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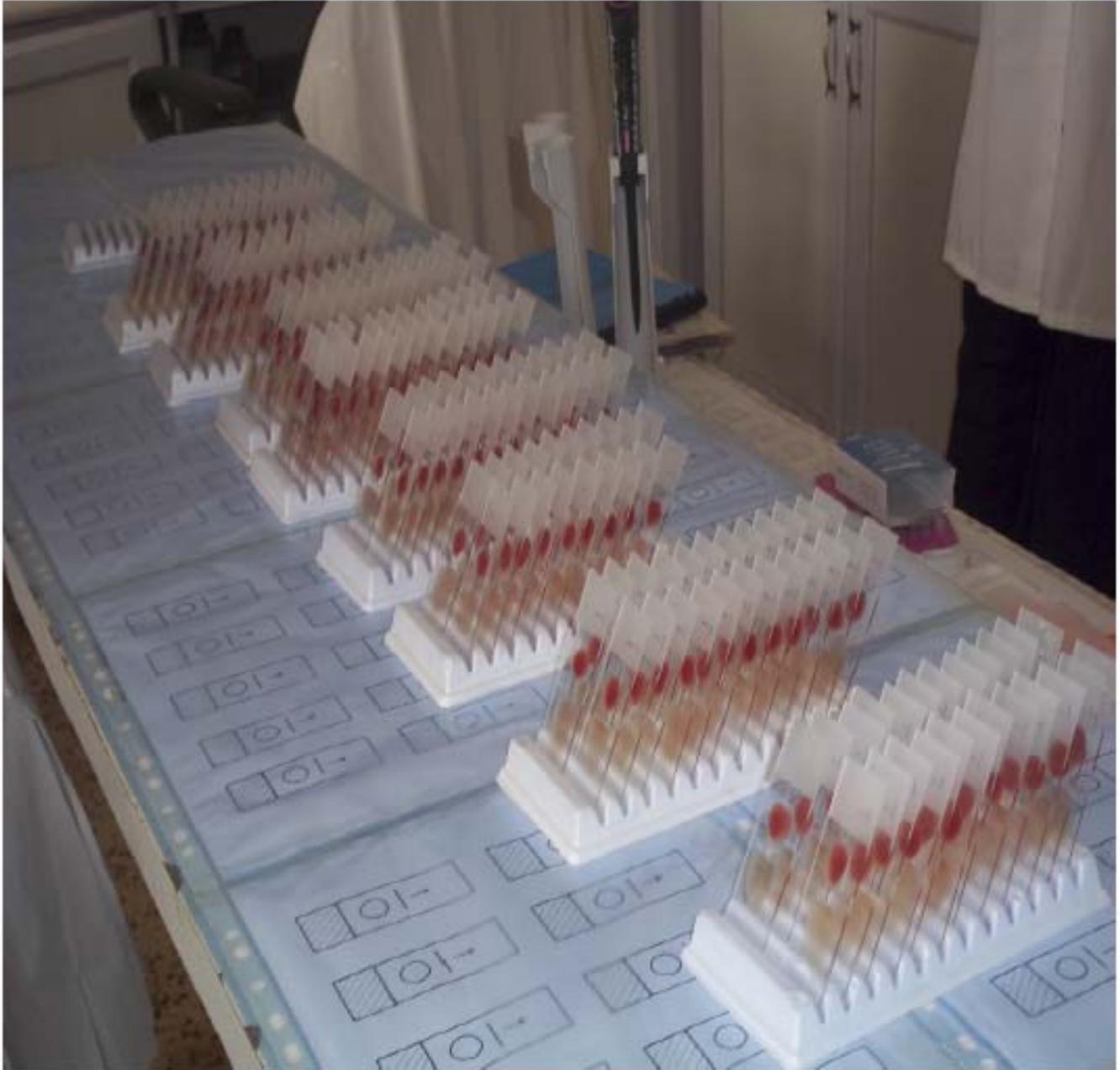
President's Malaria Initiative

IMPROVING MALARIA DIAGNOSTICS

ANNUAL REPORT FY2011

MEDICAL CARE DEVELOPMENT INTERNATIONAL

COOPERATIVE AGREEMENT: GH5-A-00-07-00022-00



IMaD 
Improving Malaria Diagnostics

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USAID | IMaD Project is funded by the U.S. Agency for International Development (USAID) under contract number GHS-A-00-07-00022-00 awarded in September, 2007.

The project is implemented by Medical Care Development International (MCDI) in collaboration with the African Medical and Research Foundation (AMREF), and Hydas World Health (HWH), with technical support from Cheikh Anta Diop University (UCAD).

ABSTRACT

This Annual Report details IMaD activities from October 1, 2010 through September 30, 2011. Activities covered in this report span four major areas which form the basis of IMaD's program objectives:

- BASELINE ASSESSMENT
- TRAINING PERSONNEL IN MALARIA MICROSCOPY, RDTS, AND CLINICAL METHODS FOR FEVER DIAGNOSIS
- QUALITY ASSURANCE AND SUPERVISION
- CAPACITY BUILDING

This report discusses the major activities associated with each objective, the monitoring and evaluation criteria used to measure success and major accomplishments made throughout FY 2011. In addition, this report highlights constraints and offers potential solutions to overcome program challenges.

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ACRONYMS

ACT	Asian Collaborative Training Network
AFRO	Africa Regional Office
AMREF	African Medical and Research Foundation
AOTR	Agreement Officer's Technical Representative
CDC	Centers for Disease Control and Prevention
CTO	Chief Technical Officer
DRC	Democratic Republic of Congo
ECAMM	External Competency Assessment of Malaria Microscopists
FIND	Foundation for Innovative New Diagnostics
GHS	Ghana Health Services
GLP	Good Laboratory Practice
HF	Health Facility
HO	Home Office
HWH	Hydas World Health
ICC	In-Country Coordinator
IMaD	Improving Malaria Diagnostics
INRSP	Institute of Public Health and Sanitation
ITN	Insecticide Treated Net
JSI	John Snow International
MCDI	Medical Care Development International
MOH	Ministry of Health
MOP	Malaria Operational Plan
NAMS	National Archive of Malaria Slides
NMCC	National Malaria Control Center
NMCP	National Malaria Control Program
NPHRL	National Public Health Reference Laboratory
OTSS	Outreach Training and Support Supervision
PIH	Partners in Hope
PNLP	National Malaria Control Program
QA/QC	Quality Assurance/Quality Control
RDT	Rapid Diagnostic Test
SOP	Standard Operating Procedure
UCAD	University of Cheikh Anta Diop
USAID	United States Agency for International Development
UTH	University Teaching Hospital
WHO	World Health Organization



Executive Summary

This annual report covers the period from October 1, 2010 to September 30, 2011 and describes the activities of the “Improving Malaria Diagnostics” (IMaD) project under USAID Cooperative Agreement GHS-A-00-07-00022-00.

In accordance with individual country Malaria Operational Plans (MOPs), IMaD’s activities fall within the following major technical assistance categories as applied to strengthening diagnosis of malaria:

Objective 1: BASELINE ASSESSMENT

Objective 2: TRAINING PERSONNEL IN MALARIA MICROSCOPY, RDTs, AND CLINICAL METHODS FOR FEVER DIAGNOSIS

Objective 3: QUALITY ASSURANCE AND SUPERVISION

Objective 4: CAPACITY BUILDING

The IMaD project is implemented by Medical Care Development International (MCDI) and consortium members: the African Medical and Research Foundation (AMREF) and Hydas World Health (HWH), with technical support from Cheikh Anta Diop University (UCAD). The consortium also works with the World Health Organization (WHO) and the Foundation for Innovative New Diagnostics (FIND) to update global guidelines on malaria diagnostic testing.

The IMaD approach to improving malaria diagnostics is to address the above mentioned objectives in a step-wise fashion. Initial visits begin with a baseline assessment of malaria diagnostic capacity and results in the establishment of quality assurance programs based on on-site supervision and training visits in selected sites. Activities during FY2011 largely focused on support for the Outreach Training and Support Supervision (OTSS) program.

IMaD’s major accomplishments from October 1, 2010 to September 30, 2011 include:

- ★ More than 4,150 health workers trained in malaria diagnostic methods (OTSS, malaria microscopy, case management, and RDT use) in **Angola, Benin, Democratic Republic of Congo (DRC), Ethiopia, Ghana, Kenya, Liberia, Malawi, Mali, Nigeria, and Zambia;**
- ★ A total of 1,230 health facility (HFs) visits were performed during Outreach Training and Support Supervision in **Benin, Ghana, Kenya, Liberia, Malawi, Mali, and Zambia;**
- ★ Maintained IMaD In-Country Coordinators (Annex 5-IMaD In-Country Coordinators) in **Benin, DRC, Ghana, Liberia, Malawi, Mali, and Zambia** and hired an In-country Coordinator in **Madagascar;**
- ★ Conducted Baseline assessments of 10 district hospitals in **Burundi;**
- ★ IMaD OTSS checklists and databases adapted and strengthened based on feedback from OTSS follow-up workshops. OTSS databases updated and installed locally at the NMCC in **Zambia** and the PNL in **Benin;**

- ★ Malaria Microscopy and RDT Job Aids developed for distribution in **Angola, Benin, Ghana, Liberia, Mali, Malawi, and Zambia**; and
- ★ Completed RDT roll out plan in **Malawi**.

This report covers activities conducted in FY2011 and is divided into five sections: 1) description of activities; 2) accomplishments; 3) OTSS implementation; 4) challenges, lessons learned, and the way forward; and 5) core.

Section 1 | DESCRIPTION OF ACTIVITIES

OBJECTIVE 1: BASELINE ASSESSMENT

Following the initial IMaD baseline assessment of 8 district hospitals conducted in **Burundi** in FY2010, IMaD assessed an additional 10 health centers in the first quarter of FY2011. The IMaD clinical and laboratory assessment tool was designed to capture information concerning infrastructure, diagnostic services, human resources, safety, personnel training, supply chain management, and the presence of quality assurance procedures.

OBJECTIVE 2: TRAINING PERSONNEL IN MALARIA MICROSCOPY, RDTs, AND CLINICAL METHODS FOR FEVER DIAGNOSIS

A. REFRESHER TRAINING IN LABORATORY DIAGNOSIS OF MALARIA

Refresher Training in Laboratory Diagnosis of Malaria (Annex 3- Timetable) is one of IMaD's principle activities for strengthening and maintaining competency of malaria microscopists. During FY2011, Malaria Microscopy Refresher Training (MMRT) in malaria diagnosis was conducted in **Angola, Benin, DRC, Kenya, Liberia, Malawi, Mali, and Zambia**. Table 1 illustrates MMRT results by country.

Table 1: Malaria Microscopy Refresher Training Results by Country

Country	Number Tested*	Sensitivity		Specificity		% of Participants above Standard***
		Pre-test	Post-test	Pre-test	Post-test	
Angola	5	83%	88%	79%	84%	60%
Benin	24	93%	98%	97%	99%	79%
DRC	53	83%	91%	65%	81%	42%
Kenya	39	54%	85%	77%	92%	44%
Liberia	24	95%	94%	83%	87%	67%
Malawi	22	78%	96%	83%	91%	73%
Mali	20	85%	87%	56%	80%	30%
Zambia**	76	88%	96%	86%	94%	78%
Aggregate	263	84%	93%	80%	91%	60%

* In some cases, the number trained differs from the number tested because of participant absence from either the pre- or post-test.

** Three of the four trainings were facilitated in collaboration with CIDRZ and ZISSP.

*** Standard: 90% or higher Sensitivity; 80% or higher Specificity

Laboratory technicians from provinces, regions and districts attended these five day workshops developed by IMA D, and adapted as necessary to specific country circumstances. Participating staff work mainly in the malaria/parasitology section of the laboratory and are expected to take a lead in establishing the relevant laboratory procedures, sharing their updated knowledge with the other staff in their health facilities, and supervising staff in both their own health facilities and surrounding facilities during OTSS visits.

The aim of refresher training is to enable the participants to acquire and develop essential knowledge and competency in both technical and management aspects of malaria diagnosis. On completion of the five day course, 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 corrective measures
10. Maintain and store microscopes properly
11. Participate in development of national and facility-based plans for Quality Assurance/Quality Control (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 follow Standard Operating Procedures (SOPs)
15. Perform technical work according to standards of good laboratory practice (GLP)

Pre- and post-competency assessments are conducted on theory-based knowledge and malaria microscopy. Standard slide sets, the majority provided by IMaD partner Hydas World Health (HWH), supplemented as needed by the Walter Reed Army Institute of Research (WRAIR) and the Malaria Research and Reference Reagent Resource Center (MR4), are used to measure microscopist's ability to detect positive and negative slides, perform species identification, and parasite counting. Individual scores for sensitivity ($[\text{True Positive} / (\text{True Positive} + \text{False Negative})] \times 100$), specificity ($[\text{True Negative} / (\text{True Negative} + \text{False Positive})] \times 100$), species identification, and quantification are measured for each participant. IMAD recommends annual refresher training in malaria microscopy and RDTs for supervisors and national trainers implementing the OTSS program. IMAD has established minimum standards for malaria microscopy sensitivity (90%) and specificity (80%) and tracks scores for species identification and quantification against baselines for all participants.

B. CLINICAL METHODS FOR FEVER DIAGNOSIS ADDRESSED DURING OTSS WORKSHOP

Correct diagnosis of the cause of fever is a cycle that relies on the collaboration between clinical and laboratory personnel. IMaD conducted a 5-day training workshop for both laboratory and clinical staff that addressed a number of topics targeted at fever investigation such as: approach to fever, pallor and anemia, sources of error, and case studies. Regional and district clinical supervisors in **Benin, Kenya, Liberia, Malawi, and Zambia**, are conducting on-site training to hundreds of clinicians, primarily in outpatient departments. Supervisors take a lead in applying correct standard operating procedures for fever investigation, sharing their updated knowledge with the other staff in their health facilities, and supervising staff during OTSS visits. The timetable for this training can be found in Annex 4 - OTSS Clinical Training timetable.

OBJECTIVE 3: QUALITY ASSURANCE AND SUPERVISION

A. TRAINING FOR OUTREACH TRAINING AND SUPPORT SUPERVISION (OTSS)

During FY2011, an OTSS training of trainers (Annex 5 - OTSS Laboratory Training timetable) was conducted in **Kenya, Malawi and Zambia** to establish standards for support supervision, on-site training and mentoring, and ongoing quality assurance activities in supervised health facilities. Senior health staff attended five-day clinical and laboratory OTSS training workshops developed by IMaD for experienced supervisors and trainers. Pre- and post-tests on general laboratory and health facility management issues and on QA concepts are used to measure retention of knowledge. Participants received feedback on pre-test performance to help them address areas that require strengthening. The course also addresses expectations of national supervisors who are asked to brainstorm strategies for overcoming anticipated obstacles to implementing the program. Supervisors are also provided with relevant training materials and checklists to use as a basis for evaluating services, and instructing mentoring staff within their area of responsibility.

B. OUTREACH TRAINING AND SUPPORT SUPERVISION

The Outreach Training and Support Supervision (OTSS) program is designed to provide long-term, ongoing support and on-site training to strengthen diagnostic services in health facilities during regularly scheduled supervisory visits, by identifying areas that require improvement and providing support to clinicians and laboratory staff.

IMaD has developed a standardized checklist for OTSS that is adapted by NMCPs and laboratory and clinical staff during Stakeholders Meetings and OTSS Workshops in each country. These checklists are designed to provide the basis for a structured supervisory visit covering all necessary malaria-related diagnostic services, as well as collecting information that can be monitored over time to assure that quality diagnostic services are available in support of the agreed upon IMaD program in each country.

In order to assure the correct and consistent use of quality diagnostics in making malaria treatment decisions, NMCPs require input from both clinical and laboratory staff. Therefore, the checklist includes both laboratory and clinical components. In an effort to improve relations, facilitate communication, and build trust between clinical and laboratory staff, whenever possible, the OTSS program is carried out by joint clinical/laboratory teams. The laboratory supervisors may need to visit other departments in the health facility in addition to the laboratory (e.g. outpatient, inpatient, and medical records) in order to address issues comprehensively. Likewise, the clinical supervisors may need to visit other departments (in addition to in- and out-patient), including the laboratory and medical records.

As noted above, the most effective OTSS occurs when laboratory and clinical supervisors make visits together. Joint visits provide an excellent opportunity to discuss pertinent issues, brainstorm strategies, and encourage cooperation and communication between the two cadres. Using the combined clinical and laboratory checklists allow supervisors to monitor improvements and continuously assess problems as they arise. During FY2011, OTSS visits took place in **Benin, Ghana (laboratory only), Kenya, Liberia, Malawi, Mali, and Zambia.**¹

Below, Table 2 illustrates the scope of work IMaD has successfully achieved by rounds, conducted in the seven main countries enrolled in OTSS through the end of FY 2011. In total, 1,979 visits have taken place to evaluate 653 different facilities with the OTSS checklists during the IMAD life of project (LOP). During FY2011, 1,230 total visits were conducted. IMaD plans to continue to expand the number of sites included in OTSS evaluations and continue follow-up activities to monitor the success of the program.

¹ It is important to note the difference between how IMaD uses the terms *round* and *visit* in the subsequent tables and report. IMaD has defined a *visit* as the chronological event to evaluate an individual health facility where the baseline evaluation starts at visit 1 and each subsequent visit incrementally increases. For example the first time a facility is assessed this will be Visit 1 for that facility and then when the next assessment occurs it will then be Visit 2. Conversely, a *round* has been defined as the programmatic grouping of evaluations that occur during a set timeframe and will contain varying visit numbers within the group of health facilities. For example, within Round 2 it may be possible for 10 facilities to receive Visit 1 and 20 facilities to receive Visit 2 for a total of 30 facilities visited in Round 2. This distinction was required to document the expansion of the program activities while still working with programmatic and budget constraints.

Table 2: Status of IMaD OTSS (LOP) - Number of Health Facility Visits by Country and Round

Country	Number Tested*	Sensitivity		Specificity		% of Participants above Standard***
		Pre-test	Post-test	Pre-test	Post-test	
Angola	5	83%	88%	79%	84%	60%
Benin	24	93%	98%	97%	99%	79%
DRC	53	83%	91%	65%	81%	42%
Kenya	33	59%	86%	82%	92%	45%
Liberia	24	95%	94%	83%	87%	67%
Malawi	22	78%	96%	83%	91%	73%
Mali	20	85%	87%	56%	80%	30%
Zambia**	76	88%	96%	86%	94%	78%
Aggregate	257	84%	94%	80%	91%	61%

* In some cases, the number trained differs from the number tested because of participant absence from either the pre- or post-test.

** Three of the four trainings were facilitated in collaboration with CIDRZ and ZISSP.

*** Standard: 90% or higher Sensitivity; 80% or higher Specificity

C. DATA ENTRY ACTIVITIES AND TECHNICAL/KNOWLEDGE TRANSFER PLAN

Information from the OTSS checklists is captured through a data entry exercise facilitated by IMaD in each country receiving OTSS support. Analysis of this data allows NMCPs to monitor and track the efforts to improve malaria diagnosis and treatment over time. IMaD, through its In Country Coordinators (ICCs) and Home Office (HO) staff have engaged a number of external and local consultants to conduct data entry to support the OTSS program in **Benin, Ghana, Kenya, Liberia, Malawi, Mali, and Zambia**. In all instances, ICCs have provided training and supervision to local data entry personnel, and were present during data entry to answer questions, translate technical terminology, keep staff on schedule, and improve the performance during data entry. The IMaD team is currently working with the ICCs in those countries where OTSS visits are now established to build the capacity of NMCP and laboratory managers to oversee and implement OTSS as a way of maintaining a sustainable malaria diagnostics QA program. This process is based on building local capacity to enter OTSS checklist data in-country, including training in a methodology that will facilitate rapid and timely analysis of the OTSS-captured data.

To better enable NMCP staff to complete data management and analysis activities, a redesigned OTSS database was created during FY2011 which simplified data entry and management through a streamlined user interface. Additionally, automated reporting features were created to allow for graphs and tables to be updated as information was added. This system will be installed locally and an identified staff member will be trained in its management in each country that is implementing an OTSS QA program. Aspects of regular reporting and data analysis will be completed by the local staff onsite rather than waiting on IMaD Home Office support. Throughout FY2012, IMaD will continue to provide support for data entry and technical support and assistance specifically for production of larger reports or complex analyses.

During FY2011, OTSS databases were installed locally at the NMCC in **Zambia** and the PNLP in **Benin** and staff was trained in each country to manage the database. During FY2012, IMaD will continue this transition of data management to country ownership.

OBJECTIVE 4: CAPACITY BUILDING

A. NATIONAL ARCHIVE OF MALARIA SLIDES (NAMS)

The availability of high quality blood slides with a known, accepted malaria-related composition (positive/negative, species, and density) to support routine training and assessment of malaria microscopists is essential as a basis for improving malaria diagnostics by NMCP program managers. A high quality malaria slide bank can serve as a critical tool to assess individual microscopy competency by measuring sensitivity and specificity, ability to quantitate and perform species identification, in a standardized manner. The development of a national slide bank is in keeping with recommendations set forth by the WHO Malaria Microscopy Quality Assurance Manual (version 1, 2009) as seen in this excerpt from Chapter 9 “Setting up a National Slide Bank”:

The aims of the national slide bank are to provide:

- *Sets of “known, replicate” slides for QA training in malaria microscopy and quality assurance (QA);*
- *A permanent reference collection of the malaria species present in the country and;*
- *Sometimes, sets of reference slides on request from outside the country.*

Slide bank production is dependent on developing and implementing a well-designed plan that outlines actions for the following steps: identification of resources, obtaining commitments from key staff, finalizing SOPs, obtaining ethics approval, preparation of materials, specimen collection, and slide validation and storage.

(WHO Malaria Microscopy Quality Assurance Manual Version 1, 2009).

The lack of standards and a method for ascertaining individual competency poses one of the primary obstacles to reliable malaria diagnosis. A slide bank is an enabling step to malaria diagnostic QA by offering a “gold standard” for assessments of reader competency as well as sensitivity and specificity for other diagnostic modalities. Standards and rigor in slide bank creation provides the basis for externally validated competency at national laboratories responsible for compiling and distributing blood films for national and local training and certification programs. In FY2011, IMaD further supported the development of a NAMS in **Ghana** at Kintampo Health Research Center (KHRC) in collaboration with consortium partner HWH. In Q3 of FY2011, IMaD conducted a NAMS training at KHRC and by September 2011 a total of 16 donors had been identified and samples sent to HWH for validation. During Q4 of FY2011 the Institutional Review Board (IRB) process for development of a NAMS in **Ethiopia** was initiated. This slide archive is projected to be completed by the end of FY2012.

Section 2 | ACCOMPLISHMENTS

Malaria Microscopy Refresher Training (MMRT) and Outreach Training and Supportive Supervision (OTSS) training courses and visits were at the forefront of IMaD activities in FY2011. **Kenya** conducted its first round of OTSS while OTSS programs launched in FY2009 and FY2010 continued in **Benin, Ghana, Liberia, Malawi, Mali, and Zambia**.

Highlights from the FY2011 accomplishments include –

- Refresher Training in Laboratory Diagnosis of Malaria and use of RDTs conducted in **Angola, Benin, DRC, Kenya, Liberia, Malawi, Mali, and Zambia**.
- OTSS visits conducted in **Benin, Ghana, Kenya, Liberia, Malawi, Mali, and Zambia**.
- IMaD formalized its collaboration with the Kintampo Health Research Center to develop a NAMS in **Ghana** and initiated the IRB approval process for NAMS development in **Ethiopia**.
- Development, printing and distribution of Malaria Diagnostic Bench Aids and Job Aids for distribution in **Benin, Ghana, Malawi, Zambia**.
- RDT roll out plan for **Malawi** approved.
- Draft laboratory register for malaria approved, printed and distributed in **Malawi**.

Section 3 | OTSS IMPLEMENTATION: OUTREACH TRAINING AND SUPPORT SUPERVISION

During FY2011, the IMaD project worked with NMCPs and field staff to support OTSS QA programs. **Kenya** successfully launched its first round of OTSS, and OTSS rounds initiated in previous years were continued in **Benin, Ghana, Liberia, Malawi, Mali and Zambia** continued. National QA Teams were mobilized to provide technical and logistical support to the Regional and District level OTSS supervisors. Trained and competency assessed OTSS supervisors provided on-site training and supervision to 3,723 health workers on a number of topics including; malaria microscopy techniques, RDT training, fever diagnosis, and good prescriber practices. Quality assurance protocols were instituted in regional and district laboratories to support malaria microscopy competency (cross-checking blood films). IMaD In-Country Coordinators worked with NMCPs and OTSS supervisors to reduce costs associated with the OTSS program and in many cases were able to increase facility enrollment by introducing new cost-saving approaches. Examples of such approaches include the coordinated use of MOH/NMCP vehicles for on-site supervision and OTSS checklists delivery, as well as the use of MOH/NMCP conference space provided free of charge to IMaD for stakeholders meetings, trainings, and workshops.

OTSS visits are intended to occur on a quarterly basis for health facilities that have received fewer than 3 visits and on a semi-annual basis for those that have received 4 visits or more, and show acceptable performance (actual schedules vary on a country by country basis but 3 is the minimum number of quarterly visits before health facilities can be graduated to semi-annual). The frequency of visits should be strongly dependent on performance and take into consideration staff turnover (facilities with a newly appointed head of laboratory should be visited sooner rather than later) within budgetary and logistical constraints. The following countries made significant advancements towards this goal during FY11: Ghana (Rounds 3-5), Kenya (Round 1), Liberia (Rounds 1 - 3), Malawi (Round 2-3), Mali (Round 4), and Zambia (Rounds 3-4). Baseline data was collected during OTSS Round I visits and progress measured towards annual targets during subsequent visits. Below is a summary of country specific progress towards a subset of indicators. Each of the graphs that are presented displays the country's progress toward achieving the target for that specific indicator. The horizontal axis of each graph displays both the visit number and the fraction of facilities that reported data during that visit. The vertical axis of each graph is the percentage of facilities that fulfills the requirements of the specific indicator.²

² OTSS data presented in this report are up to date and in aggregate form. In regards to how data are presented, it is important to note the following: “**Visit 1**” represent data gathered during the first visit to a health facility, “**Visit 2**” represent data gathered during the second visit to a health facility, “**Visit 3**” represent data gathered during the third visit to a health facility, “**Visit 4**” represent data gathered during the fourth visit to a health facility.

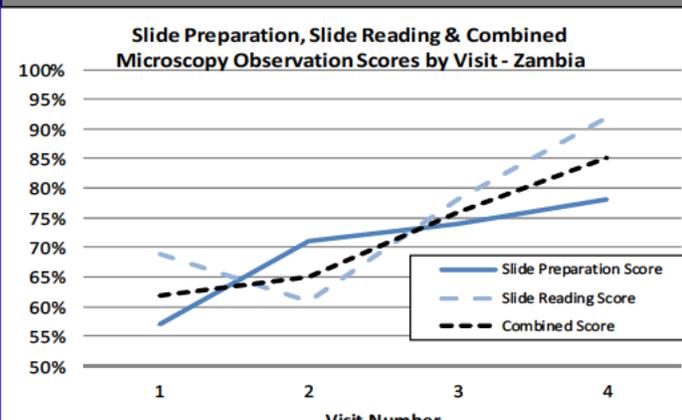
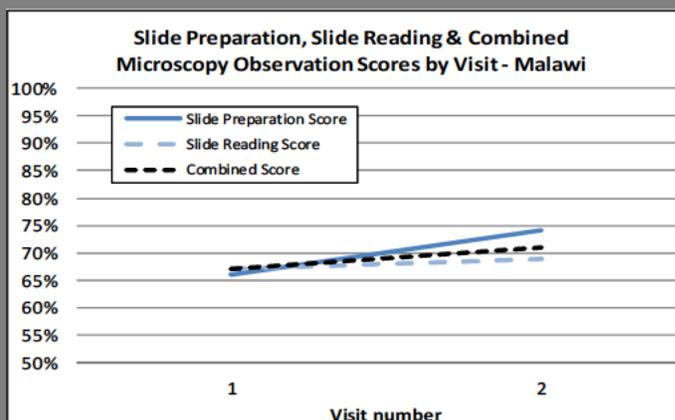
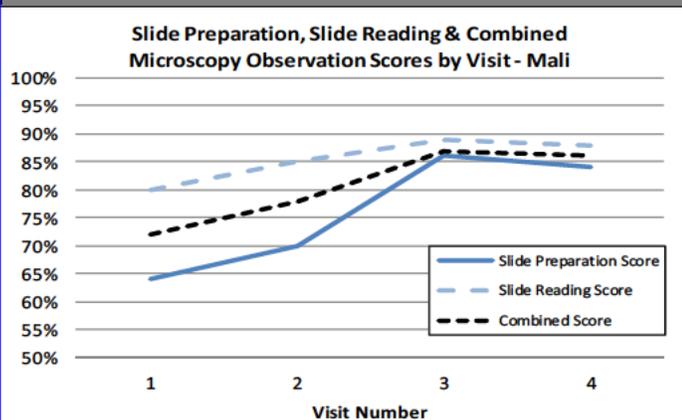
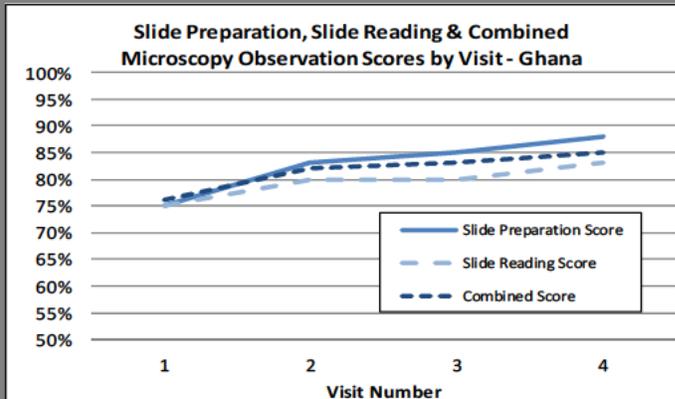
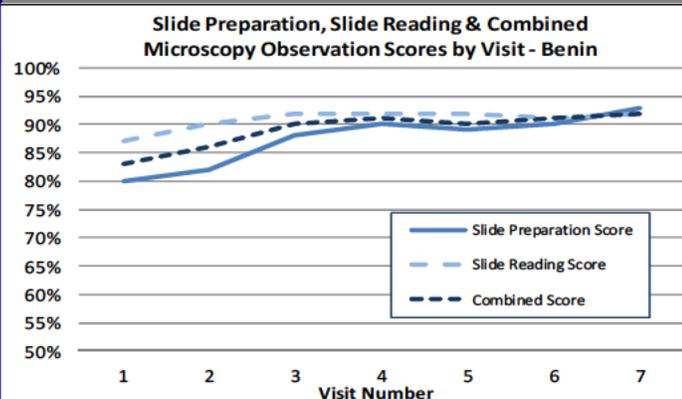
Percentages calculated are based on the number of HFs that returned data, not necessarily the total number of HFs visited during a particular round of OTSS. Denominators of the fractions presented alongside percentages reflect the number of HFs that reported data for that indicator. *Full country OTSS reports available.

Indicator 1: Average number of staff trained on-site during OTSS Visit

Average number of on-site staff trained per health facility during OTSS Visit		OTSS Visit						
		visit 1	visit 2	visit 3	visit 4	visit 5	visit 6	visit 7
Benin	Number of trainings conducted = avg.lab trained/hf	1.7	1.6	1.1	1.2	1.4	1.3	1.4
	Number of trainings conducted = avg.clinical trained/hf	5.3	2	1.6	1.9	1.7	1	1.2
Ghana	Number of trainings conducted = avg.lab trained/hf	3.6	2.9	3.3	4.2			
	Number of trainings conducted = avg.clinical trained/hf	0.9	0.4	0.4	0.1			
Malawi	Number of trainings conducted = avg.lab trained/hf	1.8	1.7					
	Number of trainings conducted = avg.clinical trained/hf	4.5	2.8					
Mali	Number of trainings conducted = avg.lab trained/hf	2.5	2.4	4.1	2.3			
	Number of trainings conducted = avg.clinical trained/hf	3	3.3	2.9	3.3			
Zambia	Number of trainings conducted = avg.lab trained/hf	1.6	2	1.7	3.2			
	Number of trainings conducted = avg.clinical trained/hf	2	3.2	3.2				

Indicator 2: Percent (Average) of Malaria Microscopy Tasks Performed According to Protocol during OTSS Observations

Percent (avg.) of Malaria Microscopy Tasks Performed According to Protocol During OTSS	OTSS Visit						
	visit 1	visit 2	visit 3	visit 4	visit 5	visit 6	visit 7
Benin	83%	86%	90%	91%	90%	91%	92%
Ghana	76%	82%	83%	85%			
Malawi	67%	71%					
Mali	72%	78%	87%	86%			
Zambia	62%	65%	76%	85%			

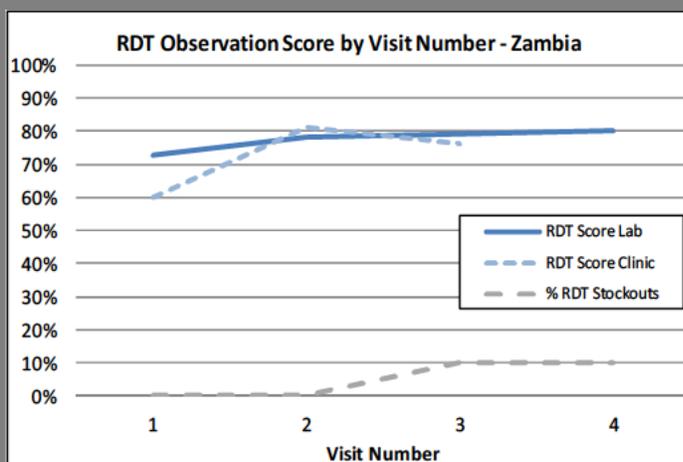
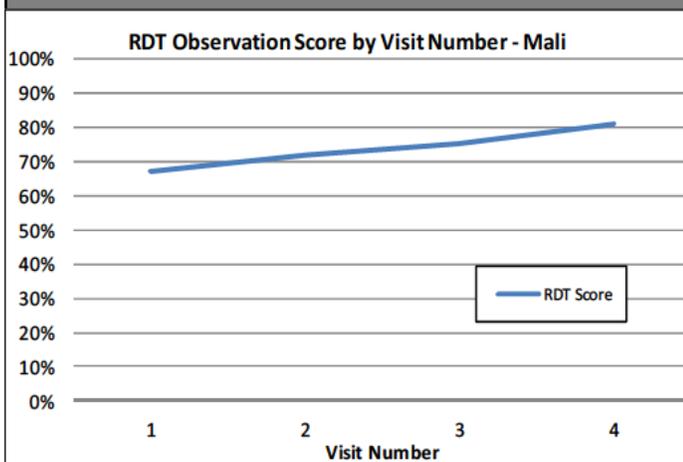
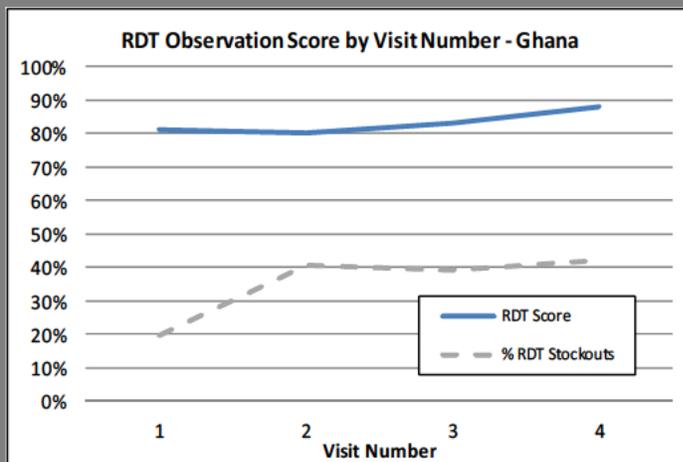
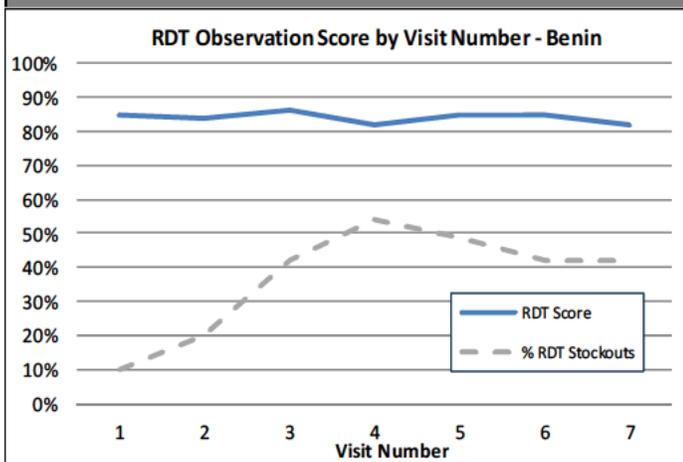


Comments

- "Protocol" refers to the ability of the laboratory technician to accurately adhere to the recommended steps for malaria microscopy set forth by the National Malaria Control Program with technical assistance from IMaD.
- All countries exhibited positive trends between the baseline and the most recent OTSS visits, a trend which can likely be attributed to the on-site trainings that occur during each OTSS visit. Malaria microscopy protocols are reviewed with laboratory staff during these trainings and on-site corrections provided when necessary

Indicator 3: Percent (Average) of RDT Tasks Performed According to Protocol during OTSS Observations

Percent (avg.) of RDT Tasks Performed According to Protocol During OTSS Observations	OTSS Visit						
	visit 1	visit 2	visit 3	visit 4	visit 5	visit 6	visit 7
Benin	85%	84%	86%	82%	85%	85%	82%
Ghana	81%	80%	83%	88%			
Malawi	N/A	N/A					
Mali	67%	72%	75%	81%			
Zambia	73%	78%	79%	80%			

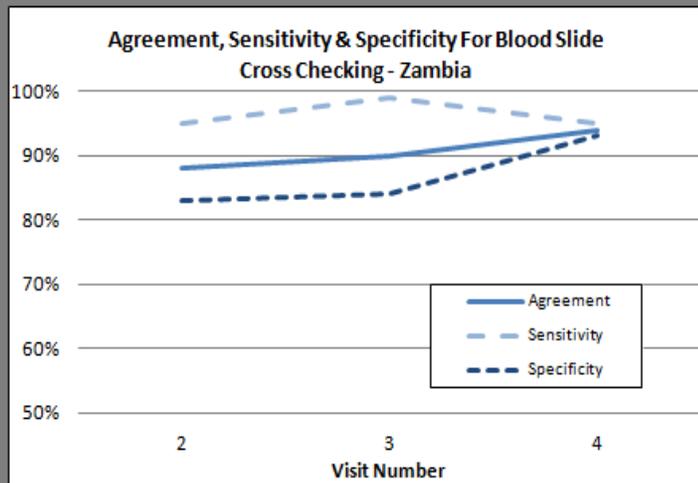
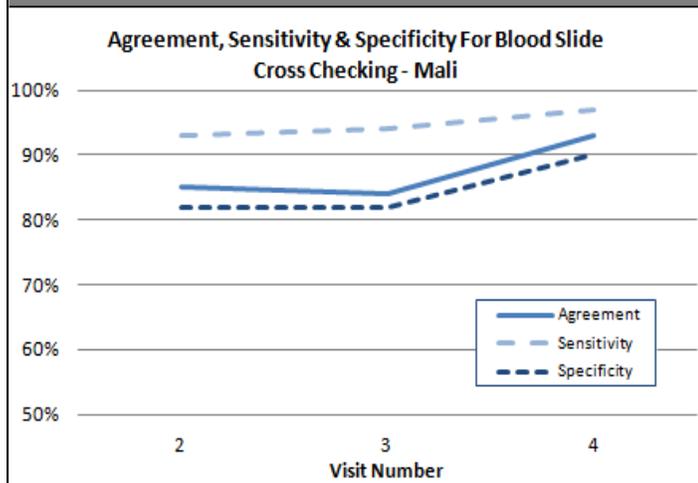
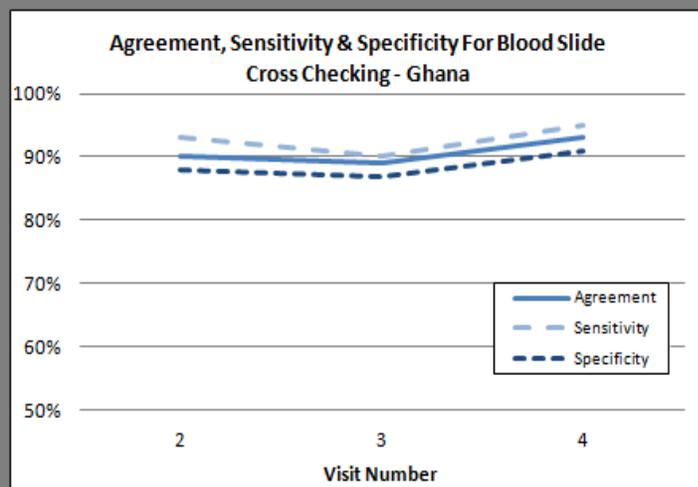
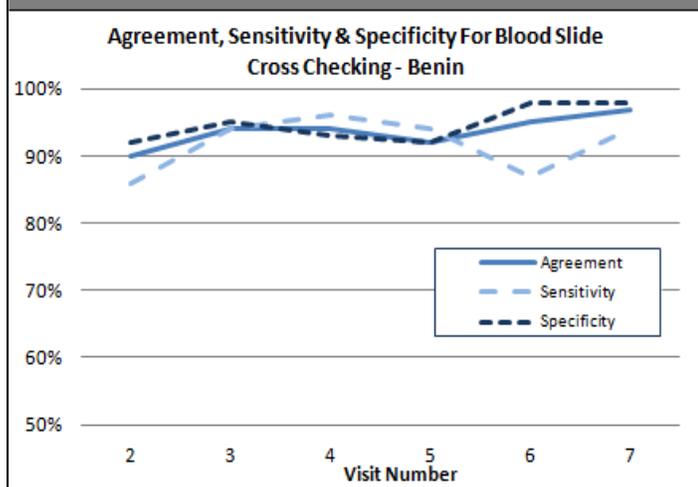


Comments

- “Guidance” refers to the ability of the laboratory technician to accurately adhere to the recommended steps for RDTs set forth by the National Malaria Control Program with technical assistance from IMaD.
- Where stockout data was captured, RDT performance has been displayed with corresponding percent of health facilities reporting stock outs of RDTs over the three months preceding the OTSS visit.
- No data presented for Malawi as RDTs were not yet distributed to health facilities during the time of data collection.

Indicator 4: Percent of blood slides correctly reading malaria slides (agreement)

Percent of slides read correctly (agreement)	OTSS Visit						
	visit 1	visit 2	visit 3	visit 4	visit 5	visit 6	visit 7
Benin	N/A	90%	94%	94%	92%	95%	97%
Ghana	N/A	90%	89%	93%			
Malawi	N/A	90%					
Mali	N/A	85%	84%	93%			
Zambia	N/A	88%	90%	94%			

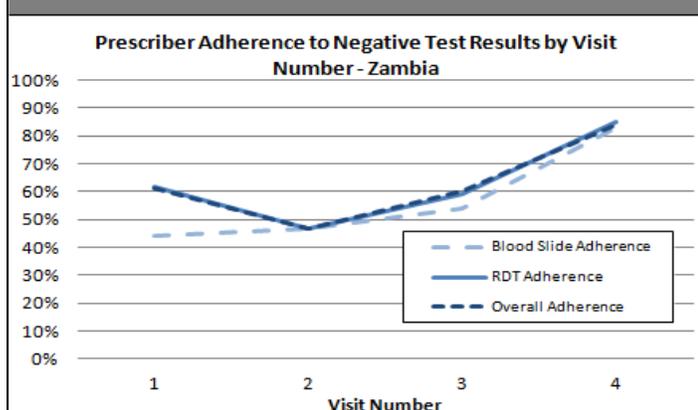
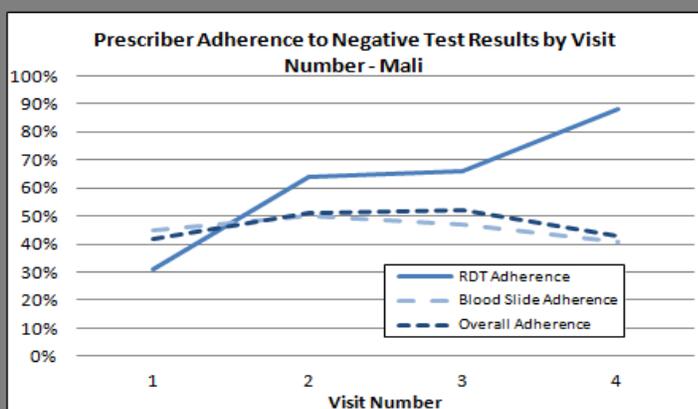
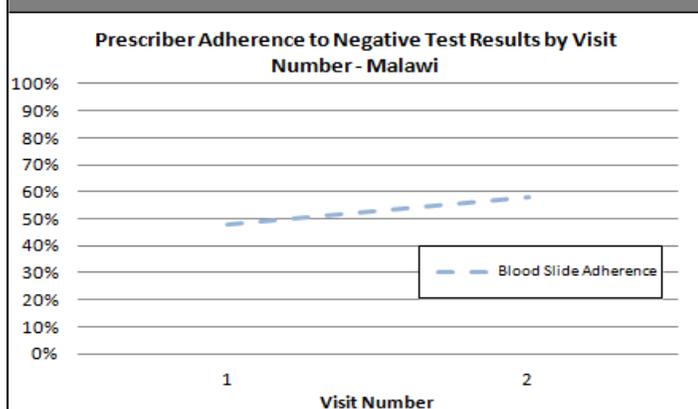
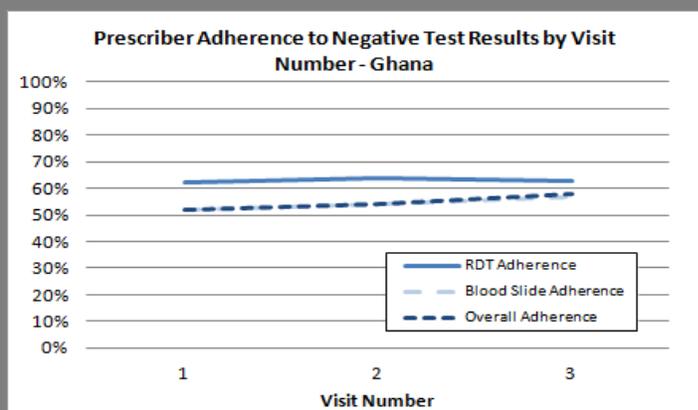
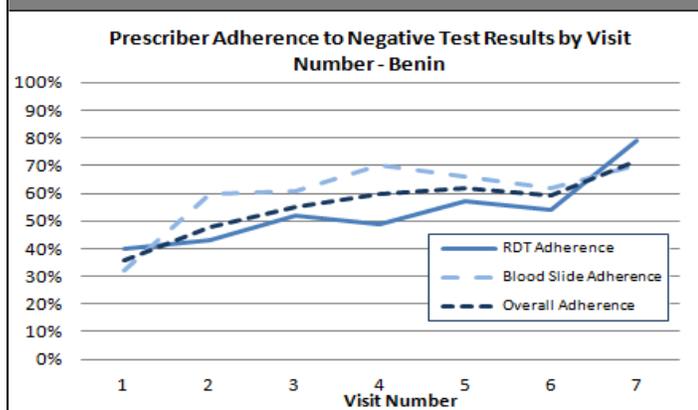


Comments

- Baseline values for this exercise are higher than expected. Only moderate increases were exhibited as average agreement at baseline was already at 85% or higher (IMaD's target) for all countries.

Indicator 5: Percent (Average) of Negative Test Results not Treated with Anti-malarial

Percent (avg.) of negative test results not treated with antimalarial	OTSS Visit						
	visit 1	visit 2	visit 3	visit 4	visit 5	visit 6	visit 7
Benin	36%	48%	55%	60%	62%	59%	72%
Ghana	52%	54%	58%	45%	*only 13% of all HF responded during visit 4; rounds 1-3 presented		
Malawi	48%	58%					
Mali	42%	51%	52%	43%	*compliance to RDT went from 31%-88% between v1 and v4		
Zambia	61%	47%	60%	84%			



Comments

- RDT data will be collected for Malawi during OTSS Rd 3.
- Improvements exhibited were larger in countries where IMaD was able to conduct joint supervision (Malawi and Zambia) or where IMaD was able to strengthen diagnostic components of clinical assessment tools (Benin).

Section 4 | CHALLENGES, LESSONS LEARNED AND WAY FORWARD

OBJECTIVE 1: TRAIN LABORATORY PERSONNEL IN APPROPRIATE USE OF MICROSCOPY AND RDTs

In order for the OTSS program to work effectively and for supervisors to provide quality on-site supervision to health facilities, competency assessments of supervisors in malaria microscopy are essential. The team has faced the following constraints when conducting workshops to support the Laboratory Diagnosis of Malaria and OTSS Training:

1. Availability of standardized slide sets of known composition

Solution: HWH, an IMaD partner holds a number of standardized slide sets that were produced with the MR4. Additionally, IMaD has routinely checked out a number of slide sets directly from the MR4 to use in IMaD countries. IMaD is also recommending the development of national slide banks to the NMCPs and NPHRLs to support country training and assessment needs. Based on discussions with country USAID/PMI staff, and specific requests based on those discussions, IMaD is now supporting the production of locally-produced NAMS in Ghana and will soon include Ethiopia as well.

2. Identifying a large enough number of quality microscopes in country to support training

Solution: In the past, IMaD has procured microscopes for countries where it was difficult to identify adequate numbers of good quality microscopes for training. In some countries where the identification of microscopes has been a problem, IMaD rents them from a reputable source.

OBJECTIVE 2: LABORATORY QUALITY CONTROL AND SUPERVISION

The OTSS program requires a well-designed action plan for each round of supervision. This plan includes a schedule of available supervisors, mobilization of resources (printed checklists, distribution of per diems, mode of transport), and support of data entry activities. The OTSS program requires that the NMCP or NPHRL is able to identify a committed staff member to oversee daily activities of the OTSS program.

1. Identification of NMCP or NPHRL staff who can commit time and energy to oversee OTSS activities.

Solution: The IMaD ICCs are working to build the capacity of NMCP/NPHRL staff to support the various components of the OTSS program, especially data entry/data analysis, and how to make basic revisions to the supervisory checklist. These staff are committing as much time as their schedules permit and over time will be able to train others to assist them.

2. Implementation of the Technology/Transfer Plan

Solution: A manual has been produced for NMCP/NPHRL managers to address the OTSS program. This manual is an updated version of the original OTSS manual that was created prior to the implementation of databases to handle data analysis. It has been deployed for use in Ghana and Benin, and will be produced for use in all IMaD countries supporting OTSS. Much like the OTSS checklists, these manuals can be updated with input from the NMCP/NPHRL managers to reflect any changes desired.

OBJECTIVE 3: FINALIZATION OF DATA ENTRY ANALYSIS PACKAGE

In an effort to streamline OTSS data collection and management systems, the IMaD Home Office has created a comprehensive OTSS database, shifting from an Excel-based database to Microsoft Access 2007. The application includes easy to use administrative and reporting function, improved data management capabilities, and builds in-country capacity by enabling the MOH to operate independently. To complement the database system, IMaD produced a series of training materials and documentation related to data entry, data management, and reporting to improve sustainability of the system. IMaD finalized the design of these applications in Q3 of FY2011 and began working with countries to train and implement the database.

OBJECTIVE 4: SCALE UP OF OTSS PROGRAM

In countries like Ghana and Zambia where IMaD is striving for national OTSS program coverage, IMaD identified significant financial and human resource constraints which limited scale-up efforts. To address these constraints IMaD has taken the following actions:

- 1) Where feasible, IMaD has oriented district-level supervisors to the IMaD project, OTSS procedures, and the OTSS checklist, thereby increasing staff/human resources available to conduct OTSS visits.
- 2) IMaD will reduce OTSS frequency to two annual visits coupled with an Internal Quality Assurance (IQA) program for health facilities that have received a full cycle of OTSS visits and are performing well (number of visits for a full cycle is country-specific). This approach will ensure that facilities will continue to be enrolled in the OTSS program while good laboratory practices are being maintained by the health facilities that will no longer receive quarterly visits. IQA activities will focus on topics such as: QC of stains, record keeping, microscope maintenance, and quality of reagents and supplies.

In the year to come, lessons learned from Ghana and Zambia will be used to inform and improve scale-up efforts.

OBJECTIVE 5: INTEGRATION

In Liberia, IMaD is currently exploring the creation of a sustainable and integrated laboratory system to provide quality diagnostic services for effective implementation of prevention, case management and surveillance of malaria, TB, HIV, other infections, and other diseases.

In most Liberian laboratories the same technician performs testing for TB, HIV, malaria, and other conditions. A coordinated approach to training staff in laboratories such as these is beneficial and would reduce costs as implementing partners could streamline their training activities and take advantage of infrastructural improvements made by sister programs. Even when there are multiple technicians in the laboratory, it is in the best interest of the facility to cross train and supervise their laboratory staff in a coordinated manner so as to avoid deficiencies in overall testing capacity should, for example, a technician be absent or transferred to another facility. It is important to note that in a majority of cases, the same technicians recruited to supervise malaria diagnostics as part of OTSS are also responsible for management and oversight of other lab activities.

One way to streamline this coordinated approach is to provide synchronized supportive supervision for each disease area. Training on common topics such as laboratory management, laboratory safety and quality assurance would benefit the facility as a whole if all disease areas are taken into consideration when formulating laboratory strengthening plans.

IMaD proposes to begin implementing project activities at referral laboratories eventually shifting focus and resources to laboratories at tertiary level hospitals and then, during the 2nd year, scale up QA programs to all hospitals and health centers with the largest service populations for HIV, TB and malaria.

Section 5 | IMaD CORE

During FY2011, the IMaD Home Office and partner organizations undertook various activities to strengthen and support the IMaD project and country activities. IMaD core activities fell into the following categories:

Program Management/Coordination

In December 2010, IMaD held its Annual Planning Meeting in Silver Spring, Maryland to review FY2010 activities and plan for FY2011. Representatives from all partner and technical support organizations (MCDI, AMREF, Hydas World Health and UCAD/Senegal), all IMaD In-Country Coordinators (ICCs) from the field, Home Office staff, and representatives of the IMaD PMI management team from USAID and CDC attended the meeting. The annual meeting is designed to strengthen program management, facilitate future planning, and discuss and resolve management and technical issues through discussions among all partners, with guidance from PMI and CDC.

Development of Global Policies and Guidelines

IMaD provided technical and logistic support to USAID's leadership activities to develop global policies and guidelines and support operations research on malaria diagnostics. This included the provision of secretariat support for the Diagnostics Work Stream of the Roll Back Malaria (RBM) Case Management Working Group. During FY2011, IMaD staff also participated in WHO informal consultations on RDTs and other diagnostic meetings to contribute to draft WHO RDT Guidelines.

Quality Assurance/Database Management

Since late FY2010, the development of a database (based on the use of Microsoft Access) continues to facilitate the analysis of OTSS data in IMaD countries. Because of the need to capture data from already-conducted OTSS activities, the data entry system was the first part of the database to be developed. In order to reduce data entry errors, the entry system mirrors the paper forms that are used by the supervisors in the field to collect information from health facilities. A template has been created for the data entry system that is designed to fit the specifics of each country where IMaD works, including a French-language version for IMaD's francophone countries. The purpose of these activities is to train staff to operate and also install the OTSS database within partner organizations facilities to build capacity and sustainability of the project within each country. Also, to help facilitate data entry and QA of the existing data, assistance was provided from the MCDI HO to ensure the quality of results.

External Competency Assessment of Malaria Microscopists (ECAMM)

The purpose of the ECAMM is to establish a malaria microscopist's individual level of competency including the detection of malaria parasites, species identification and parasite quantification. The course is intended for national core-level microscopists, and it is designed to identify an individual participant's strengths and

weakness in malaria microscopy. Upon completion of the course, participants are graded based on competency and receive a WHO certificate of accreditation. Participants are assessed using a slide set of 56 slides of known composition. Newly certified “national experts” will become engaged in supervisions, trainings, QA/QC activities and act as resources for other relevant initiatives.

Monitoring and Evaluation

In preparation for the FY2010 Annual Planning meeting, the IMaD project reviewed PMI recommended indicators relating to malaria diagnostics. IMaD’s M&E Matrix was edited accordingly to bring it in line with WHO/PMI indicators. Additionally, OTSS checklists were reviewed and revised to ensure that they were capturing the necessary data for reporting on these indicators.

In early FY2011, at the request of the IMaD Agreement Officer’s Technical Representative (AOTR), and in collaboration with the PMI technical team from USAID/Washington, IMaD began planning an “Assessment of the Status of Malaria Diagnostic Practices” to be conducted by Tulane University School of Public Health and Tropical Medicine in Benin, Ghana, and Zambia. The objective of this assessment is to assess the scale, quality, and use of diagnostic testing in making appropriate treatment decisions for malaria in the three countries, and provide recommendations to accelerate progress towards achieving the goal of universal diagnostic testing for malaria and close adherence of clinicians to test results.

The assessment will: 1) Assess the current status of diagnostic testing for malaria in Benin, Ghana, and Zambia; 2) Identify best practices and constraints/barriers to scaling-up quality malaria diagnostic testing, and identify areas for further improvement; 3) Assess supervision and outreach capacity at each level of the health system and ability/availability of appropriate staff and local resources to conduct supervision of laboratory technicians on a regular basis; 4) Develop recommendations on how current activities to improve malaria diagnostics under IMaD can be strengthened, streamlined, and accelerated; and 5) Suggest how best to sustain IMaD progress to date in the medium to long-term. A Technical Advisory Group (TAG) was created to oversee the design, final selection of the contractor, and implementation of this assessment during Q2 – Q3 of FY2012.

Transition and Closeout

Importance of the Transition and Sustainability of Activities

OTSS

The Outreach Training and Support Supervision is designed to provide long-term, ongoing support to strengthen diagnostic services in health facilities, by identifying areas that require improvement and providing on-site feedback and technical advice and support to the front-line clinicians and laboratory staff in peripheral health facilities. The OTSS model combines training, proficiency testing and on-site supervision and has three main objectives:

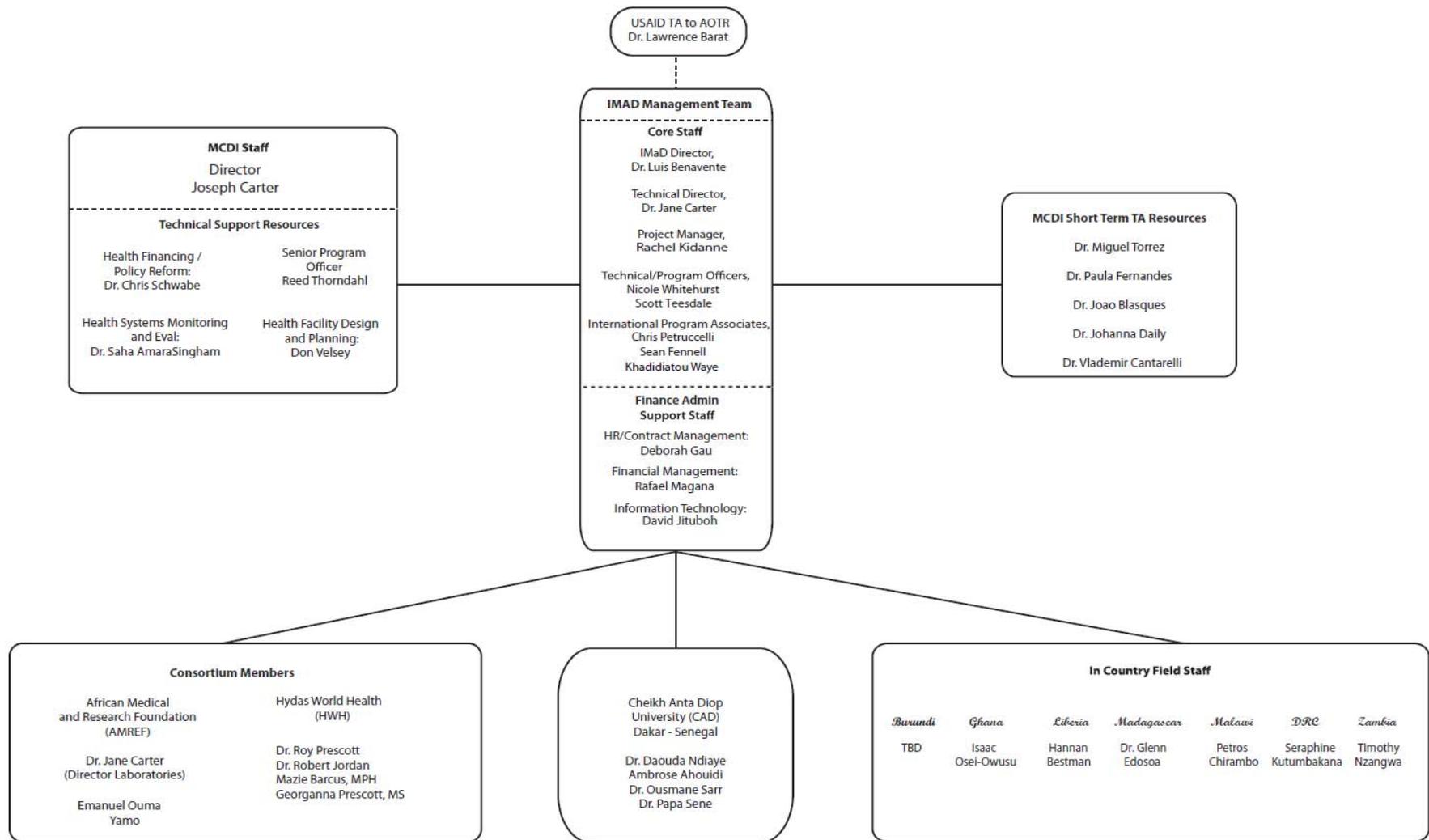
1. To improve malaria diagnostic capacity, particularly at peripheral health centers serving populations with no access to central or provincial health referral system.
2. To combine ongoing training and supportive supervision with field-based quality assurance.
3. To promote increased and improved interactions between the clinicians and laboratory staff at the health facility level.

IMaD will use FY2012, the final year of the IMaD cooperative agreement, to transition all in-country activities to local institutions in each country so that they can be implemented locally. Funding for the continuation of these activities will vary by country, however these institutions have been heavily involved in the implementation of OTSS and training throughout the life of the project. Regardless of the funding mechanism moving forward, IMaD will transition oversight of OTSS activities to local institutions to ensure that they are continued and that the improvements already exhibited from activities are maintained.

Section 6 | APPENDICES

A. IMaD Program Structure and Management

IMAD ORGANIZATIONAL STRUCTURE



B. IMaD Staff, Roles & Responsibilities

The IMaD Core Management team is composed of the following people:

- Dr. Luis Benavente, **IMaD Director**, Medical Care Development International (MCDI).
Responsibilities: Represents IMaD's prime recipient, MCDI, for project management, planning, and coordination; liaises with IMaD partners; tracks progress towards benchmarks based on work plans; liaises with partners in maintaining updated M&E data including oversight of database development, data processing, and data analysis; ensures partner compliance with federal regulations, including making policies; develops overall quality assurance framework for diagnosis with RDTs; coordinates presentations in technical conferences; budgeting; assigns country-specific responsibilities to partners; and, coordinates development of technical scopes of work for consultants.
- Dr. Jane Carter, **Technical Director**, African Medical and Research Foundation (AMREF).
Responsibilities: Point of contact for WHO; supervises the development of assessment and training materials; develops technical scopes of work for consultants; oversees the development of QA protocols for microscopy; reviews QA protocols for RDTs; oversees AMREF's staff hired via IMaD; coordinates presentations at technical conferences in Africa; and, oversees technical content of deliverables.
- Rachel Shaw Kidanne, RN, **IMaD Project Manager**, MCDI.
Responsibilities: Assists Project Director in maintaining communications with country leads and NMCPs; oversees Hydas World Health's staff hired with IMaD funding; and, liaises with Project Director in providing day-to-day technical/logistical/administrative support to selected country teams.
- Chris Petruccelli, **IMaD Program Associate**, MCDI.
Responsibilities: Assists with ATPs, contracts, and other administrative activities; assists with the organization of teleconferences, conferences, presentations, and other technical/scientific events; and, works on other project activities as needed.
- Khadidiatou Waye, IMaD Program Associate, MCDI.
Responsibilities (Francophone): Assists with ATPs, contracts, and other administrative activities; assists with the organization of teleconferences, conferences, presentations, and other technical/scientific events; and, works on other project activities as needed.

The IMaD Core Technical Team is composed of the following people:

- Dr. Luis Benavente, **IMaD Director**, MCDI. (*Responsibilities: see above*)
- Dr. Jane Carter, **Technical Director**, AMREF. (*Responsibilities: see above*)
- Nicole Whitehurst, **Technical Officer**, MCDI.

Responsibilities: assists in the development of IMaD methodology, policy and SOP review, and training. liaison between IMaD partners, PMI, and CDC; maintains communication in countries where IMaD has LTTA; ensures timely submission of deliverables to PMI; Supervises interns/temporary staff; and, monitors production of deliverables: semiannual and country reports.

- Roy Prescott, Ph.D. **Slide Archive Director**, Hydas World Health (HWH).
Responsibilities: Leads slide development and provides ongoing technical assistance.
- Scott Teesdale, **Program/M&E Officer**, MCDI.
Responsibilities: Works closely with Project Director 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/temporary staff; and, monitors production of deliverables: semiannual and country reports.
- Sean Fennel, **IMaD Program Associate**, MCDI. *Responsibilities:* Supports OTSS Database and M&E initiatives; assist in production of deliverables: semiannual and country reports; conducts Data Entry trainings for data entry personnel.
- Emanuel Ouma Yamo, **Laboratory Advisor**, AMREF. *Responsibilities:* Lead laboratory trainer and advisor for IMaD technical activities.

Section 7 | ANNEXES

Annex 1: FY2011 Activities

FY11 IMaD Activities	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Activity	Angola	Benin	Burundi	DRC	Ethiopia	Ghana	Kenya	Liberia	Madagascar	Mali	Malawi*	Nigeria	Zambia	Total
Baseline Assessment (# of facilities assessed)			10											10
Training for baseline assessment (local enumerators)														0
Diagnostic Policy								250						250
Bench Aids Printed/Distributed		15				500		75			100		300	990
Standard Operating Procedures Printed/Distributed								250						
Laboratory Registers Printed/Distributed											4000			4000
National RDT Roll Out Plan											1			1
Refresher Training in Microscopy and RDTs (# of individuals trained)	6	26		55			47	40		20	22		37	253
Refresher Training in Clinical Diagnostic Methods														0
Training of Trainers (# of individuals trained)														0
OTSS Training (# of individuals trained)							18				36		86	140
OTSS Supervision (on site training, # of staff trained)		494				1551	312	120		252	491		503	3723
OTSS Rounds		3				3	1	3		1	1		2	14
OTSS Visits		229				528	52	53		50	205		113	1230
Data Entry Training (# of individuals trained)								5						5
OTSS Database Installed In country		1											1	2
Staff Trained in Database Management		1						5					1	7
Procurement (number of orders made)								1						1
Accreditation course participants					12		2					24		38
ICC		1		1		1		1	1	1	1		1	8
<i>Total number trained</i>	6	522	0	55	12	1551	379	170	0	272	549	24	627	4167
*Additional data pending analysis														

Annex 2: Country Specific Accomplishments

ANGOLA

Refresher Training – Microscopy and RDTs (September 2011)

- 6 laboratory staff trained

BENIN

Refresher Training – Microscopy and RDTs (March 2011)

- 26 Laboratory supervisors trained

Bench Aid production (March 2011)

- Bench Aids translated into French, printed (15 sets) and sent to country for distribution at the central level (Q4 FY2011)

Outreach Training and Support Supervision Round 5

- 72 Health facilities visited
82 Laboratory staff trained
105 Clinical staff trained

Outreach Training and Support Supervision Round 6

- 72 Health facilities visited
87 Laboratory staff trained
78 Clinical staff trained

Outreach Training and Support Supervision Round 7 (September 2011)

- 72 Health facilities visited
79 laboratory staff trained
63 clinical staff trained

Database Installation/Training (October 2011)

- OTSS Database installed at the central level and staff members were trained on OTSS data management

BURUNDI

- **Baseline assessments** of 10 district hospitals. IMaD Burundi Laboratory Assessment report submitted to the Burundi USAID mission and approved

Stakeholder's Meeting (May 3rd - 7th, 2011)

- Findings from the IMaD Burundi Laboratory Assessment shared and malaria case management and guidelines reviewed

DEMOCRATIC REPUBLIC OF CONGO

Provincial level Malaria Microcopy and RDT Training (February 2011)

- Malaria Microscopy and RDT training conducted in 4 PMI supported provinces training a total of 55 provincial laboratory staff

ETHIOPIA

National Archive of Malaria Slides (NAMS)

- Ethical Review process was initiated

External Competency Assessment of Malaria Microscopists (ECAMM)

- 12 national level lab staff trained

GHANA

OTSS Round 3 (October 2010)

- 156 Health facilities visited
452 Laboratory staff trained
55 Clinical staff trained

OTSS Round 4 (February/March 2011)

- 171 Health facilities visited
500 Laboratory staff trained
76 Clinical staff trained

OTSS Round 5* (May 2011)

- 201 Health facilities visited
599 Laboratory staff trained
26 Clinical staff trained

*Please note that as OTSS Round 5 data is still being processed, figures may be revised as further data is received

National Archive of Malaria Slides (January-September 2011)

- IMaD signed Memorandum of Understanding with Kintampo Health Research Center to create NAMS
- Final Ethical review approvals obtained, Ghanaian and US
- Training course of mass slide production conducted in KHRC
- Validation of donors ongoing process initiated and continuing

KENYA

Refresher Training – Microscopy and RDTs (October 2010)

- 47 People trained

OTSS Round 1 (November – December 2010)

- 52 Health facilities visited
81 Laboratory staff trained
231 Clinical staff trained

LIBERIA

Refresher Training – Microscopy and RDTs (March 2011)

- 24 People trained

OTSS Round 1 (October 2010)

- 18 Health facilities visited
49 Laboratory staff trained

OTSS Round 2 (February 2011)

- 16 Health facilities visited
52 Laboratory staff trained

OTSS Round 3 (July-Sept 2011)*

- 23 Health facilities visited
28 Laboratory staff trained

*This data will most likely be revised as checklists are still being received and processed

MADAGASCAR

- Workplan for FY11-FY12 under development based on PMI and Mission decision to allow IMaD activities to proceed through non-governmental mechanisms

MALAWI

Refresher Training – Microscopy and RDTs (November 2010 & January 2011)

- 22 Laboratory Staff trained

OTSS workshop

- 17 clinical Staff trained
- 22 laboratory staff trained

OTSS Round 2 (February 2011)

- 102 Health facilities visited
134 Laboratory staff trained
357 Clinical staff trained

OTSS Round 3 (September 2011- data analysis in process)

- 103 health facilities visited

RDT Roll Out Plan

- RDT Roll-Out Plan finalized and approved in September 2011, printing will be completed during early FY12

Malaria Laboratory Register

- TWG developed a malaria laboratory register to include RDTs that was approved by the MOH

MALI

Refresher Training – Microscopy and RDTs (October 2010)

- 20 people trained

OTSS Round 4 (November 2010)

- 50 Health facilities visited
110 Laboratory staff trained
142 Clinical staff trained

Bench Aid production (November - December 2010)

- Bench aids translated into French
- Distributed in Round 4 of OTSS

ZAMBIA

Refresher Training – Microscopy and RDTs (February 2011)

- 19 people trained

OTSS Training Workshop (February 2011)

- 39 Laboratory staff trained to implement OTSS protocols in Lusaka District Health Facilities

22 Clinical staff trained to implement OTSS protocols in Lusaka District Health Facilities

OTSS Round 3 (October 2010)

- 54 Health facilities visited
79 Laboratory staff trained
141 Clinical staff trained

OTSS Round 4 (May/June 2011)

- 54 Health facilities visited
149 Laboratory staff trained
148 Clinical staff trained

Annex 3: Sample Refresher Training in Malaria Diagnostics Time Table

REFRESHER TRAINING IN LABORATORY DIAGNOSIS OF MALARIA: TIME TABLE

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
8.00-9.00	Introductions Ground rules Expectations	Review of Pre test slides	Review stained slides	Review of Test Slides	Review of Test Slides
9.00-10.00	Module 1 Pre-test (Theory)	Module 6 Collection of capillary & venous blood (Theory)	Module 8 Artefacts, pseudoparasites, other blood parasites, mixed infections (Theory)	Module 11 Use, care & storage of the microscope (Theory)	Module 12 Malaria QA/QC (Theory)
10.00 – 10.30	Module 2 Pre-test (Practical)	Module 7 Malaria diagnosis: microscopy (Theory)	Module 9 Preparation and staining of thick and thin blood films (Theory)	Module 11 Use, care & storage of the microscope (Practical)	Module 13 SOP development (Theory & Practical)
10.30-11.00	Tea break				
11.00-12.00	Module 2 Pre-test (Practical)	Module 5 Parasitological stains & Prep of stains (Practical)	Module 10 Malaria diagnosis RDT (Theory)	Module 10 Malaria diagnosis RDT (Practical)	Module 14 Sources off error in malaria diagnosis (Theory)
12.00-1.30	Module 2 Pre-test (Practical)	Module 6 Collection of capillary & venous blood(Practical)	Module 9 Preparation and staining of thick and thin blood films (Practical)	Module 10 Malaria diagnosis RDT (Practical)	Module 14 Sources off error in malaria diagnosis (Theory)
1.30 – 2.30	Lunch				
2.30- 3.30	Module 3 Epidemiology and overview of progress in malaria eradication	Module 7 Practice slides examination (Practical)	Module 7 Practice slides examination (Practical)	Module 7 Practice slides examination (Practical)	Module 15 Presentation work plans
3.30-4.30	Module 4 Life cycle of malaria and parasite morphology (Theory)	Module 7 Practice slides examination (Practical)	Module 7 Practice slides examination (Practical)	Module 7 Practice slides examination (Practical)	Module 15 Presentation work plans
4.30 – 5.30	Module 5 Parasitological stains & Prep of stains (Theory)	Module 7 Practice slides examination (Practical)	Module 7 Practice slides examination (Practical)	Module 7 Practice slides examination (Practical)	Closing & issuing of certificates
5.30 – 6.00	Tea break				

Annex 4: Sample OTSS Clinical Training Time Table

CURRICULUM FOR CLINICAL SUPERVISORS TO STRENGTHEN MALARIA MANAGEMENT THROUGH OUTREACH TRAINING AND SUPERVISION TIMETABLE

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
8.00-8.30	Introductions Ground rules Expectations Joint session	Recap	Recap	Recap	Recap	Recap
8.30-9.30		Module C4 Approach to pallor/anaemia	Module J2 Malaria: programmatic issues Joint session	Module C8 Malaria microscopy: use & interpretation Theory & demonstration	Module J4 Training/supervisory visit to a health facility Joint session Practical	Module C12 Post - test
9.30-10.30	Module J1 Essential health facility management Joint session					
10.30-11.00 Tea Break						
11.00-12.00	Module C1 Approach to fever	Module C5 Overview of malaria	Module J3 Sources of errors in patient diagnosis Joint session	Module C9 Rapid Diagnostic Tests (RDTs): use & interpretation Theory & practical		Module J5 Way forward Plan of action Closing Joint session
12.00-1.00						
1.00-2.00 Lunch Break						
2.00- 3.00	Module C2 Standards of clinical practice	Module C6 Participants see patients with fever/pallor and present to group Practical	Module C7 Malaria: Case histories & discussion	Module C10 Outreach Training & Support Supervision: principles, development and use of checklists	Module C11 Feedback from training/supervisory visit to a health facility	Depart
3.00-4.00	Module C3 Pre-test					
4.00-5.00						
5.00-5.30 Tea Break						

Annex 5: Sample OTSS Laboratory Training Time Table

<i>Time</i>	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>	<i>Friday</i>
9:00 -10:30	Module 1 Introductions Ground rules Expectations Administrative Issues	Module 5 Standards of laboratory practice	Module 10 Management of chemicals, reagents and supplies	Organize into 2 groups and overview of group visit to health facility	Continue to develop workplans
10:30-11:00	TEA BREAK	TEA BREAK	TEA BREAK	NO TEA BREAK	
11:00-12:00	Module 2 Malaria: programmatic Issues (NMCP)	Module 6 Principles and concepts of QA/QC and review of microscopy and RDT EQA protocols	Module 11 Medical lab equipment	Visit Health Facility (use checklist and record any questions)	Module 16 (practical) Workplan Presentations
12:00-1:00	Module 3 On-site Training and Support Supervision Overview	Module 7 Essential health facility management (align with checklist)	Module 12 Lab safety, cleaning, disinfection, sterilization, and waste disposal		
1:00-2:00	LUNCH BREAK				
2:00-2:30	Module 4 OTSS Checklist and scoring overview	Module 8 Laboratory management information systems	Module 13 Sources of error in patient diagnosis	Module 14 Feedback from OTSS Visit	Closing
2:30-3:30		Module 9 (practical) Design a plan as to how data will flow from your county to NMCP	Module 13(practical) Sources of error in patient diagnosis		Module 15 (practical) Develop workplans for OTSS
3:30-5:00		Module 9 (practical) presentation of data flow plan			

Annex 6: Distribution of microscopes in Ghana

Facility name	Region
Regional Hospital, Koforidua	Eastern
Oda District Hospital	Eastern
Suhum Government Hospital	Eastern
Goaso Hospital	Brong Ahafo
St John of God Hospital, DuayawNkwanta	Brong Ahafo
Atebubu Government Hospital	Brong Ahafo
Bolga Regional Hospital	Upper East
Navrongo War Memorial Hospital	Upper East
Bongo District Hospital	Upper East
St Mary Theresa Hospital, Dodi Papease	Volta
St Anthony's Hospital	Volta
Akatsi District Hospital	Volta
Bole Hospital	Northern
Bimbila Hospital	Northern
Zabzugu Hospital	Northern
Ashaiman Polyclinic	G. Accra
Tema Gen Hospital	G. Accra
Dodowa	G. Accra
Suntreso Regional Hospital	Ashanti
Mampong Municipal Hospital	Ashanti
Ejisu District Hospital	Ashanti
Effia Nkwanta Reg Hospital	Western
Tarkwa Hospital	Western
Dixcove Govt Hospital	Western
Wa Regional Hospital	Upper West
Jirapa District Hospital	Upper West
Nadowli District Hospital	Upper West
Central Regional Hospital	Central
Saltpond Govt Hospital	Central
Agona Swedru	Central

Annex 7: IMaD In-Country Coordinators

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