data flow in paper form from the community to the facility, and the facility to the district (subcounty). At the district level, the data are entered by the district community health focal person into the Community Health Unit HIS Chalkboard (MOH 516), a paper-based form. Community data are not entered into DHIS 2 but remain in the Chalkboard for use by the district health teams to identify health issues and areas in need of attention.

Routine facility service delivery data flow in paper form from the facility to the district (subcounty), where the data are entered by the health records and information officer into the DHIS 2. Information is accessed at other levels of the health system (e.g., province/county and national) through the DHIS 2 online information system. Provincial and other referral hospitals can enter data directly into the DHIS 2 so they do not need to send reports to the district level. However, there are some routine data sources with MIP information that are not included in the national HMIS / DHIS 2 (e.g., training and supervision information). Paper forms that capture training data are sent from the provincial level to the national DOMC office and entered into the DOMC database. According to the DOMC staff, training on MIP is embedded in case management training.

All indicators are not captured in the ANC register. Information on case management of pregnant women is located in the OPD register but is incomplete and not aggregated as pregnancy status is not always noted. Information on training of health workers in MIP is captured through MOH and partner training reports/logs and is not entered into the DHIS 2. Instead, it is sent to DOMC directly and is supposed to be entered into their database. This

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13 “The World Health Organization defines a health system as all organizations, people and actions whose primary intent is to promote, restore and maintain health.(1) It has six interrelated building blocks, namely: service delivery; health workforce; information; medical products, vaccines and technologies including infrastructure; financing; and leadership or governance.” (Somanje, Habib, Saidou Pathé Barry, Babacar Dramé, and Chris Mwikisa-Ngenda. 2012. “Health Systems Strengthening: Improving District Health Service Delivery and Community Ownership and Participation.” African Health Monitor (15): 48–54.)
training information is not shared with the DRH. Additional MIP information is captured in malaria supervision reports; these data are also not entered into the DHIS 2.

The SMS for Life project has piloted the use of eHealth to improve capture and use of case management data. Data on all cases tested and treated and commodity data were collected in five districts. The information was not disaggregated by age or pregnancy status. There is also an RDT pilot/module, called “SMART READER,” being implemented in Nyando in Nyanza Province to read RDT results and link them with other patient data.

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

Kenya has a wide array of stakeholders from the government, academic and research institutions, donor agencies, nongovernmental organizations, and the private sector that support M&E, surveillance, and operations research activities. These stakeholders have formed a working group to help guide such activities.

The DOMC is part of the MOPHS and has six technical units that cover case management, MIP, surveillance, M&E, operational research, vector control, epidemic preparedness and response, advocacy communication, and social mobilization. Each unit has a focal person and associated program officers. The DOMC’s units for surveillance and M&E are responsible for tracking malaria program performance; they use both routine information sources and survey data to measure program impact, outcomes, and population-based coverage. DRH is involved in supportive supervision; development of information, education, and communication materials; chairing the MIP Technical Working Group (TWG); and joint planning and implementation of activities. M&E for MIP at the national level is the responsibility of the DOMC’s M&E focal person. At the district level, the health records officer is responsible for entering MIP and other RH and malaria information into the DHIS 2.

The 2009–2017 NMS, developed by the DOMC, has six strategic objectives; the fourth objective focuses on improving M&E: “Objective 4: To strengthen surveillance, monitoring and evaluation systems so that key malaria indicators are routinely monitored and evaluated in all malarious districts by 2011.” The 2009–2017 NMS presents an M&E performance framework with specific program objectives and targets. DOMC staff interviewed for this review emphasized that the NMS has been important in guiding the DOMC and its partners by streamlining the set of indicators to be measured, defining them, and setting targets.

Complementary to the NMS is the M&E Plan. The M&E Plan presents the program objectives; lists associated indicators (see Box 1), data sources, and frequency of collection; shows who is responsible; and includes an M&E action plan.

Box 1. MIP-related indicators in the M&E Plan

<table>
<thead>
<tr>
<th>Process</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of IPT drugs distributed to health facilities and consumed for IPTp</td>
<td></td>
</tr>
<tr>
<td>Number of health care workers trained in IPT</td>
<td></td>
</tr>
<tr>
<td>Number of health workers trained (clinical and laboratory)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of ITNs / long-lasting ITNs (LLINs) distributed through facilities</td>
<td></td>
</tr>
<tr>
<td>Number of ITNs/LLINs distributed through mass campaign</td>
<td></td>
</tr>
<tr>
<td>Number of pregnant women who had four ANC visits</td>
<td></td>
</tr>
<tr>
<td>Number of pregnant women who received IPTp1 (endemic districts only)</td>
<td></td>
</tr>
<tr>
<td>Number of pregnant women who received IPTp2 (endemic districts only)</td>
<td></td>
</tr>
<tr>
<td>Number of health facilities with no reported stock-outs of IPTp drugs in the last three months lasting more than seven days</td>
<td></td>
</tr>
</tbody>
</table>
The M&E Plan has several shortcomings because many key indicators recommended by the WHO MIP M&E Guidelines are not included, such as indicators for severe anemia and birth weight. Indicators for malaria diagnosis and treatment for pregnant women are also not included. Additionally, the 2012 MOP notes strengths and weaknesses of the Kenya malaria M&E system (presented in Box 2).

**Box 2. Strengths and weaknesses of the Kenya malaria M&E system**

- Notable strengths of the Kenya malaria M&E system include the organizational structure of the M&E unit, M&E partnerships, the presence of a comprehensive M&E system and costed M&E plan, and the presence of an M&E database to store routine and activity data as well as data from surveys and evaluations.
- The main weakness, as reported by two separate data quality assessments (DQAs) conducted in 2010 by the Global Fund and Kenya’s MOPHS, is the delay in data made available through the HMIS. In addition, with the varied epidemiology of malaria in Kenya, sample sizes for household and health facility surveys need to be very large to get subnational estimates.


**Key Malaria Indicators**

Indicators of primary interest include those having to do with the three prongs of MIP control promoted by WHO:

1. IPTp
2. ITN use among pregnant women
3. MIP case management with
   a. RDTs
   b. ACTs

The authors reviewed the client card, ANC and OPD registers, maternal death notification form, and monthly facility reporting form to determine which indicators related to the three prongs of MIP prevention and control were being tracked and reported. Results are presented in Tables 2–4 below. A description of MIP indicators and their level of use is in Table 5 below.

**Other Routine Malaria in Pregnancy Data**

The DOMC has a malaria supervision manual with three checklists—one for facilities, one for districts/subcounties, and one for counties/provinces. The facility checklist includes a review of any stock-outs of key commodities in the last three months, including SP, quinine (tablets and injection), AL, RDTs, and ITNs distributed through ANC / child welfare clinics. A review of data management and reporting is also included. There are complementary Excel spreadsheets to enter the data collected. ICF International has prepared a report on use of supportive supervision data. At least one of the checklists has been programmed for use on a PDA using Visual Basic and Windows Mobile 5. The PIMA project (MEASURE Evaluation Associate Award) is working with the DOMC to try to digitize the supportive supervision checklists and link them to the DOMC’s proprietary database, the Malaria Information Acquisition System, currently housed at the national headquarters. The data are not entered into the DHIS 2.
The facility supervision checklist asks the visiting supervisor to observe client-provider interactions during an ANC visit and record if SP was provided, whether the provider directly observed the client swallow the SP, and if the provider gave adequate counseling about IPTp, including dosage, timing, side effects, and follow-up. In addition, the facility supervision checklist records whether the facility provides pregnant women with ITNs/LLINs and indicates that the supervisor should check the ANC register to confirm, and if ITNs/LLINs are not being provided, explore the reasons why.

Health worker training in malaria, including MIP, is captured at the national level in the Malaria Information Acquisition System, according to DOMC staff. A health facility key informant reported that training information is collected routinely using the service delivery indicators form—MOH 105—yet a DMCC interviewed said this information was “available but not updated.”

As specified in the NMS, semiannual facility surveys are conducted to monitor the availability of malaria case management commodities and assess the quality of practices. There is a questionnaire for service providers; an inventory of drugs and supplies, including SP; and an exit interview guide for case management clients. An integrated supportive supervision tool is also used as part of this process. Five of these semiannual surveys have been completed to date. Management Sciences for Health is helping to support these surveys; results are presented at the M&E TWG.

Data from sentinel surveillance sites are useful for understanding changes in malaria prevalence, malaria drug efficacy, and death rates from malaria and other causes. Since Kenya’s malaria control interventions are tailored to the epidemiological context in different counties, the surveillance is vital for ensuring that the program is designed to meet the needs of its clients, including pregnant women. For details, please see Annex 3.

With respect to case management, findings from a recent study by Afrane et al. revealed substantial overprescription of antimalarials and misdiagnosis of clinical malaria among hospitals in Kenya. More than half of cases with fever treated for malaria were not actually clinical malaria. The authors concluded that routine health facility data are unreliable for monitoring trends in malaria morbidity and for evaluating impacts of malaria interventions. This is an example of why sentinel surveillance remains important.

**Table 2. Indicators related to MIP prevention**

<table>
<thead>
<tr>
<th>DOES THE FORM HAVE A PLACE TO RECORD THE FOLLOWING INFORMATION?</th>
<th>ANC REGISTER</th>
<th>MCH BOOKLET</th>
<th>MATERNAL DEATH NOTIFICATION FORM</th>
<th>NATIONAL INTEGRATED FORM FOR REPRODUCTIVE HEALTH, HIV/AIDS, MALARIA, TB AND CHILD NUTRITION</th>
<th>DISTRICT/PROVINCE/COUNTY</th>
<th>NATIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are instructions for completing the form included?</td>
<td>Yes</td>
<td>No (instructions about a few specific data elements)</td>
<td>Yes</td>
<td>No</td>
<td>Data from monthly facility reports entered into online DHIS 2 by districts and subnational referral hospitals</td>
<td>N/A (not applicable; can access data from DHIS 2)</td>
</tr>
</tbody>
</table>

The MCH booklet (revised edition January 2013) has preprinted spaces to fill out IPTp doses 1–7, but the ANC register only has columns for IPTp1 and IPTp2. One ANC register is used across the country but only the 14 malaria-endemic counties provide IPTp and therefore record and report it in the ANC register and MCH booklets.

### Table 3. Indicators related to MIP case management

<table>
<thead>
<tr>
<th>DOES THE FORM HAVE A PLACE TO RECORD THE FOLLOWING INFORMATION?</th>
<th>ANC REGISTER</th>
<th>MCH BOOKLET</th>
<th>MATERNAL DEATH NOTIFICATION FORM</th>
<th>NATIONAL INTEGRATED FORM FOR REPRODUCTIVE HEALTH, HIV/AIDS, MALARIA, TB AND CHILD NUTRITION</th>
<th>DISTRICT, PROVINCE, COUNTY</th>
<th>NATIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPTp dose given</td>
<td>Yes, doses 1 and 2 only</td>
<td>Yes, IPTp1–IPTp7 (with date recorded)</td>
<td>Yes</td>
<td>Yes, doses 1 and 2 only</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>ITN distribution</td>
<td>Yes, by visit</td>
<td>Yes (with date)</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Asked if slept under net the previous night</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Are instructions for completing the form included?  
- Yes  
- No (instructions about a few specific data elements)  
- Yes  
- No  
- Yes

Asked if client currently has fever/malaria  
- Blank field for remarks  
- No  
- No  
- No  
- No  
- No

Temperature recorded  
- No  
- No  
- No  
- No  
- No

Malaria testing  
- No  
- No  
- No  
- No  
- No

Malaria test result listed  
- No  
- No  
- No  
- No  
- Yes (diagnosis column)

Malaria treatment given  
- Blank field for remarks  
- No  
- No  
- No  
- Yes (treatment/prescription column)

Referral for malaria treatment  
- Blank field for remarks  
- No  
- No  
- No  
- Yes (just blank referral column)

Pregnancy status  
- N/A  
- N/A  
- N/A  
- N/A  
- No
### Table 4. Other ANC indicators relevant to control of MIP

<table>
<thead>
<tr>
<th>DOES THE FORM HAVE A PLACE TO RECORD THE FOLLOWING INFORMATION?</th>
<th>ANC REGISTER</th>
<th>MCH BOOKLET</th>
<th>MATERNAL DEATH NOTIFICATION FORM</th>
<th>NATIONAL INTEGRATED FORM FOR REPRODUCTIVE HEALTH, HIV/AIDS, MALARIA, TB AND CHILD NUTRITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are instructions for completing the form included?</td>
<td>Yes</td>
<td>No (instructions about a few specific data elements)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>ANC visit</td>
<td>Yes, each visit</td>
<td>Yes</td>
<td>Total ANC visits only</td>
<td>Records 4 visits only</td>
</tr>
<tr>
<td>Gestation of pregnancy at visit (in weeks)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Iron/folate given</td>
<td>Records iron and folate separately</td>
<td>Yes</td>
<td>Iron only (Y/N)</td>
<td>No</td>
</tr>
<tr>
<td>Hb, PCV recorded</td>
<td>Yes, Hb level recorded</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>HIV testing done—pregnant woman</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Prevention of mother-to-child transmission—on CTX (prevention of opportunistic infections)</td>
<td>Yes</td>
<td>No (ARV or Option B + HAART, but not whether on CPT/CTX)</td>
<td>Blank field for remarks</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Abbreviations: ARV, antiretroviral; CPT, co-trimoxazole preventive therapy; CTX, co-trimoxazole; HAART, highly active antiretroviral therapy; Hb, hemoglobin; PCV, packed cell volume.

### Table 5. Indicators and level of use

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>LEVEL OF USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of ANC clients receiving IPTp1</td>
<td>Facility, subcounty/district, county, national</td>
</tr>
<tr>
<td>% of ANC clients receiving IPTp2</td>
<td>Facility, subcounty/district, county, national</td>
</tr>
<tr>
<td>% of ANC clients receiving ITN</td>
<td>Facility, subcounty/district, county, national</td>
</tr>
<tr>
<td>% of malaria cases among pregnant women</td>
<td>Facility</td>
</tr>
</tbody>
</table>

### DATA FLOW AND REPORTING PROCESS

#### Data Collection

Pregnant women with fever in large health centers and district hospitals are generally sent to the OPD clinic for a diagnostic test and treatment, if they test positive for malaria. Pregnant women attending smaller health centers and dispensaries, where all services are likely to be provided in the same room, are sent to the laboratory, if present, or clinically diagnosed and treated.
In the OPD register, there are two different forms to indicate if the client tested was more than or less than five years of age. Providers are instructed to write in the comments column whether or not a client is pregnant, but the information is not always reported and is not aggregated. In the ANC register, the health worker is supposed to record if malaria was diagnosed during the visit or if the pregnant woman complains about it in the “Other conditions” field but there is no place in the ANC register to specifically record whether a malaria test was conducted.

Also in the ANC register, the health worker is supposed to record if the pregnant woman was treated for malaria in the “Additional treatments given?” field, but the health worker does not have to write down the specific treatment regimen provided. One health center–based Kenya enrolled community health nurse pointed out that if pregnant women with symptoms of malaria come to the health facility for treatment on the weekend when the ANC clinic is closed, they will not be captured in the ANC register.

Kenya is currently pilot testing a longitudinal ANC register where each client would be recorded just once during her pregnancy and information from subsequent visits would be recorded on the same row in the register. Results of the pre-test are pending.

The MCH booklet does not have any specific designated area to record information on malaria treatment and referral, but there is a “clinical notes” section that is open-ended where this information could be recorded.

CHWs, whose role is related to health education/counseling and promoting early and repeated attendance at ANC, do not collect any MIP-related information in the 514 household register they complete (MOH 514 register) but rather record whether pregnant women are referred to ANC and counseled about birth planning. CHWs also fill out the community HIS household register (MOH 513), which captures information on whether members of the household registered are using an ITN, including pregnant women.

Each community health extension worker (CHEW) aggregates information from the 513 and 514 forms submitted by the CHWs working in the CHEW’s area of oversight on the CHEW Summary form (MOH 515). The Summary form includes information on the number of individuals ages five years and older that tested positive for malaria using an RDT and were treated with ACTs, but does not indicate pregnancy status or provide any information on ITN use. Information from CHEW Summary forms is not entered into the DHIS 2 but is summarized on the Community Health Unit HIS Chalkboard, where gaps in service usage will prompt CHW action (e.g., number of pregnant women not attending at least four ANC visits).

**Data Reporting**

Data sent from the facility level to the district level are entered into the DHIS 2. These data are publicly available and database users can create their own charts and graphs. Figures 3.1–3.3 in Annex 3 are illustrative graphs showing the type of MIP-related and ANC data captured in the DHIS 2 using Homa Bay District and Siaya County as examples. The data can also be aggregated and displayed at the individual health facility and national levels.

The following routine national reports are produced with HMIS and other routine data:

- Annual reports—these are provided to RBM
- RBM quarterly report—RBM has their own quarterly report template
- *Malaria Surveillance Bulletin*—produced by the DOMC on a quarterly basis for Global Fund
- DRH annual operational/work plan—produced by DRH using program performance data
The audiences for these reports include RBM, Global Fund, district officials, program implementing partners, and health facilities. The DOMC prepares graphs and charts through the DHIS 2 to populate these reports.

The Malaria Surveillance Bulletin includes information aggregated at the national level on the proportion of ANC clients that received IPTp1, IPTp2, and an ITN/LLIN. The Bulletin also includes information on malaria testing and treatment by epidemiological zone, but the information is not disaggregated by age or pregnancy status. Sources used to produce the Bulletin include various routine data reporting systems such as the DHIS 2, Integrated Disease Surveillance and Response (IDSR), the Logistics Management Information System (LMIS), and Laboratory Information Management System.

**MALARIA IN PREGNANCY DATA QUALITY**

DOMC staff said that completeness of the data is still a challenge because of late reporting. HMIS data are entered into the DHIS 2 primarily at the district level. Information on case management of pregnant women appears to be incomplete as DOMC staff have said that not all providers note in the “remarks” section of the OPD register whether the client was a pregnant woman. In addition, there are no written instructions to show that providers should be doing this. One enrolled community health nurse said that the MOH 514 has incomplete data as it does not collect all the information needed to fill out the 515 form. As noted, the MOH 514 register does not collect any MIP-related information, just whether pregnant women are referred to ANC and counseled about birth planning. The most recent national Malaria Surveillance Bulletin from June 2013 indicated that “reporting rates remained steady over the last quarter at 90% for DHIS, at around 65–70% for LMIS and 65% for e-IDSR. A low rate for e-IDSR is due to the migration to the electronic systems and is expected to improve as the system stabilizes.”

The majority of facility-based stakeholders interviewed did not report problems with data quality and felt they had adequate data for making decisions. County-level stakeholders, in contrast, voiced concerns about gaps in data quality (including IPTp2 and LLINs) and completeness of reporting. One DMCC mentioned that private facilities were the biggest challenge with respect to complete monthly reporting by all facilities. Another subcounty informant noted, “Confirmed and unconfirmed cases [of malaria] are complete but not accurate.”

National stakeholders noted there are still problems with delayed reporting, especially for facilities that are more remote and may have a more difficult time sending the hard copy reports to the district level and the health records officer. The DHIS 2 has made it easier and faster for stakeholders at multiple levels of the health system to access information. Facility-based key informants generally stated that reports are sent on time.

**Efforts to Improve Data Quality**

The national interagency malaria M&E TWG meets quarterly to review data and discuss implementation of the national M&E plan. Participants include the HMIS Division, implementing partners, Division of Disease Surveillance and Response (DDSR), DOMC, MEASURE Evaluation, Kenya Medical Research Institute (KEMRI), and US Centers for Disease Control and Prevention (CDC)/KEMRI.

At the facility and district levels, the DOMC is conducting annual DQAs, as mandated by the Global Fund, in high-burden malaria districts. The DQA team compares source documents (e.g., registers) with summary reporting tools and looks for any discrepancies. IPTp is one of the indicators included in the DQAs. According to the DOMC, common problems found are
transcription and arithmetic errors. Staff, such as the district health records officers, are periodically given HMIS training (by the HMIS Division).

USAID’s AfyaInfo project and the PIMA project are working with the DOMC and MOH to improve data quality and reporting. There is also a broader indicator harmonization working group supported by PIMA that makes recommendations regarding the DHIS 2. PIMA has worked with the DOMC to include IPTp in the Malaria Surveillance Bulletins so that people will review, and help improve the quality of, the IPTp data. One DMCC mentioned that facilities hold internal meetings to review their data before submitting it (to the district/subcounty) and that the facilities had received feedback on how to improve reporting on LLIN provision and ANC visits. A subcounty key informant mentioned that health facilities in their area are holding monthly data review meetings.

**USE OF MALARIA IN PREGNANCY DATA**

The DOMC staff said they review DHIS 2 data to plan resource allocations and to see which counties are doing well and which are not. The staff also said that they try to address any gaps noted with those counties. In addition, they are using commodity data for planning and management (e.g., LLIN stock-outs). Malaria control and prevention oversight, including resources, is under the malaria strategy, which is led by DOMC. DRH participates at the planning and implementation level.

One DOMC staff person said, “We expect that the facility is the first place to look at this [data in the DHIS 2]. If IPTp2 is low or malaria has increased, they should take action.”

Another DOMC staff person gave an account of seeing something strange about several districts’ IPTp2 data: the proportion of clients receiving IPTp2 was higher than those receiving IPTp1. They made arrangements to go out to districts to review their data and correct the problem. The problem was with the numerator, as doses of IPTp3 and above were being counted together with IPTp2.

In another example, the DOMC observed that one county had a falling trend for IPTp. A DOMC staff person travelled to that county and reviewed the data with the district managers, who had not been using DHIS 2 to look at trends in the data. There are some endemic counties with nonendemic districts that are not providing IPTp due to reinforcement of the national policy (that IPTp be provided in malaria-endemic areas only). Some counties have included those districts in the denominator for IPTp coverage in the past, which caused the coverage to appear artificially low.

Data from different sources are also put into a dashboard for the Global Fund. IPTp is not supported by Global Fund so is not reported apart from information on SP availability as an MOH-sourced commodity. The dashboard information is only available from DOMC with authorization from the DOMC director.

Health facility–based key informants mentioned using the Chalkboard to target community outreach services. A dispensary nurse said they use HMIS data to see if they have reached their targets or not and also indicated data on LLIN distribution is used to inform them as to how many nets to order. One of the DMCCs interviewed pointed out that malaria case management information for pregnant women is not adequate for making decisions. Overall, informing decisions about commodities procurement was the most commonly mentioned use of MIP-related data among district and facility stakeholders.
**Other Issues**

When calculating the percentage of ANC clients receiving IPTp1 and IPTp2, Kenya uses “new ANC visits” as the denominator. This is slightly different from what is recommended by WHO/RBM, which is “first ANC visits.” One key informant noted there are challenges in the definition of the terminologies “first ANC visit” and “new ANC visits” because some pregnant women start ANC visits in one area and continue in another, which may not even be in the same county or may be in an area not designated to provide IPTp (e.g., low-transmission areas). Data on first ANC visits from areas not providing IPTp is not captured at the national level, hence the use of “new ANC visit.”

There is also a problem with the calculation of the IPTp2 indicator, according to DRH staff, as the ANC register only has two columns for recording IPTp doses—a column for IPTp1 and a column for IPTp2. IPTp doses 3 and higher (IPTp2+) are often recorded under the IPTp2 column. The bottom of the ANC register has a space to aggregate IPTp2 and greater. This was being used as the numerator for the percentage of clients who received IPTp2 in reports to the district, causing IPTp2 to be higher than IPTp1 in some cases. In addition, to calculate coverage, the MOPHS recently used the estimate of all pregnant women in the country rather than those in the 12 malaria-endemic counties where IPTp is offered. The MOPHS has worked with partners to correct this calculation in the DHIS 2.

**STOCK MANAGEMENT**

PMI is supporting the Kenya Medical Supplies Agency to strengthen supply chain management, warehousing, and financial management and information systems at the national level. Information on malaria medicines is tracked at the health facility level and reported monthly to the district level using the Health Facility Monthly Summary Report for Malaria Medicines, which provides information on the quantities of malaria drugs received (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 Summary Report does not provide any client information. The Artemether-Lumefantrine Dispenser’s Book tracks number of doses dispensed by client weight category but not age, sex, or pregnancy status. Information on the numbers of SP and AL doses dispensed is also included in DHIS 2 and can be disaggregated by geographic area and facility, but not by client type.

Reporting on MIP service delivery and logistics management data is integrated at the district level. There is an integrated RH monthly facility report that is sent to the district headquarters in addition to the Health Facility Monthly Summary Report for Malaria Medicines. At the district level, MIP data on IPTp1, IPTp2, and ITNs are entered into the online DHIS 2 database where both the DOMC and the DRH can access them, as can others who register with the system. The DHIS 2 was only implemented in the past two years. However, data from some routine data collection mechanisms, such as supervision reports and training reports, are not part of the HMIS and are not entered into the DHIS 2. This information is captured at the national level in the DOMC’s proprietary database, the Malaria Information Acquisition System.

**Discussion**

**STRENGTHS AND OPPORTUNITIES**

DOMC staff interviewed asserted that they are very happy with the new DHIS 2, which they feel is dynamic. One helpful feature is that the date is recorded whenever anyone makes a change to the data in the system. In general, the DOMC staff feel the data collection system is working well and the quality of their data is improving and is being regularly uploaded to the DHIS 2. Specific opportunities worth highlighting include the following:
• Kenya has made great strides in improving quality and accessibility of HMIS data by recently transitioning to use of the DHIS 2.

• A midterm review of the NMS is scheduled in 2014 and will also consider the role of intermittent screening and testing and coverage areas.

• Simplified guidelines on providing IPTp are being rolled out following a CDC-led operations research study. The study also revealed that folic acid can be given concurrently with SP if a lower dose of folic acid is used than what Kenya was using at the time.

WEAKNESSES

• Tracking of case management of malaria in pregnant women: The DOMC said that MIP cases are underreported and suggested that adding RDT data to the ANC register would help rectify the situation.

• Calculation of the IPTp2 indicator from HMIS data is problematic: Entry of IPTp2+ into the DHIS 2 as IPTp2 doses makes the IPTp2 indicator from HMIS data higher than IPTp1 in some places.

• DOMC staffing for service delivery (e.g., dispensaries only have one staff person) and M&E and training of staff in M&E (including data clerks): When tools change, retraining is needed.

RECOMMENDATIONS

• DOMC to make RDTs available at ANC clinics to enable case detection and collection of data on MIP. Key steps to moving this forward include
  • discussion at national level among all stakeholders including DOMC, DRH, and procurement partners;
  • quantifying procurement needs at ANC clinics;
  • ensuring distribution of RDTs to ANC clinics; and
  • properly developing capacity of managers and frontline providers to correctly use RDTs.

• Update HMIS paper forms and DHIS 2 electronic platform for ANC and OPD to include collection and reporting of IPTp3 and IPTp4, malaria test conducted, malaria test result and treatment and/or referral. For OPD, also add field for documenting pregnancy status. Add IPTp4 to MCH booklet. Key steps to moving this forward include
  • discussion at national level, ideally through national working group, to review existing forms and update as necessary; and
  • introduction of new forms to managers and frontline providers through training, supervision visits, and M&E-specific visits to health centers.

• Improve quality of MIP data collected and reported, including existing data on IPTp1 and 2. Key steps to moving this forward include
  • investing in data quality improvement (DQI) for MIP indicators include IPTp doses 1 and 2 (and 3 and 4, when integrated);
  • LLIN distribution in ANC and case management (when/if they are integrated into the HMIS), including assigning responsibility and funds to lead DQI efforts which may include developing and implementing a module to assess MIP data quality; and
  • supporting the MOH to develop, implement, and monitor action plans for DQI.

• Data use often drives identification of data quality issues, so this should be part of the DQI process. Organize review meetings of data at all levels of monitoring: monthly at facility level, quarterly at district level and above.
• DOMC and local implementing partners to update service providers on IPTp indicators to clarify the issue of IPTp2 and IPTp2+ doses and entries in order to standardize reporting and ensure accurate aggregation of data. Key steps to moving this forward include ensuring training and supervision materials have the correct information to transfer to frontline providers and ensuring trainers have the most up-to-date knowledge to train frontline providers effectively.

• Local implementing partners in counties to support collection of retrospective data from ANC registers on IPTp1 and IPTp2 doses given from 2011 to the present for reentry into DHIS 2 in districts/counties where reporting of IPTp2+ as IPTp2 was a documented problem. Key steps to moving this forward include ensuring local partners have the capacity to support this effort.

• For calculating IPTp coverage, ensure that the estimate of pregnant women in DHIS 2 in subsequent years reflects the corrected calculation, including only malaria-endemic districts versus all districts. This will require that the steps for the correct calculation are clearly documented and published in the 2011 National Monitoring and Evaluation Guidelines.

To review these findings, vet these recommendations, and mobilize resources to act upon them, it is recommended that country-level stakeholders, under the leadership of the MOPHS, DOMC, and DRH, as well as WHO, PMI, the United Nations Children’s Fund, and implementing/supporting partners, meet to discuss the findings of this report and the stated recommendations and identify and prioritize steps for moving forward.
Annex 1. Questions to Guide Desk Review and Key Informant Interviews

Specific questions developed to guide the HMIS desk review and key informant interviews include the following:

- What forms, tools, registers, etc., are used?
- What is actually collected and reported (indicators)?
- Are all MIP indicators captured through ANC?
- Is MIP HIS integrated or parallel?
- Is ANC HIS integrated or parallel?
- How complete and timely is reporting?
- Who is responsible for MIP M&E?
- How are indicators summarized, analyzed?
- How is MIP data used, if at all?
### Annex 2. List of Key Informant Interview Respondents at the National and Subnational Levels

#### NATIONAL LEVEL

<table>
<thead>
<tr>
<th>NAME</th>
<th>JOB TITLE</th>
<th>DEPARTMENT/AGENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>David Soti</td>
<td>Director</td>
<td>DOMC</td>
</tr>
<tr>
<td>Jacinta Opondo</td>
<td>M&amp;E Program Officer</td>
<td>DOMC</td>
</tr>
<tr>
<td>Julius Kimti</td>
<td>Program Officer for Case Management / MIP</td>
<td>DOMC</td>
</tr>
<tr>
<td>Amin Abdinasir</td>
<td>Team Leader</td>
<td>ICF/PIMA (MEASURE)</td>
</tr>
<tr>
<td>Geoffrey Lariumbi</td>
<td>Program Officer</td>
<td>PIMA (MEASURE)</td>
</tr>
<tr>
<td>Peter Nasokho</td>
<td>Program Officer</td>
<td>PIMA (MEASURE Associate Award)</td>
</tr>
<tr>
<td>Rose Mulindi</td>
<td>M&amp;E Advisor</td>
<td>Jhpiego/MCHIP Kenya</td>
</tr>
<tr>
<td>Judith Mawa</td>
<td>MNH Program Officer</td>
<td>DRH</td>
</tr>
<tr>
<td>Shiphrah Kuria</td>
<td>Focal person for maternal, neonatal, and child health</td>
<td>DRH</td>
</tr>
<tr>
<td>Sanyu Kigondu</td>
<td>Program Officer</td>
<td>Jhpiego/MCHIP Kenya</td>
</tr>
<tr>
<td>Augustine Ngindu</td>
<td>Malaria Technical Advisor</td>
<td>Jhpiego/MCHIP Kenya</td>
</tr>
</tbody>
</table>

#### SUBNATIONAL LEVEL

<table>
<thead>
<tr>
<th>RESPONDENT ROLE(S)</th>
<th>HEALTH FACILITY / RESPONSIBILITY</th>
<th>COUNTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health care provider</td>
<td>Kabucha health center</td>
<td>Bungoma</td>
</tr>
<tr>
<td>Health care provider</td>
<td>Luucho dispensary</td>
<td>Bungoma</td>
</tr>
<tr>
<td>Health care provider</td>
<td>Ekitale dispensary</td>
<td>Bungoma</td>
</tr>
<tr>
<td>Health care provider</td>
<td>Chwele subdistrict hospital</td>
<td>Bungoma</td>
</tr>
<tr>
<td>Health care provider</td>
<td>Kachonge dispensary</td>
<td>Bungoma</td>
</tr>
<tr>
<td>Health care provider</td>
<td>Ngalasia dispensary</td>
<td>Bungoma</td>
</tr>
<tr>
<td>Health care provider</td>
<td>Mayanga dispensary</td>
<td>Bungoma</td>
</tr>
<tr>
<td>DMCC</td>
<td>County community health services focal person</td>
<td>Bungoma</td>
</tr>
<tr>
<td>Doctor, HRIO, DMCC, RHC, DCSsFP/PHO</td>
<td>DHMTs at subcounty level</td>
<td>Bungoma</td>
</tr>
<tr>
<td>DMOH</td>
<td>In charge of the DHMTs</td>
<td>Bungoma East</td>
</tr>
<tr>
<td>HRIO</td>
<td>DHMT in charge of records</td>
<td>Bungoma West</td>
</tr>
<tr>
<td>DMOH</td>
<td>In charge of the DHMTs</td>
<td>—</td>
</tr>
<tr>
<td>DMCC</td>
<td>DHMT in charge of malaria</td>
<td>Bungoma North</td>
</tr>
</tbody>
</table>

Abbreviations: DCSsFP/PHO, district community strategy focal person / district public health officer; DHMT, district health management team; DMOH, district medical officer of health; HRIO, health records information officer; RHC, reproductive health coordinator.
Annex 3. Malaria in Pregnancy Data from the National Health Management Information System

Figure 3.1. MIP-related service statistic data for Homa Bay District, January 2012–February 2013

Figure 3.2. ANC attendance service statistic data for Homa Bay District, January 2012–February 2013
TYPES AND SOURCES OF ROUTINE DATA FOR DIVISION OF MALARIA CONTROL MONITORING AND EVALUATION INDICATORS (FROM THE 2012 PRESIDENT’S MALARIA INITIATIVE KENYA MALARIA OPERATIONAL PLAN)

- Routine disease and service reporting and national surveillance from the HMIS, LMIS, the IDSR system, and district, county (new), provincial, and national administrative systems.
- Routine sentinel surveillance information from selected sites prospectively monitoring different parameters.
- Routine demographic sentinel information from Kenya’s Demographic Surveillance System (DSS) sites in Kisumu (population of 135,000, managed by KEMRI/CDC) and Kilifi (population of 220,000, managed by KEMRI / Welcome Trust). In the absence of functional national vital registration systems, these sites monitor birth and death rates, mortality and morbidity rates, and socioeconomic indicators and conduct verbal autopsies to ascribe probable causes to all deaths. Data from the DSS sites is provided to the DOMC quarterly per agreements.
TYPES AND SOURCES OF ROUTINE DATA FROM SENTINEL SITE SURVEILLANCE (FROM THE 2012 PRESIDENT’S MALARIA INITIATIVE KENYA MALARIA OPERATIONAL PLAN)

- Routine sentinel surveillance information from selected sites prospectively monitoring different parameters. These include five sites monitoring antimalarial drug quality and two sites monitoring antimalarial drug efficacy. With decreasing malaria risk in the country, health facilities in sentinel districts established in 2000 to represent the four different epidemiologic zones are no longer routinely used by the DOMC / KEMRI / Welcome Trust to collect retrospective data on implementation and health impact of malaria control interventions.

- The malaria surveillance and response system for the 39 epidemic-prone districts, managed by the DDSR, is an important part of the M&E Plan. Epidemic thresholds for malaria have been set for four to six sentinel facilities in each of these districts. Health centers submit data to districts on a weekly basis, and districts then transmit the data to provincial and national level by text message. Data is reviewed at the district level and case counts above preset thresholds are investigated by the district health officer.

- Routine demographic sentinel information from Kenya’s DSS sites in Kisumu (population of 135,000 managed by KEMRI/CDC) and Kilifi (population of 220,000, managed by KEMRI / Welcome Trust). In the absence of functional national vital registration systems, these sites monitor birth and death rates, mortality and morbidity rates, and socioeconomic indicators and conduct verbal autopsies to ascribe probable causes to all deaths. Data from the DSS sites is provided to the DOMC quarterly per agreements.