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# IMPROVING MALARIA DIAGNOSTICS ANNUAL REPORT FY09

COOPERATIVE AGREEMENT: GHS-A-00-07-00022-00  
MEDICAL CARE DEVELOPMENT INTERNATIONAL

# **IMPROVING MALARIA DIAGNOSTICS**

## **FY2009 ANNUAL REPORT**

### **DISCLAIMER**

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

## **USAID | IMaD Project**

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The project is run by Medical Care Development International (MCDI) in collaboration with the African Medical and Research Foundation (AMREF), Hydas World Health (HWH), the Swiss Tropical Institute (STI) and Cheikh Anta Diop University (CAD).

### **ABSTRACT**

This Annual Report details IMaD activities from October 1, 2008 through September 1, 2009. Implementation activities covered in this report span four major areas which form the basis of IMaD's program objectives:

- National malaria policy development
- Laboratory baseline assessment
- Training, supervision and quality assurance
- Procurement assistance

This report discusses the major activities associated with each objective, the monitoring and evaluation criteria used to measure success and major accomplishments made throughout the year. In addition, this report highlights constraints and proffers potential solutions to overcome program challenges.

## **USAID | IMaD Project**

Joseph Carter  
Director, International Division  
Medical Care Development International (MCDI)  
8401 Colesville Road, Suite 425  
Silver Spring, MD 20910  
Phone: (301) 562-1920  
Fax: (301) 562-1921  
E.mail: [mcdi@mcdi.org](mailto:mcdi@mcdi.org)

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## Abbreviations

AMREF	African Medical and Research Foundation
CDC	Centers for Disease Control and Prevention
CSB	Centre de Santé de Bas
CSReF	Centre de Santé de Reference (Reference/District Hospital)
DOMC	Division of Malaria Control
EQA	External Quality Assurance
GFATM	Global Fund for AIDS, TB, and Malaria
Hb	Hemoglobin
HC	Health Center
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome
HSSP	Health Services and Systems Program
HWH	Hydas World Health
IMaD	Improving Malaria Diagnostics
INRSP	Institut Nationale de Recherche en Sante Publique
INSP	Instituto Nacional de Saude Publica
IPM	Pasteur Institute (Madagascar)
JSI	John Snow International
LIBR	Liberian Institute of Biomedical Research
M&E	Monitoring and Evaluation
MACEPA	Malaria Control and Evaluation Partnership in Africa
MCDI	Medical Care Development International
MOH	Ministry of Health
MOH&SW	Ministry of Health and Social Welfare
MOP	Malaria Operational Plan
MRTC	Malaria Research and Training Center
MSC	Mali Service Center
NGO	Non-governmental Organizations
NIAID /NIH	National Institute of Allergy and Infectious Diseases/National Institutes of Health
NMCC	National Malaria Control Center
NMCP	National Malaria Control Program
NPHL	National Public Health Laboratory

NPHRL	National Public Health Reference Laboratory
PEPFAR	President's Emergency Plan for AIDS Relief
PMI	President's Malaria Initiative
PNLP	Programme National de Lutte contre le Paludisme
PPE	Personal Protective Equipment
PT	Performance Testing
QA	Quality Assurance
RDT	Rapid Diagnostic Test
SOP	Standard Operating Procedure
STI	Swiss Tropical Institute
TA	Technical Assistance
TOR	Terms of Reference
TWG	Technical Working Group
USAID	United States Agency for International Development
USG	United States Government
WHO	World Health Organization

## **Executive Summary**

This annual report describes the FY2009 activities of the Improving Malaria Diagnostics (IMaD) Project under USAID Cooperative Agreement GHS-A-00-07-00022-00. The work detailed in this document covers the period October 1, 2008 through September 30, 2009.

IMaD is a consortium of five non-governmental and academic organizations led by Medical Care Development International (MCDI) with collaborating partners: African Medical and Research Foundation (AMREF), Hydas World Health (HWH), Swiss Tropical Institute (STI) and Cheikh Anta Diop University (CAD). Consortium partners provide expertise in clinical laboratory diagnosis, strategic planning and policy development, preparation of national guidelines, training strategies and development of training materials, quality assurance programs and technical assistance on procurement to the U.S. Government President's Malaria Initiative (PMI) funded under USAID.

IMaD has four main objectives concerning improvement of malaria diagnostics under the PMI as per the MOPs:

1. To perform comprehensive baseline laboratory assessments to inform activities;
2. To develop and assist with the development and implementation of malaria laboratory diagnostic policy;
3. To provide training (clinical and laboratory diagnostics and management) and technical assistance for establishing quality assurance programs and supervision as they pertain to improving malaria diagnostics; and
4. To provide technical input on required equipment and supplies (PMI commodities) at country level.

Under these objectives, IMaD has developed a stepwise approach to building capacity that is tailored specifically to each country's requirements. Activities performed in support of IMaD objectives during FY2009 included:

1. Development of malaria laboratory diagnostic policy:
  - formation of local technical working groups;
  - development of generic national policies and guidelines;
  - dissemination of national standards
2. Performance of comprehensive baseline laboratory assessments:
  - development of clinical and laboratory diagnostic assessment tools;
  - malaria microscopy competency assessments of laboratory technicians;
  - collection and analysis of assessment data.
3. Provide training and technical assistance for establishing quality assurance programs and supervision:
  - development of training materials and job aids;

- development and implementation of “Outreach Supervision” checklists and database for laboratory and clinical supervisors.
  - organization and training of local trainers;
  - development and implementation of refresher training course in malaria microscopy and RDTs;
  - development of refresher training course in clinical diagnostic methods for malaria
  - implementation of national outreach training and supervision program for laboratory and clinical personnel
  - facilitation for IMaD and national core staff to attend WHO malaria microscopy accreditation courses.
4. Provide technical input on required equipment and supplies:
- tailoring essential equipment and supply lists to specific needs based on site assessments;
  - completed procurement order of twenty Olympus CX-21 electric microscopes for training in Mali
  - working with DELIVER Project to complete procurement requests for specific countries.

During 2009, IMaD prioritized activities based on data collected in baseline assessments during 2008 and early 2009. FY2009 activities included: Outreach Training and Support Supervision (OTSS) workshops, refresher training courses on malaria microscopy and RDTs, baseline site assessments, and launch of the Outreach Training and Support Supervision program. IMaD’s major accomplishments for FY2009 include:

- ★ Trained a total of 534 health workers in malaria diagnostic methods (OTSS, laboratory assessments, malaria microscopy) in Angola, Benin, Ghana, Kenya, Liberia and Zambia
- ★ Launched Outreach Training and Support Supervision program in Angola, Benin, Ghana and Zambia
- ★ Conducted first round of Outreach Training and Support Supervision in 36 health facilities in Benin
- ★ Initiated the hire of four IMaD In-country Coordinators in Benin, Ghana, Liberia, and Zambia
- ★ Completed the National Guidelines for Laboratory Diagnosis of Malaria in Ghana
- ★ Conducted baseline assessments of 1210 health facilities in Ethiopia, Kenya and Malawi
- ★ Developed generic refresher training curriculum for malaria microscopy and RDTs and refresher training curriculum in clinical methods for malaria case management



- ★ Finalized generic Outreach Supervision Checklists and database based on feedback from OTSS workshops
- ★ Trained 13 IMaD and national core staff from Kenya, Zambia, Liberia, Ghana in the WHO malaria microscopy accreditation course

This report covers the major planning phase of FY2009 and is divided into four sections: 1) detailed activities concerned with each program objective; 2) specific major accomplishments; 3) major challenges and suggested solutions; and 4) IMaD's planned activities for the coming year (FY2010).

The FY2009 Annual Report forms the foundation for FY2010, the major implementation and scale up phase of the IMaD Project.

## **Section 1 | Description of Activities**

### **1.1. *Implementing Partners***

The main consortium members (MCDI, AMREF, HWH, STI and CAD) bring specific expertise to the IMaD Project. MCDI, AMREF and HWH are the parties responsible for managing IMaD. Specifically, MCDI has managed large-scale malaria control projects with a case management component, including malaria diagnostics. AMREF brings clinical and laboratory expertise coupled with a long history of diagnostics development in sub-Saharan Africa. HWH has experience in the implementation of laboratory quality assurance programs. STI brings expertise in monitoring and evaluation as well as the management of drugs and supplies. The Universite Cheikh Anta Diop brings expertise in malaria research and laboratory sciences. The current organizational chart is found in appendix A.

IMaD is currently working with the Ministries of Health, PMI and in-country organizations in the following countries: Angola, Benin, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali and Zambia.

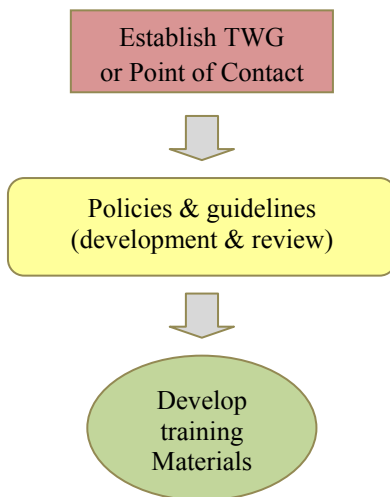
#### ***IMaD In-country Coordinator***

IMaD has successfully hired four in-country coordinators in Benin, Ghana, Liberia, and Zambia. The main role of the IMaD In-country Coordinator (ICC) is to facilitate timely implementation of IMaD's annual work plans in-country. To this end, the Coordinator liaises with and maintains productive collaborative relationships with in-country partners, including: (1) the PMI team, (2) the National Malaria Control Programs and the National Public Health Reference Laboratory, (3) other local PMI implementing partners, especially those working in procurement (i.e. DELIVER) and case management and (4) other stakeholders in malaria diagnostics, such as professional associations, private sector representatives, and the WHO country office. The IMaD In-Country

Coordinator supports and follows up on assignments carried out by IMaD’s partners, assisting with coordination, logistics, communication, and administrative/logistical tasks, such as organization of training workshops and other events, and monitoring and recording program deliverables (supervisory visits made, people trained, reports disseminated and other products). In addition, the IMaD In-country Coordinator works with the IMaD regional and headquarters staff to coordinate IMaD technical assistance, including temporary duty visits and virtual support during weekly or bi-weekly teleconference and through regular activity reports. In those countries where IMaD does not have an ICC the team has identified a focal person within the ministries of health to coordinate activities.

**1.2. Objective 1: Development and implementation of malaria diagnostic policy.**

In many countries, the lack of guidelines for laboratory diagnosis of malaria severely hampers Ministry of Health efforts to support health systems strengthening. A national policy for health laboratory services and relevant guidelines are useful standards to determine minimum requirements for infrastructure, choice of testing services and to guide national educational programs for training laboratory staff and clinicians at every level of the health care system.



IMaD is mandated with providing technical assistance at the MOH level to develop national policies and guidelines to support the diagnosis of malaria. IMaD uses established international standards and guidelines, especially those developed by the World Health Organization, to develop national policy and guideline documents. These standards are consensus driven by international experts in the field of malaria diagnosis. We have encouraged the creation of national technical working groups to adapt the drafts supplied by IMaD to the malaria situation in country. Initial and finalization

meetings are facilitated by IMaD in coordination with the NMCP involvement through the technical working group (TWG) and stakeholder workshops. IMaD also assists senior laboratory staff to develop or revise relevant SOPs for distribution throughout MOH laboratories.

**1.3. Objective 2: Performance of baseline laboratory assessments.**

A baseline assessment of clinical and laboratory services is a prerequisite to strengthening the quality and utilization of laboratory services for malaria diagnosis. A laboratory assessment tool has been developed that is easy to use and to accurately capture information concerning laboratory infrastructure, safety, human resources, training, diagnostic services, supply chain, recording, reporting and implementation of quality assurance procedures. The inclusion of the

clinical component is used to capture information pertaining to the utilization of diagnostic services by clinicians, sample collection and the return of results.

#### 1.4. **Objective 3: Provide training and technical assistance for QA and supervision.**

##### *IMaD capacity-building and the outreach training program*

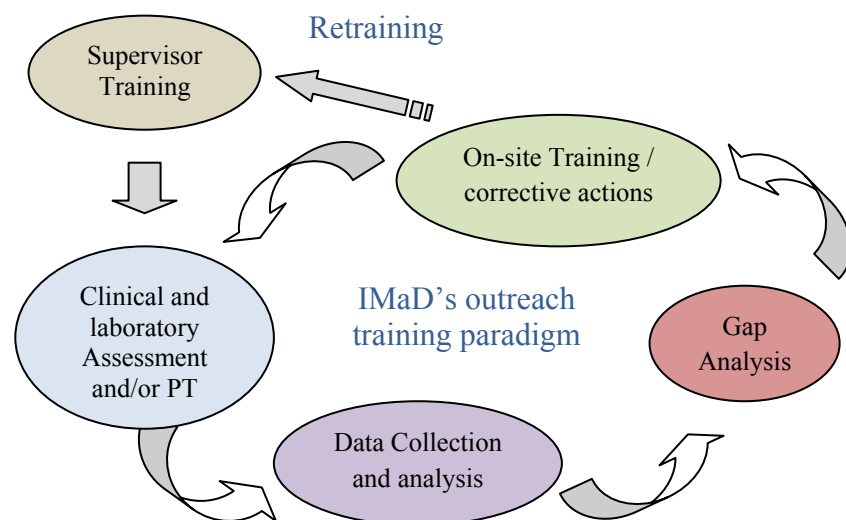
One of the greatest challenges to building quality laboratory systems is sustaining good laboratory practice. Good laboratory practice is not intrinsic and does not develop as a result of implementing external quality assurance programs without added support. Rather, training and simultaneous implementation of external quality assurance (that is proficiency testing coupled with on-site supervision) are essential to building and maintaining laboratory quality assurance systems.

IMaD has developed an Outreach Training and Support Supervision model for capacity building that combines training and mentoring, proficiency testing and on-site supervision. To date this program has been launched in four IMaD countries: Ghana, Benin, Liberia and Zambia.

The outreach model has three main objectives:

1. To impact those health facilities furthest from the central health referral system as rapidly as possible.
2. To combine ongoing training and support supervision with quality assurance.
3. To promote interaction between the clinicians and laboratory staff.

The OTSS model for building laboratory capacity is implemented in a step-wise fashion. The process begins with in-country planning and establishment of a technical working group (TWG) and points of contact. This is followed by the development of a national policy and guidelines based on recognized international standards and tailored to



the requirements of the country. Once finalized, these guidelines are used to customize training materials as required.

The initial phase of the outreach model is composed of clinical and laboratory supervisor training together with a comprehensive, on-site baseline assessment of both clinical and laboratory diagnostic services, gap analysis and roll out of outreach training using structured checklists. The model is a continuous cycle consisting of implementation of on-site supervision, external quality assessment (proficiency testing – PT) for laboratories, and clinical audit, followed by data collection and analysis, identification of gaps and on-site follow-up training and mentoring with corrective action. It is crucial to maintain this cycle of assessment and retraining to ensure sustainability of quality improvements.

Of key concern to IMaD’s capacity building model are the requirements of individual countries. IMaD has adapted OTSS programs based on feedback received during supervisor training workshops. Although IMaD prefers a fully integrated approach, there is built-in flexibility to allow for concentration on laboratory diagnosis pertaining to malaria.

#### *WHO Malaria Microscopy Accreditation Course*

To date, IMaD has supported 13 participants to attend the WHO Malaria Microscopy Accreditation Course held at AMREF facilities in Nairobi. The purpose of this course is to strengthen national reference groups in IMaD countries and develop a core team of national accredited malaria microscopists. The participants from each of the IMaD countries will be actively involved in national level training in malaria microscopy and diagnostic QA in support of the IMaD Outreach Supervision Program.

#### **1.5. Objective 4: Provide technical input for required equipment and supplies.**

IMaD has been requested to support USAID’s DELIVER Project<sup>1</sup> with respect to strengthening malaria diagnostics. Under USAID Task Order 3, JSI has been assigned with the procurement of RDTs, bed nets, anti-malaria pharmaceuticals and laboratory equipment to the 15 malaria focus countries. As part of this effort, IMaD will provide technical information on laboratory equipment and supply needs. These needs will be determined from data collected during both the initial laboratory assessments as well as the ongoing Outreach Supervisory Visits.

#### **1.6. Monitoring and evaluation.**

IMaD performance continues to be monitored through a combination of indicators:

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<sup>1</sup> John Snow International | DELIVER Project: <http://deliver.jsi.com/dhome>

**Input indicators** measure the level of resources being made available for use by IMaD, including infrastructure, equipment and diagnostics supplies procured. Input indicators also include national policies and guidelines essential for effective implementation of IMaD.

**Process indicators** monitor whether personnel recruitment and training has occurred, management systems and procedures have been instituted, requisite working groups, committees and task forces have been established for planning and coordination project activities, and whether diagnostic supplies have been distributed to end-users.

**Output indicators** measure the numbers of countries with actions plans to improve malaria diagnosis, number and types of individuals trained, labs with supervisory systems, labs equipped with microscopes and job aids, MOH with strengthened capacity, etc. Some output indicators will provide a numeric evaluation of the coverage achieved by the IMaD project in terms of cases with confirmed diagnosis.

**Outcome indicators** will focus on the quality assurance system with supervisory visits contributing to increases in the accuracy of diagnoses by trained laboratory technicians and health workers. Selected core indicators will be consistent with the monitoring and evaluation indicators within PMI.

Additional indicators from the GFATM monitoring and evaluation toolkit will be included, if necessary, to further demonstrate project outcomes (see IMaD Tracking Sheet in Annex D for accomplishments – quantitative).

## **Section 2 | Accomplishments**

### **2.1. *Development of curricula, tools and job aids***

IMaD has developed the following generic documentation to support FY2009 and future implementation activities:

1. Curriculum for Laboratory Supervisors to Strengthen Malaria Diagnosis through Outreach and Support Supervision
2. Curriculum for Clinical Supervisors to Strengthen Malaria Management through Outreach and Support Supervision
3. IMaD Refresher Training in Laboratory Diagnosis of Malaria Curriculum and Timetable
4. IMaD Refresher Training in Clinical Methods for Malaria Case Management Curriculum and Timetable
5. Outreach Supervision Checklist
6. OTSS Manual for Outreach Supervisors
7. Generic Guidelines for Laboratory Diagnosis of Malaria
8. Quality Assurance Validation of Blood Slides for Malaria

9. Individualized Work plans developed for nine countries for FY2010
10. IMaD Monitoring and Evaluation Matrix
11. Job Aids/Bench Aids

With the exception of the workplans, the above mentioned documents are considered to be in generic format until the IMaD team and PMI resident advisors share the materials with the Ministries of Health. Materials are made country specific in terminology and focus during discussions with Ministries of Health and National Malaria Control Programs, during Technical Working group meetings; and during Stakeholders Workshops.

### **1. IMaD Refresher Training in Laboratory Diagnosis of Malaria Curriculum and Timetable:**

This curriculum has been developed to facilitate strengthening of malaria diagnostic interventions, with a focus on malaria microscopy. It is expected that the training of laboratory technicians to improve their skills in malaria microscopy will strengthen and enhance the ongoing strategic approaches of achieving NMCP and PMI goals that will result in the reduction of malaria transmission in the country. This course is designed to provide the participants with the most up to date procedures and practices for the laboratory diagnosis of malaria, based on recent guidelines prepared by the World Health Organization.

On completion of the course, the participants should be able to:

1. Demonstrate an understanding of the epidemiology of malaria
2. Describe the biology of the malaria vector and parasite
3. Prepare thick and thin blood films and stain films to a high standard
4. Identify all malaria species (*P.f.*, *P.v.*, *P.o.*, *P.m*) microscopically
5. Identify all malaria parasite stages microscopically
6. Differentiate pseudoparasites and artifacts from true malaria parasites
7. Quantify malaria parasites accurately
8. Carry out malaria Rapid Diagnostic Tests (RDTs) correctly
9. Identify sources of errors in malaria diagnosis and implement their remedies
10. Maintain and store microscopes properly
11. Participate in development of national and facility-based plans for QA/QC in malaria diagnosis
12. Monitor the performance of malaria Rapid Diagnostic Tests (RDTs)
13. Participate in development of national plans for regular support supervision and on-site training and mentoring of staff
14. Develop and maintain Standard Operating Procedures (SOPs)
15. Perform technical work according to standards of good laboratory practice (GLP)

## **2. IMaD Clinical Training Curriculum and Time Table:**

This curriculum has been developed to facilitate strengthening of malaria diagnostic interventions, with a focus on the role of clinicians in malaria diagnosis and management. It is expected that the training of clinicians to improve their clinical skills will strengthen and enhance the ongoing strategic approaches of achieving the NMCP and PMI goals that will result in the reduction of malaria transmission in the country. This course is designed to provide the participants with skills in standard clinical methods for malaria management, based on accepted practice.

On completion of the course, the participants should be able to:

1. Demonstrate an understanding of the epidemiology of malaria
2. Describe the life cycle of the parasite in the human host and the vector
3. Relate the malaria life cycle to the clinical presentation of malaria
4. Understand standards of clinical practice and conduct history taking, physical examination and use and interpretation of laboratory tests, to a high standard.
5. Understand clinical approaches to fever and anaemia.
6. Identify, investigate and manage all types of malaria including uncomplicated malaria, severe and complicated malaria, and malaria in pregnancy.
7. Understand the principles of major diagnostic methods for malaria confirmation, including microscopy and RDT use
8. Utilize malaria diagnostic results in patient management
9. Carry out malaria Rapid Diagnostic Tests (RDTs) correctly
10. Identify sources of errors in malaria diagnosis and implement their remedies
11. Participate in development of national plans for regular support supervision and on-site training and mentoring of staff

## **3. Outreach Supervision Checklist (laboratory and clinical)**

This checklist was developed as a resource for the Outreach Supervisor to assess performance and identify areas of the laboratory services that require strengthening. Wherever possible, on-site laboratory supervision will be integrated with existing supervisory systems relating to other disease control or national programs. Checklists developed during FY2008 have been modified based on feedback received from national programs and Outreach Supervisors.

## **4. OTSS Manual for Outreach Supervisors**

The manual was developed as a resource for the Outreach Supervisors to use during Outreach visits. The manual provides guidance and instruction on how to correctly use the supervision checklist.

## **5. IMaD Guidelines for Laboratory Diagnosis of Malaria**

Guidelines for laboratory diagnosis of malaria consist of comprehensive guidelines formulated to assist laboratory personnel as well as other health professionals who will use and interpret diagnostic tests for malaria. The Guidelines include concise information serving the purpose of a first-hand book as well as a source of laboratory instruments and tools to support malaria diagnostic work. The document should also be used by other health personnel working in the field of diagnostics such as clinicians, who play an important role in the diagnostic process. The following items are included in the guidelines:

1. Country-specific introduction: background, occurrence and distribution of malaria, malaria life cycle and transmission, clinical features of malaria, reasons for ordering a diagnostic test for malaria, use and interpretation of diagnostic tests for malaria, levels of management
2. Guidelines on confirmatory diagnostic tests for malaria: diagnostic tests for malaria, microscopy, RDTs for malaria, other laboratory diagnostic techniques
3. Laboratory Management: general laboratory management, principles of quality assurance and quality control, laboratory safety and first aid
4. Standard Operating Procedures

## **6. Quality Assurance Validation of Blood Slides for Malaria**

IMaD has developed a slide rechecking protocol to ensure a standard method of validating test performance in malaria diagnosis. Rechecking of stained slides can be done on-site by the visiting supervisors and/or at designated national or regional reference laboratories; however on-site slide rechecking is recommended to enable supervisors to provide immediate feedback to laboratory staff. The purpose of rechecking slides is to assess overall laboratory performance; it is NOT intended to confirm an individual patient's diagnosis.

## **7. Country Work plans for FY2010**

IMaD has completed Work Plans for the following countries: Angola, Benin, Ghana, Kenya, Liberia, Mali, Malawi, and Zambia. The work plans are being reviewed by the specific PMI country teams and will guide implementation during FY2010.



## **8. IMaD Monitoring and Evaluation Matrix**

Malaria reporting should be integrated with national disease reporting systems, particularly at peripheral levels. As far as possible, the malaria information system will be harmonized with existing national health information systems for malaria and other disease control programs. The final IMaD M&E indicators were revised with the advice of USAID and CDC during the 2009 IMaD Annual Planning Meeting.

### **2.2. Objective 1: Development and implementation of malaria diagnostic policy.**

#### ***Ethiopia***

IMaD is providing technical support to the International Center for AIDS Care and Treatment Program (ICAP), a local PMI implementing partner in Ethiopia. Dr. Bereket Hailegiorgis, ICAP's project director and IMaD's point of contact, is working directly with the team in a friendly and collaborative manner. During FY2009 the team provided technical assistance on the following key policy documents:

1. Malaria Treatment (Case Management) Guidelines for Health Workers in Ethiopia.
2. National Guidelines for a Malaria Laboratory External Quality Assessment Scheme
3. Malaria Laboratory Diagnosis EQA Implementation Manual Content
4. Malaria Laboratory Diagnosis Training- Participant's Module Preparation Template
5. Malaria Light Microscopy Standard Operating Procedure
6. Malaria Microscopy Training Participant Manual Content
7. Malaria RDT Training Participant Manual Content
8. Job Aid for Malaria Light Microscopy

#### ***Ghana***

The National Guidelines for the Laboratory Diagnosis of Malaria is in the final stages of review by the NMCP. The CDC, supporting PMI-Ghana and the WHO, have provided the team with technical input and the document is currently in alignment with best practices and international standards. Recently, during the 5<sup>th</sup> MIM Pan-African Malaria Conference, the WHO released new recommendations encouraging all patients including those less than five years to receive a confirmatory test to exclude malaria. PMI-Ghana and the NMCP have included an introductory statement to be incorporated into all case management documents including the National Guideline for Laboratory Diagnosis of Malaria in order to comply with these recent recommendations. IMaD will support the printing and dissemination of 3000 copies of the Guidelines to health facilities throughout the country.

***Madagascar – On hold due to civil unrest.***

Based on discussions with the PMI team, IMaD will focus on developing National Guidelines for Laboratory Diagnosis of Malaria to include the use and interpretation of microscopy and RDTs and development of SOPs for laboratory diagnosis. IMaD will also help develop national procedures for malaria diagnosis, training and establishing means-tested fees. IMaD has developed a design for a detailed assessment of performance using RDTs in health centers, in collaboration with IPM, CDC, Santenet and the NMCP. This assessment is expected to provide guidance to policy changes related to RDT use in HCs.

### ***Zambia***

IMaD supported a Stakeholders Meeting in Kabwe in September 2009 to review and finalize two key diagnostic policy documents. The team provided recent updates based on the newly released WHO Quality Assurance Manual, version 1, to ensure alignment with best practices and international standards. A technical working group comprising IMaD, the NMCC, and academic and local partners, are making final revisions to the documents. IMaD will support the editing, printing and dissemination of these two key documents during the second quarter of FY2010.

### **2.3. Objective 2: Performance of comprehensive baseline laboratory assessments.**

A total of 1,210 laboratory and clinical health facility assessments were conducted during FY2009. These assessments took place in 3 countries: Ethiopia, Kenya and Malawi. The major findings from these assessments were as follows:

- Absence of or outdated National Guidelines for Laboratory Diagnosis of Malaria
- Lack of adequately trained laboratory staff.
- Lack of essential diagnostic equipment, including microscopes
- Lack of quality assurance processes for malaria diagnosis
- Poor communication between clinicians and laboratory staff.
- Limited opportunities for professional development of clinicians and laboratory staff.
- Limited communication between MOH and laboratories.

A summary of site assessments and major findings for each country are as follows:

### ***Ethiopia***

An IMaD team assisted ICAP in piloting a modified version of the IMaD assessment tool at four health facilities in the East Shoa Zone of the Oromia Region. Based on the results of these pilot assessments IMaD and ICAP revised the assessment checklist, which was then used by ICAP during an in-depth laboratory baseline assessment of selected regional laboratories and health facilities in the Oromia Region. The ICAP assessment was conducted in 70 health facilities

located in 5 selected administrative zones of the Oromia Region. The IMaD team provided assistance in the finalization of the assessment report. Major recommendations include: laboratory staff and clinicians require refresher training in malaria laboratory diagnosis (microscopy and RDTs); there is need for development of guidelines for External Quality Assurance (EQA) of malaria laboratory diagnosis; SOPs and bench aids should be developed and distributed to all facilities.

### ***Kenya***

The IMaD project trained 120 District Medical Laboratory Technologists (DMLT) and Provincial Medical Laboratory Technologists (PMLT) on the use of the health facility assessment tool, as well as 12 National Level Trainers in on-site supervision of the assessment. In total these enumerators assessed 1,192 health facilities representing 76 districts in 8 provinces throughout the country. Shortages of laboratory staff according to recommended norms<sup>2</sup> were found across all levels of health care, especially at the Health Centre level. There was a significant shortage of microscopes across all levels of care. Less than 10% of facilities were incorporating quality assurance procedures for malaria diagnosis. Laboratories lack standard operating procedures, reference manuals and bench aids relating to malaria diagnostics. Just over a quarter of laboratories had staff who had received refresher training. Just over half the laboratories received at least one support supervisory visit in the past year.

The IMaD team is currently assisting the Division of Malaria Control (DOMC) in Kenya with the finalization of the report of this assessment. Recommendations from the report are being prioritized with a view to planning interventions for the current and next fiscal years.

### ***Malawi***

IMaD conducted a laboratory assessment of 14 health facilities providing malaria microscopy services. In addition to this facility assessment, the team conducted a sensitivity/specificity assessment of microscopy proficiency in each of these health facilities. Facilities were found to have reasonably reliable electrical services but lacked backup generators. Frequent cuts in water supply and electricity interfered with malaria diagnosis. None of the facilities visited used RDTs for routine diagnosis of malaria. Laboratories visited had a



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<sup>2</sup> Medical Laboratory Services of Kenya. National Policy Guidelines, 2006.

high average daily workload - approximately 46 blood films per day. There appeared to be no standard or regular system for equipment maintenance. The proficiency assessment revealed that most microscopists competently distinguished negative from positive blood films, less competently identified species and stages, and failed to adequately measure parasite density.

#### **2.4. *Objective 3: Provide training and technical assistance for establishing QA and supervision.***

The majority of IMaD activities for FY2009 focused on identifying and training laboratory staff and clinicians to establish quality assurance and supervision through IMaD's Outreach Training and Support Supervision Program (OTSS). In FY2010, IMaD will focus on supporting OTSS visits and program strengthening.

IMaD has carried out training and quality assurance activities in Angola, Benin, Ghana, Liberia, and Zambia. Summaries of these activities are presented here.

##### ***Angola***

In August 2009, an Outreach Training and Support Supervision workshop was facilitated by IMaD, Institut de National de Saúde Pública, and the National Malaria Control Program. The purpose of the workshop was to introduce participants to quality concepts and practice using the Outreach Checklist. Sixteen laboratory professionals attended the workshop and were evaluated during pre and post examinations on theory based knowledge, RDT performance, and malaria microscopy. Based on microscopy assessment results it was recommended that supervisors attend a five day refresher training course in malaria microscopy before launching OTSS visits nationwide.

During September 2009, OTSS visits were piloted in Huambo and Zaire Provinces with MENTOR, a local PMI partner, using an abbreviated version of the IMaD OTSS Checklist. Data was collected and later analyzed to assess scalability. Based on feedback from the pilot exercise, the team is re-addressing certain aspects of the checklist to streamline data collection, developing a supervisor's manual, and producing a template for reporting.

##### ***Benin***

###### ***Outreach Training and Support Supervision***

During June 2009 an IMaD team of trainers conducted a 5.5 day course on Outreach Training in Support Supervision for 12 laboratory and 12 clinical supervisors from all 12 departments of Benin. The IMaD training program focused on both clinicians and laboratory technicians receiving combined refresher training to improve communication and trust between the two groups. In Benin, where the PISAF project is already conducting training workshops for clinicians, IMaD modified the training curriculum to two days of joint training sessions for both

clinicians and laboratory technicians, and three days of stand-alone training for laboratory technicians. This was designed to complement the existing training that had been conducted by PISAF, and the curriculum was developed after a review of PISAF's curriculum and discussions with the PISAF project staff.

The laboratory training sessions focused on laboratory infrastructure and practice, management of laboratory chemicals, reagents and supplies, laboratory security and safety, preparation and reading of blood slides (including a practical session) and use and interpretation of RDTs. The joint sessions (laboratory and clinical) focused on sources of diagnostic error, epidemiology and malaria control in Benin and included a practical session in a local health facility. These sessions were designed to prepare teams of supervisors to implement a national QA/QC outreach program funded by the IMaD project.

Pre and post examinations on theory-based knowledge were given to all participants. Laboratory supervisors were subjected to a short competency assessment on malaria microscopy. The examination briefly focused on their ability to distinguish negative from positive slides, and species identification. Overall performance was lower than expected, specifically in species identification.

#### *Malaria Microscopy Refresher Training*

Based on the results of microscopy assessments conducted during the June 2009 OTSS training course in Benin, it was recommended that the laboratory supervisors attend a refresher training course in malaria microscopy. In August 2009, prior to launching the outreach program, an IMaD team implemented a 5-day refresher training course in Cotonou for the 12 laboratory supervisors trained during the OTSS training and two participants from the NMCP. This course was conducted using the IMaD Refresher Training in Laboratory Diagnosis of Malaria curriculum which comprises both theoretical and practical sessions with a strong emphasis on practical work. The pre-test was used to identify gaps in knowledge and the post-test was used to assess the participants' improvement. A comparison was made between the results of the pre-test and the final assessment.

#### *OTSS Round 1*

Following the IMaD refresher training courses for clinical and laboratory supervisors, the first round of IMaD's Outreach Program (OTSS) was implemented in 36 health facilities from all 12 Departments of Benin, from 31 August – 5 September. During these visits, laboratory and clinical supervisors provided on-site mentoring and training for 72 health workers in the use of RDTs, proper implementation of the QA/QC system, thick and thin blood smear preparation and proper Giemsa dilution. Three Teams of IMaD and central level supervisors from the PNLN conducted oversight visits of all supervisory team visits. Two issues arose from the first round

of supervision: better communication between the MOH and the health facilities is required, and the supervisory checklists must be modified for ease of use. IMaD captured supervisor feedback on the checklist and worked with Barbara Matthys of STI to revise the checklists in accordance with these issues. The second round of OTSS has been scheduled for December 2009 and will include follow-up visits at the 36 round 1 health facilities and initial visits to an additional 24 health facilities.

## ***Ghana***

### *Outreach Training and Support Supervision*

During June 2009, an Outreach Training and Support Supervision workshop was facilitated by IMaD, the National Malaria Control Program (NMCP), Ghana Health Services (GHS) and the Institutional Care (IC) department of the GHS. The purpose of the workshop was to introduce participants to quality concepts and to the Laboratory and Clinical Outreach Checklists. A total of forty-six participants including six national level trainers attended the workshop. The workshop ran for five and a half days with daily joint sessions for clinical and laboratory cadres to address cross-cutting issues and promote communication. Separate theory and practical sessions were held for the laboratory and clinical participants to address specific topics relating to their field. Practical sessions were held at the NPHRL and Korle-Bu Hospital. An on-site supervision exercise occurred at a nearby health facility to give participants an opportunity to practice using the supervisory checklists.

Pre and post examinations on theory based knowledge were given to all participants. Laboratory supervisors were subjected to a short competency assessment on malaria microscopy focusing on their ability to distinguish negatives from positives, and parasite counting. Overall performance was lower than expected, specifically in regards to parasite counting and identifying low density positive slides. Based on the assessment results it was recommended that laboratory supervisors attend a five day refresher training course in malaria microscopy before launching OTSS visits nationwide.

### *Malaria Microscopy Refresher Training*

During November 2009, a refresher training workshop in malaria microscopy was held in Accra, to enable the Outreach Laboratory Supervisors to acquire and develop essential knowledge and competencies in malaria diagnosis. The duration of the course was five days with extensive practical sessions every afternoon. The course focused on preparation of blood films, species identification, parasite quantification, RDTs, and standards of good laboratory practice. Theory based examinations were conducted on the first and last days of the workshop. Competency assessments were based on validated standardized slide sets sourced from the Malaria Research and Reference Reagent Resource Center (MR4) and also administered on the first and last days.

Twenty Outreach Supervisors representing all ten regions in Ghana attended the training. A report detailing individual performance is forthcoming.

## ***Liberia***

### *Malaria Microscopy Refresher Training*

During October 2009, a refresher training workshop in malaria microscopy was held in Monrovia, Liberia. Twenty participants were invited to attend the workshop, one from each of the fifteen counties, and five from the national level. Four additional participants were invited by the NMCP comprising laboratory assistants working in Grand Gedeh, Sinoe, and Montserrado counties. A total of twenty-four laboratory staff attended the training.

The duration of the course was five days with extensive practical sessions each afternoon. The course focused on preparation of blood films, species identification, parasite quantification, RDTs, and standards of good laboratory practice. Theory-based examinations were conducted on the first and last days of the workshop. Competency assessments were based on validated standardized slide sets sourced from the Malaria Research and Reference Reagent Resource Center (MR4) and also administered on the first and last days. A report detailing individual performance is in preparation.

Refresher training workshops for malaria microscopy and RDTs will be held quarterly during FY2010 to address gaps in laboratory diagnostic services. The team will work closely with the NMCP to identify top performers (evaluated during competency assessments) to establish a core group of supervisors who can initiate the Outreach Training and Support Supervision program.

## ***Zambia***

### *Outreach Training and Support Supervision*

During August 2009 a team of IMaD facilitators, in collaboration with the NMCC and the Malaria Consortium, facilitated an Outreach Training and Support Supervision workshop. The purpose of the workshop was to introduce participants to quality concepts and to the Laboratory and Clinical Outreach Checklists. A total of 36 participants from all 9 provinces of Zambia, 18 laboratory staff and 18 clinicians, attended the workshop. A team of 4 IMaD trainers and 8 national level trainers conducted this workshop in Kabwe, Central Province. The workshop ran for five and a half days with daily joint sessions for clinical and laboratory supervisors to address cross-cutting issues and promote communication. Separate theory and practical sessions were held for the laboratory and clinical participants to address specific topics relating to their field.



Pre and post examinations on theory based knowledge were given to all participants. Laboratory supervisors were subjected to a short competency assessment on malaria microscopy. Briefly the examination focused on their ability to distinguish negative from positive slides, and parasite counting. Overall performance was lower than expected, specifically in regards to parasite counting and identifying low density positive slides. Based on these results, it was recommended that the 18 laboratory supervisors attend a five day

refresher training course in malaria microscopy before launching outreach visits nationwide. Refresher training occurred in December 2009 and the first round of the outreach program was launched on January 25 2010.

#### **2.5. Objective 4: Provide technical input for required equipment and supplies.**

IMaD has developed essential equipment and supplies lists for each level of the health system to support malaria diagnostics. These lists have been shared with the MOH and NMCP and tailored to country needs and specifications. In addition, IMaD envisions that supplies will be managed and monitored to some extent through the Outreach Supervisory Visits once the program is established in each country. As supply lists become finalized IMaD will send the order to the PMI resident advisor, who will place orders through the DELIVER project. Malaria microscopy kits are available through DELIVER and provide approximately enough reagents and supplies for 1,000 patient diagnoses. The estimated time for delivery is approximately 13 weeks after the confirmation of the order from the PMI Mission. An additional 1-2 weeks is needed for transportation and necessary customs clearance.

#### **Ghana**

Based on the results of IMaD's 2008 Laboratory Assessment in Ghana, IMaD formulated and provided a list of essential clinical and laboratory diagnostic equipment and supplies, technical specifications and quantities to DELIVER in May 2009. This order consisted of the following:

- 30 Olympus CX21 Microscopes with extra bulbs and wooden boxes
- 90 Microscopy malaria kits
- 200 Coast Large Flex Light Professional Use Light LL7584 (EARL light replacement)
- 74,000 Care Start RDT (*Plasmodium falciparum*) tests



This equipment and supplies arrived in Ghana in late FY2009 and are ready for distribution to health facilities. The feedback from the Round 1 outreach visits will be used to inform procurement needs in a facility-specific manner.

## ***Mali***

During IMaD's refresher training planning visit in FY2009 the IMaD team identified a need for microscopes to be used for training in Mali prior to the launch of refresher training and the outreach program. Following this finding, the IMaD project procured 20 Olympus CX 21 microscopes which were shipped directly to Bamako. These microscopes are currently being used for the IMaD-INRSP Refresher Training and will be distributed as per IMaD and INRSP guidance to health facilities and training institutions in Mali.

### **2.6. *Development of SharePoint IMaD Website***

SharePoint is a browser-based collaboration and document management platform. It is used to host websites that access shared workspaces and documents. IMaD has created a workspace for each of the ten countries in which we have been active during FY2009. The database contains "final documents" such as reports, presentations, training materials and job aids, maps, papers and other technical resources, workplans, calendars, MOPs, partner information, Curricula Vitae, curricula, proposals submitted, and contact data among many others. Additionally the repository contains a library of working documents that can be reviewed and/or edited by authorized partners. SharePoint may not work as well in places with slow internet connections, but in general is expected to facilitate document sharing between IMaD partners and PMI counterparts and to improve communication within the IMaD Consortium. Country-specific accounts and passwords have been set up for PMI Missions and for each NMCP with access to final documents and country-specific calendars.

## **Section 3 | Challenges and Lessons Learned**

### **3.1. *General challenges and solutions***

During FY2009, IMaD was confronted with the common difficulty of finding suitably qualified laboratory staff with field experience in limited resource settings. In addition, IMaD realized the need to expand organizational capacity. IMaD has addressed these constraints by scaling up both scientific and administrative support. The program now has an added 2 Full Time Employees (FTE) within the consortium plus a further 3 short term technical experts. IMaD is also currently contacting organizations and individuals throughout Africa regarding their availability to work with the project as short term technical experts. As activities increase throughout FY2010, IMaD seeks to expand its pool of technical experts to meet the needs of each country and activity.

As IMaD lacks in-country offices in the majority of active countries, the project has experienced difficulties implementing activities in the absence of dedicated representation from within each country. During the first quarter of FY2008, IMaD therefore began identifying in-country points of contact within the NMCPs. This greatly increased communication between the MOH and IMaD head office in the USA and enhanced implementation of in-country activities. During FY2009, the IMaD project, with PMI Mission concurrences, hired In-country Coordinators in 4 countries: Benin, Ghana, Liberia and Zambia, to work closely with the NMCP and the PMI Mission to ensure that activities stay on track and deliverables are met.

IMaD originally designed a generic outreach paradigm for capacity building. However, this one-size fits all approach cannot work in all countries. IMaD has designed a flexible implementation strategy informed by baseline information, outreach supervision data, field studies, and consultation visits. These data will be used to make informed decisions to improve malaria diagnostics in specific settings.

The implementation of Outreach Training and Support Supervision workshops during FY2009 has revealed the need for refresher training courses in malaria microscopy for laboratory supervisors in each country prior to the launch of outreach programs. IMaD has therefore developed laboratory and clinical refresher training curricula and has implemented laboratory refresher training courses in three countries to date. This identified need for refresher training has delayed the launch of outreach programs throughout all IMaD countries.

IMaD predicts major challenges in implementing quality-assured malaria diagnosis in post-conflict countries as most, if not all, qualified staff have left. In such countries, short term technical assistance will have little impact and therefore IMaD advises mid-term technical assistance periods of at least 3 months in duration for Angola and other countries in need of rapid implementation. In all countries, where possible, IMaD seeks to integrate activities with existing TB and HIV programs as well as clinical training and supervision.

### **3.2. *Country-specific challenges and suggested solutions***

The main challenges experienced by IMaD within each country are outlined below. In addition to current challenges, predicted future problems have been included. These issues are based on areas where the current data show a potential constraint. The major issues for each country are outlined along with recommended or planned steps IMaD will take to resolve each problem.

#### ***Angola***

Due to the post-conflict setting of Angola, IMaD has experienced difficulties in organizing logistics and facilitating communication among all partners. There is no country policy established for uniformity of RDT products, and the lack of a National Reference Laboratory has impeded the development and implementation of a national QA/QC program.

To ensure that the **IMaD** workplan and timelines are maintained, IMaD is currently seeking to identify a partner to provide long-term technical assistance in-country. This course of action has been taken in several IMaD countries and would **address** the logistical and organizational issues in Luanda and the surrounding areas.

IMaD will also support the utilization of the INSP to assist in the activities that a National Reference Laboratory would normally undertake. A Technical Working Group will be established during the first half of FY2010 to establish and define the role of a reference laboratory within the NMCP. IMaD will encourage and support the development of a country policy on malaria RDTs, as well as provide advice on lot testing and the purchase from WHO-approved suppliers only.

### ***Benin***

The NMCP in Benin has a significant lack of laboratory **supervisors** and **resources** for laboratory supervision. Additionally, laboratory data is not used in clinics when making decisions on case management.

IMaD plans on collaborating with the PISAF project on supervision starting with Round 3 to be launched in April 2010. A Memorandum of Understanding is currently being drafted which will detail the extent of collaboration and cost sharing of each project. PISAF will be responsible for all clinical aspects of supervision and IMaD will remain in charge of laboratory issues. IMaD will also seek to collaborate with the World Bank Booster Program on future refresher training courses for malaria microscopy. During supervisory visits, IMaD will provide on-site training to clinicians in the rational use of laboratory data to address the gap in coordination between laboratories and clinics.

### ***Ethiopia***

The combination of mixed parasite species and unstable malaria transmission in Ethiopia has created a difficult environment for malaria diagnosis and treatment. IMaD, through its support of ICAP, will seek to adapt training materials to focus on responding to mixed infections. Additionally, IMaD will recommend and assist, where practical, with the implementation of training for emergency outbreak responses and malaria microscopy. Epidemic preparedness and response will also be included in the recommended National Malaria Strategy.

### ***Ghana***

The number of health facilities with laboratories in each region is too high for the full scale-up of IMaD's OTSS Program to be implemented by regional supervisors. The OTSS will therefore scale up through training district level supervisors to maximize the impact and success of the OTSS program.

There are many different RDT products currently being distributed and used in Ghana. To address this, IMaD will encourage the establishment of a country policy to regulate RDT products. IMaD will also provide advice on lot testing based on WHO recommended guidelines and advise that Ghana follow WHO's "Interim Selection Criteria for Procurement of Malaria RDTs" as well as USAID guidance on procurement of RDTs.

### ***Liberia***

IMaD activities in Liberia have been delayed due to the complexities of working without an in-country presence. A shortage of trained laboratory technologists to implement OTSS in each country has also been identified.

IMaD has addressed the delays in program implementation through the hiring of an In-Country Coordinator and the development of an aggressive FY2010 Workplan. Detailed in this workplan is IMaD's Liberia-specific approach of conducting competency assessments of known laboratory technologists with the aim of identifying and developing a core team of supervisors. This team of supervisors will then assist with the implementation of the OTSS program in Liberia.

### ***Madagascar***

IMaD activities in Madagascar are currently on hold due to political instability.

### ***Mali***

IMaD has identified a shortage of training equipment to conduct refresher training for laboratory supervisors. IMaD activities were delayed due to this shortage and the difficulties in working without an in-country presence.

IMaD has procured 20 microscopes to be used in Mali for training laboratory supervisors at the INRSP and other training institutions. To address the delays in implementation of activities a job advertisement has been posted for an IMaD In-Country Coordinator. IMaD hopes to fill this position by early March 2010.

### ***Zambia***

The lack of a national reference laboratory has created challenges in the implementation of a national QA program in Zambia. To address this need, IMaD has funded two central level microscopists to attend the WHO accreditation course in Nairobi, Kenya to strengthen QA of malaria microscopy at central level

There also exists a lack of integration of clinical and laboratory supervision at peripheral levels. IMaD therefore provided joint OTSS training to provincial laboratory and clinical staff. These trained staff members will conduct supervisory visits within their provinces in teams comprising both laboratory and clinical supervisors.

### 3.3. IMaD Planned Performance Objectives FY2010

The planned performance objectives for IMaD during FY2009 were presented in detail in the IMaD FY2009 Work Plans. This section serves as an overview of the workplans and planned quarterly activities for each country. Section 1.6 contains details of the monitoring and evaluation of selected deliverables.

Table 1. FY2010 Country Activities

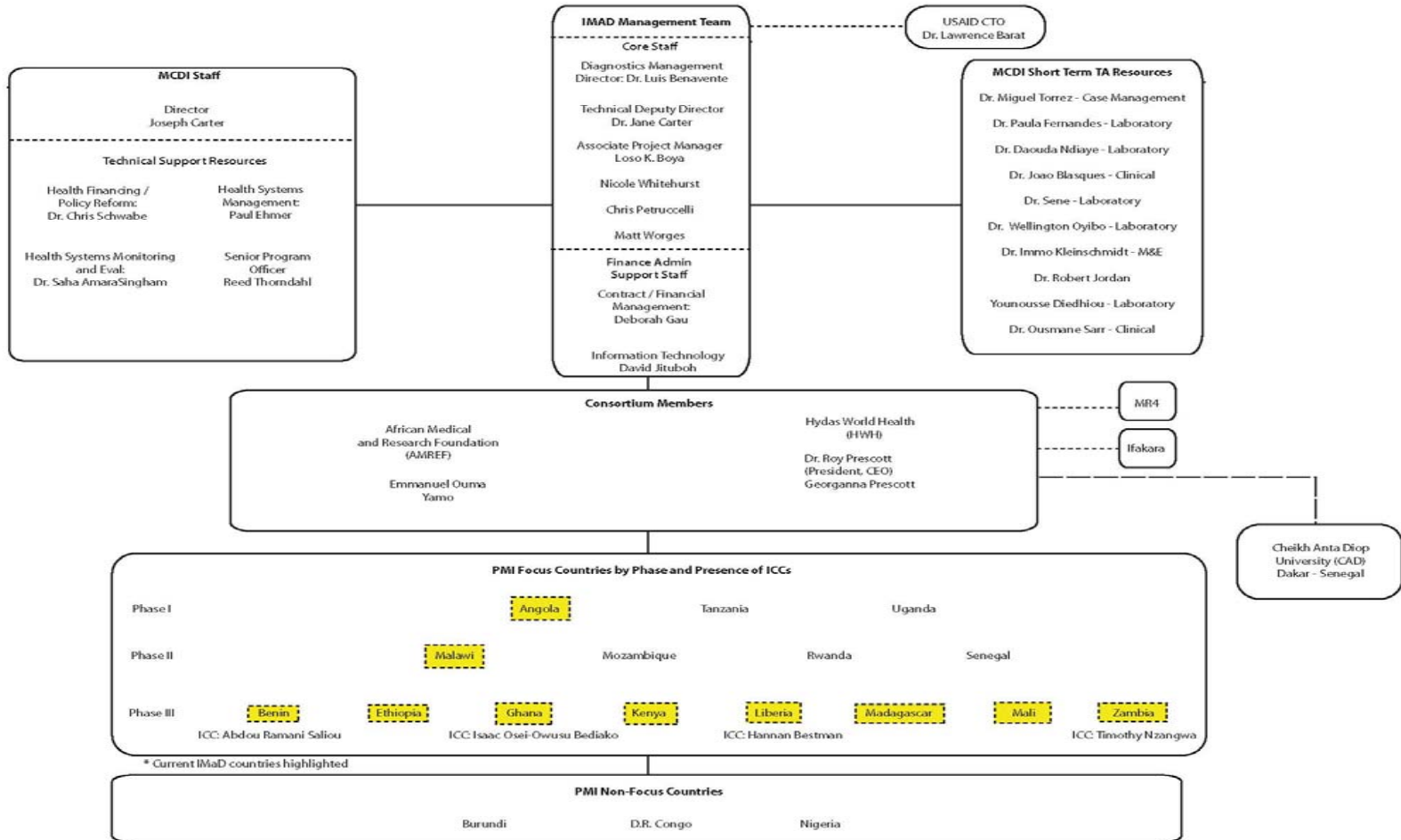
Country	Task	Activity	Quarter				
			1	2	3	4	
Angola	Training	Printing support for 1000 sets of job aids		X			
		Refresher training in malaria microscopy in Zaire province		X			
	QA	TA in outreach supervision in PMI-supported provinces		X	X	X	
Benin	QA	Implement training and EQA plan					
		Checklist orientation	X				
		OTSS Round 2	X				
Ethiopia	QA	TA for QA for microscopy and RDTs	X	X	X	X	
Ghana	Policy	Finalize national guidelines	X				
		Printing and dissemination - 3000 copies		X			
			Support printing for CM guidelines		X		
	Training	Refresher training of laboratory supervisors	X				
		Develop standard slide sets		X	X	X	
	QA	Sensitization Workshop		X			
		OTSS Round 1		X			
		OTSS Round 2			X		
		OTSS Lessons Learned Workshop			X	X	
	Kenya	Procurement	Procure 10-20 microscopes for training		X		
	QA	OTSS		X	X	X	
Liberia	Training	Refresher microscopy training	X	X	X	X	
		Development of NPRHL	X	X	X	X	
	Procurement	Procure equipment and supplies for NPHRL		X			
	Policy	Develop National Guidelines for laboratory diagnosis	X	X	X	X	
Madagascar							
Mali	Training	Refresher training in malaria microscopy		X			
	QA	Monthly OTSS		X	X	X	
		OTSS Feedback Workshop			X		
	Policy	Malaria policy development			X	X	
Malawi	ICC	Hire Mali ICC		X			
	Policy	Development of national policy guidelines		X	X	X	
		Stakeholders Meeting				X	
	Training	OTSS Training		X			
		Refresher					

	QA	OTSS Round 1	X	X	X
	Procurement	Provide input on essential diagnostic supplies and equipment			X
Zambia	ICC	Hire Malawi ICC		X	
	ICC	Zambia ICC Hired	X		
	Training	Refresher Training	X		
	QA	OTSS Round 1		X	
		OTSS Round 2			X
		OTSS Follow-up Workshop			X

# Section 5 | Appendices

## A. IMaD Program Structure and Management

REVISED IMAD ORGANIZATIONAL STRUCTURE



## B. IMaD's Core Staff

Position	CORE	Field	
		In-country	Non-country
Project Director (PD). Dr. Luis Benavente (LB) 100%	Represents IMaD prime recipient, MCDI, in overall management, planning and coordination. Liaises with IMaD partners. Tracks progress towards benchmarks based on work plan maintained by DD. Liaises with partners in maintaining updated M&E data, to include overseeing database development, data processing and data analysis. Ensures partner compliance with federal regulations, including marking policies. Develop overall QA framework for diagnosis with RDTs. Coordinates presentations in technical conferences. Budgeting. Assigns country-specific responsibilities to partners. Coordinates development of technical scopes of work for consultants.	Oversight of field activities Assessments Madagascar, Angola, Benin, Malawi.	Point person in Angola, Malawi, Benin and Madagascar.
Technical Director (TD) Dr. Jane Carter (JC) 75%	Point of contact with WHO. Supervises the development of assessment and training materials. With PD, develops technical scopes of work for consultants. Oversees the development of EQA protocols for microscopy. Reviews EQA protocols for RDTs. Oversees AMREF's staff hired via IMaD. Coordinates presentations at technical conferences in Africa. Oversees technical content of deliverables.	Participates in assessments, other site visits as per specific ATPs Oversees AMREF's field activities aimed at IMaD objectives	Point of contact for: Ethiopia, Kenya, Malawi Reviews country technical reports and work plans.

Associate Project Manager Loso Boya (LB) 100%	Assists PD in maintaining communications with country leads and NMCPs. Oversees HWH's staff hired with IMaD funding. Liaises with PD in providing day-to-day technical/ logistical/ administrative	Participates in assessments, other site visits as per specific ATPs aimed at IMaD's objectives.	Point of contact: DRC, Mali, Burundi Assists PD in deliverables for selected
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	support to selected country teams. Maintains work plan and tracks progress towards benchmarks. Oversees regular updating of IMaD's website and SharePoint files.		countries.
Program and Technical Support Officer (PO) Nicole Whitehurst 100%	Works closely with PD to ensure good communication with CTO. Liaison between IMaD partners, PMI and CDC. Maintains communication in countries where IMaD has LTTA. Ensures timely submission of deliverables to PMI. Supervises interns/temps. Monitors production of deliverables: semiannual reports, country reports.	Participates in assessments, other site visits	Assists in the production of country reports and work plans. Point person: Ghana, Liberia and Ethiopia
Project Officer Emanuel Yamo 100%	Lead laboratory trainer and advisor for IMaD technical activities	Participates in assessments, facilitates laboratory training and stakeholders meetings	Technical oversight of training materials and reports
Program Associate Chris Petrucci (100%)	Assists with ATPs, contracts and other administrative activities. Assists with the organization of teleconferences, conferences, presentations, and other technical/scientific events. Other activities as needed by project.	Assists with data analysis, report production, and other deliverables.	Point of contact for: Zambia.
Financial Officer TBN (100%)	Assists with contracting and financial management by IMaD's financial officer. Assists with budgets, tracking expenditures, pipeline analysis, capturing matching funds from all partners, preparation of financial reports. Assists with procurement.	None	None
IT Specialist David Jituboh (25%)	Design website, provide orientation to all team members on how to upload content, assists with maps, presentations and publications in electronic format	May assist in installing communication systems in selected locations	None

## C. Monitoring & Evaluation Matrix

### IMAD WORK PROGRAM MATRIX -- List of Indicators

(Synthesis of IMAD Illustrative Implementation Plan 04 September 2007, USAID RFA 30 March 2007, IMAD Consortium Partners Planning Workshop Sessions 23 October 2007, review in June 2008)

<b>GOAL</b>			
<b>Support the National Malaria Control Program in the strengthening laboratory diagnosis in national, provincial, and district-level health facilities</b>			
<b>Program Strategy and Interventions</b>		<b>Performance Monitoring and Evaluation Plan</b>	
<b>Activities</b>	<b>Expected Results</b>	<b>Indicators</b>	<b>Data Sources</b>
1. Develop detailed plans for implementing, expanding and improving laboratory-based diagnosis of malaria in Ministry of Health facilities, and any other facilities agreed upon with MOH	<ul style="list-style-type: none"> <li>• Current status of diagnostic policy and strategy reviewed in all priority countries</li> <li>• Assessment tools developed and used by teams for in country assessments</li> <li>• IMAD selected countries assessed during program life (if requested by the country)</li> <li>• A realistic and feasible action plan to improve malaria diagnostics in accordance with NMCP and/or national policy is available in the selected country</li> </ul>	<p><u>Outputs</u></p> <p># of IMaD countries with a national malaria program that have a comprehensive malaria diagnostic policy/guideline and action plan in line with national laboratory policy (if present)</p> <p># of in country assessments completed (report available on IMaD website)</p>	<p>1) NMCP, MoH (or IMaD website if uploaded there)</p> <p>2) IMaD website: country reports</p>
2. Contribute to procurement and in-country logistics of PMI commodities	<ul style="list-style-type: none"> <li>• Assessment of current procurement, storage and distribution systems for laboratory equipment, supplies and commodities for existing diagnostic labs conducted in all priority countries (when requested)</li> <li>• Procurement Plans developed for all IMaD countries (if requested), in coordination with Deliver project</li> <li>• The NMCP and/or unit in the Ministry of Health (MOH) that is responsible for the procurement and distribution of medicines and medical supplies has been assisted by IMaD team when required</li> </ul>	<p><u>Outputs</u></p> <p># and % of IMaD countries with Procurement Plans for laboratory available and prepared by IMaD (if requested)</p>	<p>3) NMCP, MoH</p>
3. Develop training materials on malaria diagnosis as determined by the national	<ul style="list-style-type: none"> <li>• Training materials developed (and translated into the national language) for microscopic/RDT diagnosis according to national malaria diagnostic policy</li> </ul>	<p><u>Outputs</u></p> <p># of IMaD countries with training curricula for</p>	<p>4) NMCP, MoH</p>

policy and WHO standards	<ul style="list-style-type: none"> <li>Development and adaptation of bench aids, additional training materials and reference materials (and translated into the national language)</li> </ul>	<p>clinicians and laboratory staff on malaria diagnostics and malaria case management, using microscopy and RDTs, according to national malaria policy and diagnostic guidelines</p> <p># and % of targeted health facilities which are performing malaria diagnosis (microscope and/or RDTs) that have appropriate reference material (SOPs, bench/job aids) adapted according to national policy</p>	5) NMCP: supervisory visit reports/Laboratory outreach checklists
4. Train health care providers and laboratory staff on malaria diagnosis and case management, according to national policy	<ul style="list-style-type: none"> <li>Training of core national teams completed in the selected countries</li> <li>Laboratory personnel trained/refreshed on malaria microscopy diagnostics and laboratory management according to national policy</li> <li>Health workers (clinicians) trained/refreshed on malaria diagnostics using RDT</li> <li>Health care providers and other relevant health personnel are trained/refreshed on malaria case management according to national policy</li> </ul>	<p><b><u>Outputs</u></b></p> <p># of clinicians trained by IMaD on case management and malaria diagnostics based on a) microscopy, b) RDTs, c) or both</p> <p># of laboratory staff trained by IMaD on malaria diagnostics using a) microscopy, b) RDTs, c) or both</p> <p># and % of targeted health facilities with at least one staff trained to perform laboratory malaria diagnostics (microscopy, RDTs)</p> <p><b><u>Outcomes</u></b></p> <p>% of slides correctly read (checked/controlled during supervisory visits and later from QA system)</p>	<p>6) and 7) Attendance lists of training course/ Laboratory outreach checklists</p> <p>8) NMCP and/or Laboratory department: supervisory visit reports/Laboratory outreach checklists</p> <p>9) NMCP and/or Laboratory department: supervisory visit reports/Laboratory outreach</p>

			checklists, Quality assurance system
5. Contribute to the development of a Logistic Management Information System (LMIS)	<ul style="list-style-type: none"> <li>In-country stock management systems have been assessed</li> <li>If required, a new Logistic Management Information System has been developed in coordination with DELIVER and/or any relevant stakeholders</li> <li>A (simplified) LMIS tool to manage laboratory stocks and supplies is introduced in the selected country</li> </ul>	<p><u>Outcomes</u></p> <p>10) % of health facilities with no reported stock-outs lasting <math>\geq 7</math> days in a row of essential laboratory supplies required for malaria diagnostics or RDTs at any time during the year or epidemic period (to be defined by the country)</p>	<p>10) NMCP and/or Laboratory department: supervisory visit reports/Laboratory outreach checklists</p>
6. Develop a quality assurance system for maintaining diagnostic quality over time	<ul style="list-style-type: none"> <li>Quality Assurance /Quality Control policies and procedures are developed and implemented in coordination with the NMCP and/or laboratory system and/or MOH</li> <li>Supervisory visits take place on a regular basis (frequency according to national malaria policy)</li> <li>A mechanism for cross-checking of a sample of slides has been established in collaboration with the NMCP and the laboratory system</li> <li>Malaria diagnostic competency over time is maintained</li> <li>The sensitivity and specificity of microscopy is monitored in pilot areas on an annual basis</li> <li>The sensitivity and specificity of RDTs is monitored in pilot areas on an annual basis</li> <li>An External Quality Assurance (EQA) program through re-reading of slides has been established</li> </ul>	<p><u>Outputs</u></p> <p># of IMaD countries active in Quality Assurance with a national QA system in place</p> <p>Cumulative # of supervisory visits done in targeted health facilities according to IMaD guidelines</p> <p>% of targeted health facility laboratories that received at least 2 supervisory visits per year</p> <p><u>Outcomes</u></p> <p>% of slides correctly read (checked/controlled during supervisory visits and later from QA system)</p>	<p>11) NMCP, MoH, (or IMaD website if uploaded there)</p> <p>12) and 13) NMCP and/or Laboratory department: supervisory visit reports/Laboratory outreach checklists</p> <p>9) NMCP and/or Laboratory department: supervisory visit reports/Laboratory outreach checklists</p>

			ry outreach checklists, Quality assurance system
7. Develop surge capacity to respond to increased demand for diagnostic capabilities during malaria epidemics	<ul style="list-style-type: none"> <li>• Mechanisms established to detect malaria outbreaks or epidemics in a timely manner in countries requesting surge capacities support</li> <li>• Mechanisms to forecast surges in demand for diagnostic supplies and lab technician is established in countries requesting surge capacities support</li> </ul>	14) # of IMaD countries requesting surge capacities support with available documentation on formal mechanisms for rapid response to malaria outbreaks and epidemics	14) NMCP, MoH (or IMaD website if uploaded there)
<b>PROGRAM OUTCOME INDICATORS</b>		<p># and % of malaria cases among children under 5 years old that are laboratory confirmed (when recommended by country policy)</p> <p># and % of malaria cases among patient of 5 years and older that are laboratory confirmed</p> <p>% of patient that have a negative diagnostic test result for malaria, who are prescribed/treated with an anti-malarial treatment</p>	<p>15 and 16) National data, e.g. annually aggregated data from monthly reports from HMIS</p> <p>17) Annual IMaD survey performing subset of health facilities or from outreach supervision</p>

## D. IMaD Tracking Sheet

FY08/FY09 Activities	1	2	3	4	5	6	7	8	9	10
Activity	Angola	Benin	Ethiopia	Ghana	Kenya	Liberia	Madagascar	Mali	Malawi	Zambia
Baseline Assessment (facilities assessed)	5	11	4	37	1192	8	9	5	14	6
Training for baseline assessment (local enumerators)	2	2	2	26	120	2			3	1
Diagnostic Policy				1			Mission			
OTSS Training	16	24		46			postponed			36
Refresher Training in Microscopy and RDTs		14		20		24	political			
Refresher Training in Clinical Diagnostic Methods							unrest			
OTSS Supervision (on-site training)	12	72								
OTSS Visits (number of HF visited)	6	36								
National level trainers/sentinel site training	2	6		6	12			94		12
Procurement (number of orders made)				1				1		
Accreditation course participants			2		9	1				
ICC		1		1		1				1
<i>Total number trained</i>	<i>32</i>	<i>118</i>	<i>2</i>	<i>98</i>	<i>21</i>	<i>27</i>	<i>0</i>	<i>94</i>	<i>3</i>	<i>49</i>
<i>Total number of policy documents completed</i>				<i>1</i>						
<i>Total number of policy documents printed</i>										
<i>Total number of training materials printed (bench aids/poster counted as sets)</i>	<i>370</i>									