

Universal Diagnosis and Treatment to Improve Maternal and Child Health

Project Year 4 Annual Report
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Acronyms

ACT	artemisinin-based combination therapy
aMDRT	advanced malaria diagnostics refresher training
ASTMH	American Society of Tropical Medicine and Hygiene
bMDRT	basic malaria diagnostics refresher training
CCMRT	clinical case management refresher training
CDC	US Centers for Disease Control and Prevention
CHMT	council health management team
CHO	community health officer
CHSP	community health service provider (Burma)
CHSU	community health service unit (Malawi)
CDO	county diagnostic officer (Liberia)
CHSL	community health services liaison
CHSP	community health service provider
CLU	clinical laboratory unit (Ghana)
CMRL	county malaria reference laboratory
CNM	Cambodia's National Malaria Control Program
DHIS2	district health information software version 2
DHIMS2	district health information management software version 2 (Ghana)
DHMT	district health management team
DLP	Direction de la Lutte contre le Paludisme (National Malaria Program of Madagascar)
DPS	Direcção Provincial de Saúde (Provincial Health Directorate of Mozambique)
DQA	data quality assurance
DRC	Democratic Republic of Congo
ECA	external competency assessment
ECAMM	external competency assessment for malaria microscopists (WHO)
EDS	electronic data system
EPHI	Ethiopian Public Health Institute
EQA	external quality assurance
ESMPIN	Expanded Social Marketing Project in Nigeria
FMOH	Federal Ministry of Health (Ethiopia, Nigeria)
HIV	human immunodeficiency virus
HMIS	health management information system
HNQIS	health network quality information system
HSO	health service officer (Burma)
HSS	health service supervisor (Burma)
HZMT	health zone management team
ICAP	International Center for AIDS Care and Treatment Programs
iCCM	integrated community case management

IEC	information, education and communication
IMaD	Improving Malaria Diagnostics
IMCI	Integrated Management of Childhood Illness
INRB	Institut National de Recherches Biomédicales – DRC (<i>National Biomedical Research Institute</i>)
INRSP	Institut National de Recherche en Santé Publique – Mali (<i>National Institute of Public Health Research</i>)
INS	Instituto Nacional de Saude (National Institute of Health of Mozambique)
IPM	Institut Pasteur Madagascar
IPTp	intermittent preventive treatment of malaria in pregnancy
IQA	internal quality assesement
IRB	institutional review board
KHRC	Kintampo Health Research Centre
LGA	local government area (Nigeria)
LLIN	long-lasting insecticidal net
LLW	lessons learned workshop
MAC	Malaria Alert Center
MCS	malaria case surveillance
MCSP	Maternal and Child Survival Program
M&E	monitoring and evaluation
MDRT	malaria diagnostics refresher training
mHealth	mobile health
MEAF	Malaria Elimination Action Framework (Cambodia)
MERG	M&E Reference Group (WHO)
MIS	malaria information system
MOH	Ministry of Health
NAMS	national archive of malaria slides
NCAMM	national competency assessment of malaria microscopy
NGO	nongovernmental organization
NIMR	National Institute of Medical Research
NMCC	National Malaria Control Centre (Zambia)
NMCP	National Malaria Control Program
NPCDD	National Program for the Control of Diarrheal Diseases (DRC)
OPD	outpatient department
ORS	oral rehydration salts
OTSS	outreach training and supportive supervision
PAMO	Program for Advancement of Malaria Outcomes (Zambia)
PCR	polymerase chain reaction
<i>Pf</i>	<i>Plasmodium flaciparum</i>
PHCU	primary health care unit
PMI	President’s Malaria Initiative (United States)
PMP	performance monitoring plan

PNCM	Programa Nacional de Controlo da Malária (National Malaria Control Program of Mozambique)
PNLMD	Programme National de Lutte Contre les Maladies Diarrhéiques (DRC national diarrheal disease program)
PNLP	Programme National de Lutte Contre le Paludisme (DRC national malaria program)
PPMV	patent proprietary medicine vendor (Nigeria)
pre-ECA	preparatory external competency assessment
PMW	plantation malaria worker
PSI	Population Services International
PSK	Population Services Khmer (Cambodia)
PT	proficiency testing
<i>Pv</i>	<i>Plasmodium vivax</i>
PY	project year
QA	quality assurance
QAACT	quality-assured artemisinin-based combination therapy
RBM	Roll Back Malaria
RDT	rapid diagnostic test
RHMT	regional health management team
RITM	Research Institute of Tropical Medicine (Philippines)
SFH	Society for Family Health (Nigeria)
SIAPS	Systems for Improved Access to Pharmaceuticals and Services
SLMTA	strengthening laboratory management toward accreditation
SMART	specific, measureable, attainable, realistic and timely
SME TEG	WHO Surveillance, Monitoring and Evaluation Technical Expert Group
SMR	scientific merit review committee
SOP	standard operating procedure
SQH	Sun Quality Health (Burma)
SSDI	Support for Service Delivery Integration
SSGI	Service de Santé a Grand Impacte (High Impact Health Service)
TB	tuberculosis
TES	therapeutic efficacy study
TMO	township medical officer
TOT	training of trainers
TWG	technical working group
UCAD	Université Cheikh Anta Diop
USAID	United States Agency for International Development
WHO	World Health Organization
ZAMEP	Zanzibar Malaria Elimination Program

Executive summary

MalariaCare supports the United States President's Malaria Initiative (PMI) in its global effort to reduce malaria morbidity and mortality. MalariaCare, a five-year partnership led by PATH and funded by the United States Agency for International Development (USAID) through PMI, aims to scale up high-quality case management services, both diagnosis and treatment, for malaria and other febrile illnesses. The partnership works in PMI focus countries and other countries to reduce the burden of serious disease and promote healthy communities and families.

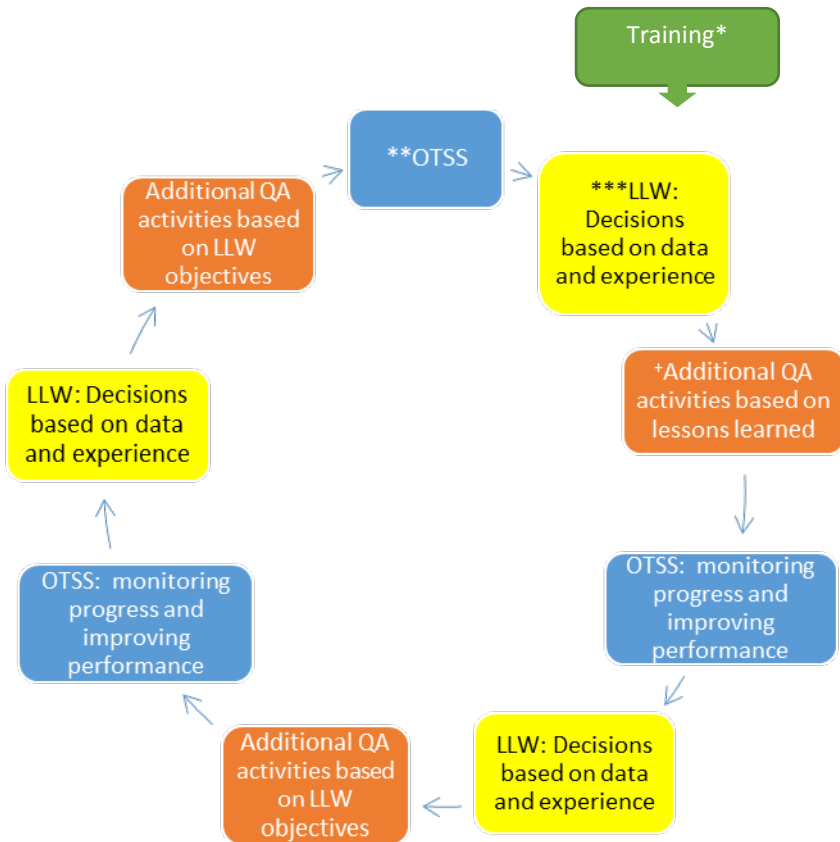
During project year four (PY4), MalariaCare continued work in 14 countries where it had activities in PY3 and restarted activities in Guinea with a focus on reestablishing diagnostic capacity after the Ebola outbreak. The project scaled up to add Burundi and Senegal to its global portfolio with planning taking place in order to initiate activities in early PY5—for a total of 17 countries.

MalariaCare's strategy is built around three key malaria case management quality assurance (QA) intervention areas:

1. Improving the quality of malaria diagnosis using microscopy and rapid diagnostic tests (RDT).
2. Building competency in quality clinical case management.
3. Strengthening quality of data collection and use for decision-making.

The project's QA components include training, supportive supervision, development and revision of tools and job aids, and working with health management teams to institute lessons learned across the health system and improve the competency of clinical, laboratory, and pharmacy staff at health facilities in diagnosing and treating malaria (see Figure 1 below). MalariaCare places emphasis on strengthening capacity for constructive mentoring with continuous feedback to supervisors and providers based on both observation and objective data, and on encouraging the collaboration between clinical and laboratory staff.

Figure 1. MalariaCare’s QA Strategy.



*Advanced and basic malaria diagnostic refresher training, supervisors training, rapid diagnostics test cascade training; **OTSS=outreach training and supportive supervision; ***LLW=lessons learned workshop; + including refresher training

The QA process is designed to be a series of linked activities that together empower local managers and providers to use information to improve case management. Skills are reinforced during rounds of outreach training and supportive supervision (OTSS) by supervisors who themselves have had their skills and knowledge improved during targeted training. Data on facility readiness and provider diagnostic and clinical competency to deliver quality case management is collected during the visits, and observation conducted, to identify strengths and weaknesses. These are immediately discussed at each facility and action plans developed. In between rounds of quarterly to biannual OTSS, lessons learned workshops (LLWs) perform a similar function but with a view to group all facilities in an administrative area, with realistic action plans developed for implementation in the short term and based on evidence from OTSS, other MalariaCare activities, and the experience of supervisors. Action may be activities supported directly by MalariaCare, such as intensive mentoring, but are also meant to encourage low cost, independent intervention locally by facility managers and administrative health management teams, thus demonstrating that change is possible without substantial external support.

MalariaCare is working to build capacity of health staff involved in delivering case management at all levels of the health care system with the aim of promoting sustainability beyond the life of the project and

transitioning activities to other partners or host governments. The project team recognizes that maintaining such resource intensive activities as supportive supervision will necessitate governments to prioritize funding toward them. MalariaCare continues to believe that the capacity built at regional, district and facility level, to mentor, communicate effectively across departments, and collect, analyze and use data, will help to maintain some successes of the program even in a low resource environment.

Facility Coverage

MalariaCare works with PMI in-country teams and NMCPs to prioritize regions of focus based on country-level priorities and within the parameters of funding available. We then include sub-national health management teams in prioritizing facilities in which to target activities. National coverage of facilities that have had at least one OTSS visit in PY4 across 9 countries ranges from 1% to 48%. In 7 countries we have regional data available on the number of facilities, and in those regions where MalariaCare is working, between 18% and 98% of facilities have had at least one OTSS visit (Table 1).

Table 1. National and regional health facility coverage for one round of OTSS.

COUNTRY	# FACILITIES WITH AT LEAST 1 OTSS VISIT	TOTAL # OF FACILITIES IN COUNTRY	NATIONAL COVERAGE %	TOTAL # OF FACILITIES IN MALARIACARE REGIONS	REGIONAL COVERAGE %
DRC	57	Unknown	Unknown	9,520	<1%
Ghana	1937	4068	48%	3217	60%
Kenya	604	9736	6%	619	98%
Madagascar	24	2688	1%	300	8%
Malawi	399	1060	38%	1060	NA
Mali	144	1283	11%	425	34%
Mozambique	161	1542	10%	676	24%
Tanzania	1313	6652	20%	2587	51%
Zambia	146	1956	7%	811	18%
Total	4785	37251	13%	8970	53%

Highlights of achievements against project objectives

1. Improve the accuracy of diagnostic testing for malaria to greater than 90 percent

In PY4, MalariaCare has continued to strengthen microscopy skills through a combination of advanced malaria diagnostics refresher training (MDRT) followed by supportive supervision, the focus of which is mentoring and feedback on key skills taught during the training such as preparing, staining, and reading slides (primarily parasite identification) to develop and maintain a cadre of well-trained microscopists serving as OTSS supervisors. MalariaCare established minimum passing standards for OTSS supervisors during MDRT as achieving a World Health Organization (WHO) Level One or Level Two equivalent score for both parasite detection (Level 1: ≥ 90 percent; Level 2: ≥ 80 percent) and parasite counting (Level 1: ≥ 50 percent; Level 2: ≥ 40 percent) (Table 2).

Table 2. World Health Organization certification scores for parasite detection, species identification and parasite counting.

	Parasite detection	Species identification	Parasite counting
Level 1 (expert)	$\geq 90\%$	$\geq 90\%$	$\geq 50\%$
Level 2	80% - < 90%	80% - < 90%	40% - < 50%
Level 3	70% - < 80%	70% - < 80%	30% - < 40%
Level 4	< 70%	< 70%	< 30%

Across MalariaCare countries in PY4, 140 supervisors (73 percent of 192 participants) across 7 countries where activities to strengthen microscopy occurred achieved an L1 or L2 equivalent for parasite detection (Table 3). Parasite detection scores for supervisors across MalariaCare countries have been consistently high, while speciation (8 percent) and parasite counting (43 percent), even though often improved, have lagged behind. Similar results are seen among all MDRT participants as also presented in Table 3. Low scores for speciation are to be expected, as WHO estimates approximately 90 percent of infections in sub-Saharan Africa are caused by *Plasmodium falciparum*, and identification of other species is more difficult as they are seldom seen. Furthermore, parasite counting, when done at all, has historically been with the ‘plus’ system, rather than the parasites/ μ l that MalariaCare has been working to institutionalize. This more subjective ‘plus’ method of quantification has been slow to change. The low performance of staff in Tanzania was a result of the selection of staff who had limited microscopy experience. MalariaCare is working with the NMCP in that country to choose more experienced staff who could act as effective mentors during OTSS and other activities.

Table 3. Number of supervisors achieving Level 1 or Level 2 equivalent scores in microscopy for parasite detection, species identification, and parasite counting during malaria diagnostic refresher training (basic and advanced).

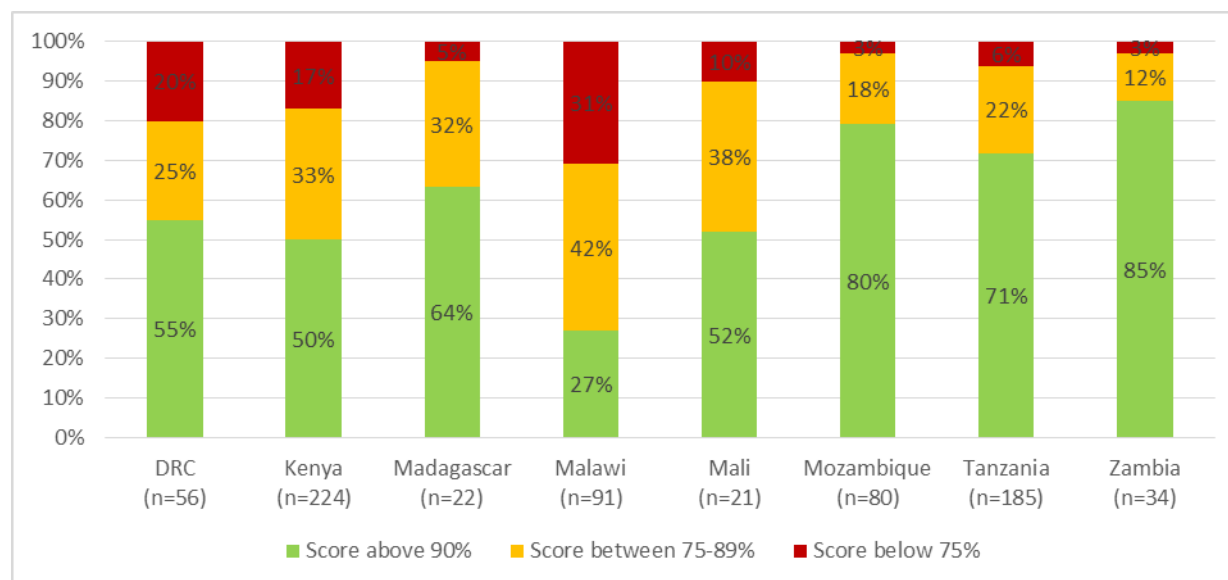
Country	N	OTSS Supervisors			N	All MDRT participants		
		Parasite detection	Species ID	Parasite counting		Parasite detection	Species ID	Parasite counting
DRC	18	83%	39%	50%	39	72%	36%	51%
Kenya	76	82%	4%	32%	156	66%	2%	31%
Liberia	23	74%	20%*	100%	23	74%	20%*	100%
Malawi	19	74%	0%	42%	59	76%	0%	15%
Mali	20	60%	0%	5%	20	60%	0%	5%
Mozambique	25	72%	0%	48%	38	68%	0%	42%
Tanzania	11	9%	0%	55%	22	18%	0%	36%
Total	192	73%	8%	43%	380	65%	5%	31%

* Two MDRT sessions occurred, but one did not include Species ID; the n for this is 10.

MalariaCare works to improve microscopy scores through OTSS and by establishing core groups of trained microscopists at both the national and peripheral level. Some of these will then act as supervisors and trainers who build capacity at facilities level through coaching during OTSS. In addition to training staff in MDRTs, a few high performers may be selected to attend a WHO external competency for malaria microscopy (ECAMM) course. In PY4, MalariaCare supported 27 external competency assessment for malaria microscopy (ECAMM) participants from 6 countries and 25 (93 percent) passed with a WHO L1 or L2 equivalent; 18 (64 percent) reached a WHO L1, 7 (25 percent) reached a WHO L2 and 2 (7 percent) scored at L3 or L4. ECAMM courses train microscopists to become experts based on a grading system that scores their ability to identify parasites, differentiate species, and accurately count. In PY4, we tested additional acceptance criteria for participants joining the WHO External Competency Assessment for Malaria Microscopy (ECAMM) that has resulted in a higher proportion reaching L1 and L2 accreditation. Those who took a pre-ECAMM course within 6 months before the ECAMM and passed at a L1 or L2 were 3.7 times more likely to pass the ECAMM at L1 or L2 than those who did not. We will promote the use of these criteria by working with WHO and Amref Health Africa to continue implementing these more rigorous standards to more efficiently build a core group of experts in our countries. Results will be published after additional upcoming ECAMM sessions have been completed and analyzed using the new criteria.

Microscopy skills are generally high across project countries during OTSS visits, but challenges such as staff turnover, equipment and stock supplies, and other general health systems challenges remain. Using the MalariaCare checklist, the proportion of facilities meeting the minimum standard competency of 75 percent across eight countries at the most recent visit ranged from 69 percent to 97 percent (Figure 2). Overall, microscopy competency scores collected during OTSS tend to be higher than MDRT scores. OTSS microscopy scores are based on slide preparation, staining and reading slides for parasite detection, while during MDRTs laboratory staff are assessed on parasite detection, species identification, and parasite counting, which tend to be more advanced and difficult skills to master.

Figure 2. Proportion of health facilities meeting minimum standard of competency (75 percent) in microscopy during most recent OTSS visit, by country.



Across eight of the countries that assessed microscopy skills during OTSS, there was no clear trend of improvement between the visits conducted in the past two years using the revised checklist (Table 4). The overall numbers included in the analysis are small, as only a subset of facilities offer microscopy services and data completeness for the microscopy section of the checklist continues to be a challenge – with supervisors submitting microscopy observations for just over half of facilities with microscopy. Further discussions with country program staff have revealed that this is due, at least in part, to lack of microscopy supplies and lack of staff who conduct microscopy at facilities. This limits supervisors’ ability to observe microscopy procedures.

Table 4. Proportion of health facilities meeting minimum standard of competency (75 percent) in microscopy, trend for subset of facilities with consistent visits, by country.

Country	Number of health facilities	Number of visits*	First Visit	Last Visit	Percentage point difference
DRC [‡]	22	4	95%	86%	-9%
Ghana**	N/A	2	N/A	N/A	N/A
Kenya [‡]	52	2	90%	81%	-10%
Madagascar	12	2	100%	100%	0%
Malawi (Joint OTSS) ^{‡‡}	28	3	93%	89%	-4%
Mali	4	2	100%	100%	0%
Mozambique (Provincial) ⁺	45	3	89%	98%	9%
Tanzania	23	2	87%	100%	13%
Zambia (Provincial) ⁺	27	2	93%	100%	7%

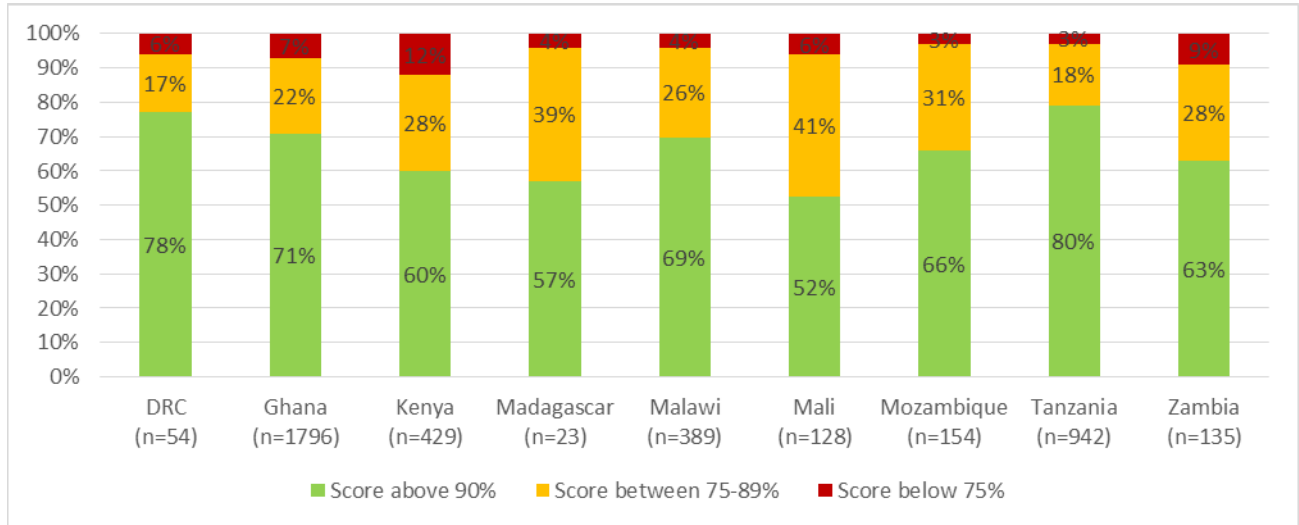
*Visits includes all available data with the revised checklist in PY3 and PY4.

**Ghana is not included because it uses a different checklist which is not comparable to other countries. For Ghana’s microscopy results, please see the Ghana narrative section.

[‡] MalariaCare is currently investigating the cause of the decrease in percentage point differences in DRC, Kenya and Malawi and will make programmatic adjustments where appropriate.

For diagnostics, MalariaCare has also worked to improve the performance of facility-based providers on RDT testing, primarily through observation and feedback during OTSS but also through RDT cascade training. Using the OTSS checklist, the project evaluated health facility performance on the necessary steps to correctly perform an RDT. At the most recent visits this year, across the nine countries shown in Figure 3 below, between 88 percent and 97 percent of facilities met the minimum competency score of 75 percent.

Figure 3. Proportion of health facilities meeting minimum standard of competency (75 percent) in rapid diagnostic test (RDT) performance during most recent OTSS visit, by country.



Analyzing trends on RDT performance reveals improvement in RDT skills across all nine OTSS countries (Table 5). MalariaCare is working with its country teams to publish results that highlight the successes and present the challenges to achieving and maintaining high RDT performance scores. For example, an analysis of over 7,500 RDT observations in Ghana, between 2013 and 2015, demonstrated that high performance can be achieved and maintained at all levels of the healthcare system.

Table 5. Proportion of health facilities meeting minimum standard of competency (75 percent) in rapid diagnostic test (RDT), trend for subset of facilities with consistent visits, by country.

Country	N	Number of visits*	First Visit	Last Visit	Percentage point difference
DRC	16	4	88%	100%	12%
Ghana	1,101	2	91%	95%	4%
Kenya	131	2	83%	96%	13%
Madagascar	18	2	83%	94%	11%
Malawi (Joint OTSS)	167	3	96%	96%	0%
Malawi (Clinical OTSS)	87	2	95%	95%	0%
Mali	52	2	83%	94%	11%
Mozambique (Provincial)	61	3	95%	95%	0%
Tanzania	135	2	90%	97%	7%
Zambia (Provincial)	35	2	89%	94%	5%
Zambia (Sub-district)	72	2	76%	92%	16%

*Visits includes all available data with the revised checklist in PY3 and PY4.

2. Improve the percentage of patients with suspected malaria or febrile illness who receive a diagnostic test

In PY4, the project conducted clinical case management refresher training (CCMRT) in eight countries, training a total of 820 providers on current national guidelines and febrile case management skills. The skills taught during CCMRTs are reinforced and strengthened through on-the-job mentoring during OTSS, using the clinical checklist to improve the quality of clinician performance at facilities. The primary focus of the training and mentoring is on improving clinical encounters for febrile illnesses and focus on the key component of recognizing the need for and conducting a diagnostic test. MalariaCare measures this by supervisor agreement with whether a malaria test should be ordered during all clinical observations. At the most recent round of OTSS across nine countries, clinical staff performed well in this area with average facility scores ranging from 86% to 98 % as seen in Table 6. In addition, performance on the three other key febrile clinical management steps included in the minimum standard score at the most recent OTSS visit was high for most countries, with average facility scores at or above 80 percent (Table 6). Exceptions include checking for signs of severe malaria in Mozambique and Zambia and three of the four key steps in DRC.

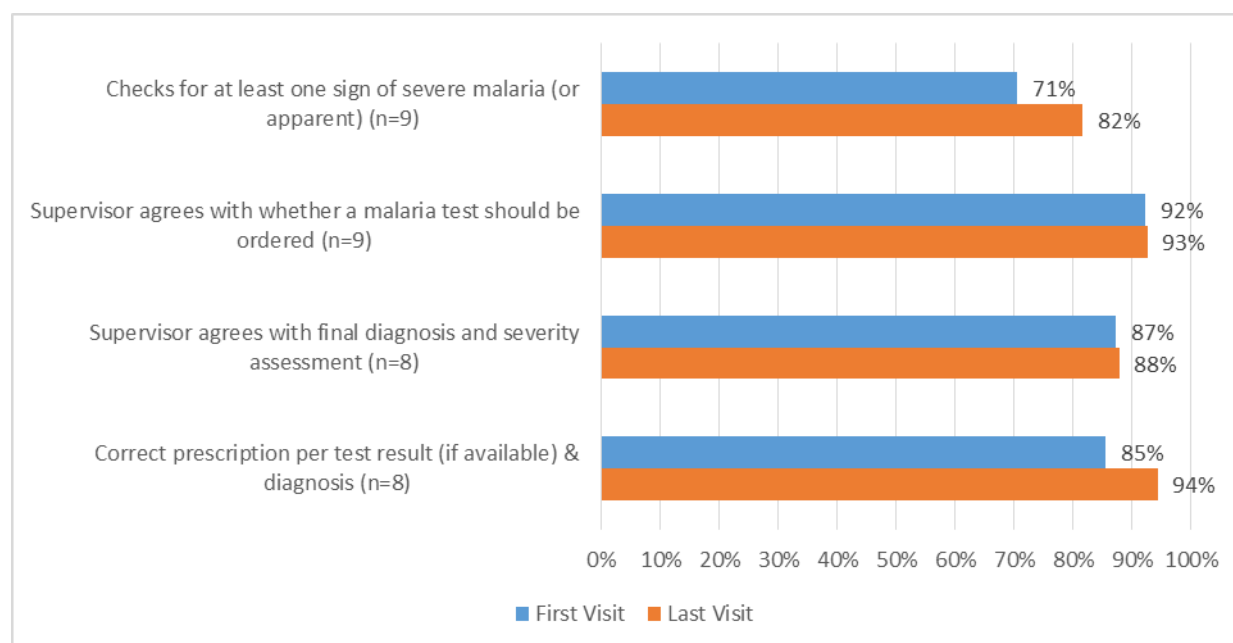
Table 6. Average health facility performance on key febrile clinical management steps, by country, during most recent OTSS visit, by country.

Step	DRC (n=43)	Ghana (n=1480)	Kenya (n=569)	Madagascar (n=22)	Malawi (n=386)	Mali (n=121)	Mozambique (n=152)	Tanzania (n=897)	Zambia (n=123)
Checks for at least one sign of severe malaria (or apparent)	61%	84%	80%	95%	82%	82%	69%	88%	65%
Supervisor agrees with whether a malaria test should be ordered	86%	87%	96%	87%	97%	98%	86%	98%	93%
Supervisor agrees with final diagnosis and severity assessment	74%	94%	94%	95%	97%	94%	90%	96%	96%
Correct prescription per test result (if available) & diagnosis	71%	N/A*	94%	95%	90%	89%	90%	94%	96%

* Correct prescription per test result (if available) & diagnosis is not available in the Ghana clinical checklist

Over OTSS rounds, checking for signs of severe malaria and correct prescription per test result have shown the greatest improvement. There has been little improvement in supervisors’ agreement with clinicians on ordering a malaria test, although this indicator started out high, with an average of 92 percent in the cross country trend analysis. Similarly, there has been little change in supervisors’ agreement with clinicians’ final diagnosis and severity assessment. While scores of 'supervisor agreement' serve as proxies to indicate whether the observed facility staff member is testing, diagnosing, and determining severity correctly, we understand the limitations in this measurement. All supervisors are not equally qualified, and while they all attend supervisor training and are monitored through reviewing the data they collect on the electronic data system (EDS) in seven countries, they are largely chosen by NMCPs with minimal input from MalariaCare.

Figure 4. Average health facility performance on key febrile clinical management steps, trend for subset of facilities with consistent visits, weighted by country.*



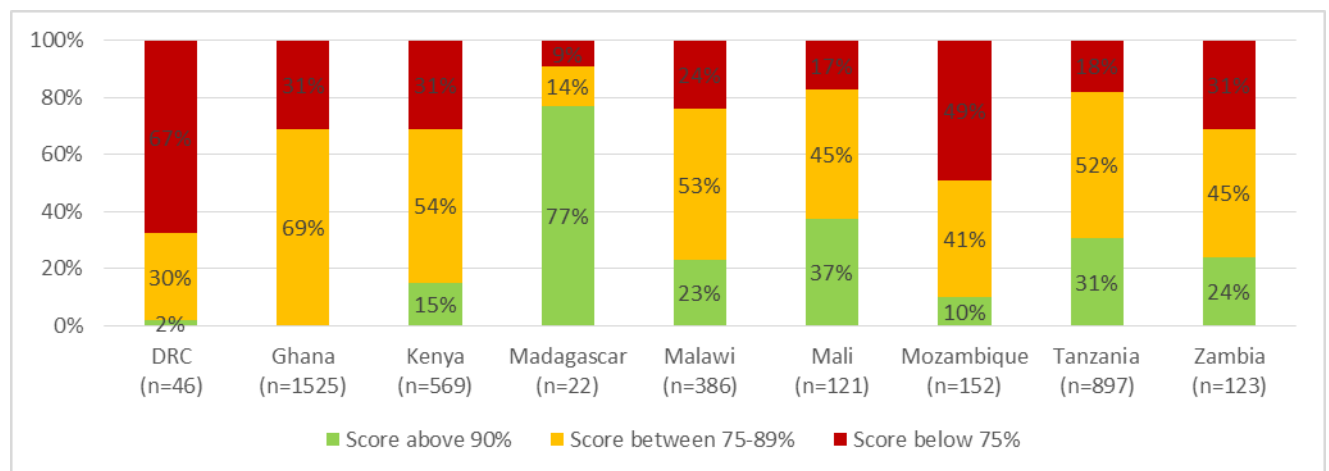
*Supervisor agreement with final diagnosis and severity and correct prescription per test result were only available in eight out of nine countries due to changes in the checklist.

Taken together, these most recent visit and cross-country trend analyses show that there is room for improvement in all clinical indicators, particularly in the DRC where MalariaCare supported the NMCP national case management working group to revise the national guidelines and develop appropriate training guidelines to address these weaknesses, and assist in dissemination and implementation of these guidelines through training and OTSS.

3. Improve the percentage of patients who receive appropriate treatment for malaria or other related illnesses - consistent with the result of the diagnostic test

In addition to improving the proportion tested, MalariaCare has worked to improve the ability of providers to adhere to the results of the test, initiate early treatment, and conduct appropriate follow up of both uncomplicated and severe malaria. While clinicians are able to recognize the need for a diagnostic test, are able to properly diagnose malaria, and treat malaria appropriately (Table 6) as measured by our 4 minimum standard steps for clinical competency (Figure 4), review of the data from clinical OTSS visits reveal that they are scoring poorly in certain tasks that may impact their ability to diagnose other febrile conditions, such as conducting a number of steps measured by physical exam or performing a focused history. Scores are based on steps on the clinical check list correctly performed with the four minimum standard steps weighted to make up two thirds of the score, and other tasks such as their history and physical exam skills, communication with caregivers, and referral practices, all making up one third of the total score (See Appendix D). Data from the latest round of OTSS in 9 countries demonstrates (Figure 5) highly variable scores across countries in meeting the minimum competency standard for clinical care. MalariaCare will continue to emphasize performance on our key indicators, while building more complete clinical skills by focusing on deficient areas identified in the clinical encounter through OTSS observations.

Figure 5. Proportion of health facilities meeting minimum standard of competency (75 percent) in clinical care during most recent OTSS visit, by country.



MalariaCare focused on building clinicians’ capacity to adhere to test results and national guidelines for treatment of uncomplicated and severe malaria. MalariaCare evaluates adherence in three ways through register review: a) the proportion of positive test results recorded that received an ACT; b) the proportion

of negative test results that did not receive an ACT; c) and the proportion of those prescribed ACTs who had a test performed. The latter is measuring adherence to the WHO recommendation of testing before treatment. These different measurements help us better target areas of, if the problem is primarily one with clinical, laboratory, or pharmacy staff, and in doing so helps us tailor mentoring to improve adherence.

Lack of adherence to negative malaria test results continues to be problematic. In some countries, clinicians still use antimalarial drugs other than ACTs in spite of clear national guidelines. Analysis of the latest round of PY4 OTSS results demonstrates the variability of the problem across countries with adherence to negative test results, ranging from 35 percent in DRC to 100 percent in Madagascar (Figure 6). Nonetheless, improvement over time is occurring. In 9 countries conducting OTSS, improvement over time has been seen in Table 7, with Mozambique and Madagascar staying about the same across 3 rounds.

MalariaCare’s work has contributed to the improvement in adherence, through training, mentoring and collaborative review of registers during OTSS, improving confidence and adherence to RDT testing and increasing use of ACTs. MalariaCare understands that adherence is not simply dependent on knowledge of acceptable guidelines, and that there are other factors that may account for lack of adherence, such as client expectation and financial incentives. While we cannot address all of these issues, we attempt to influence those that we can affect through improved mentoring and coaching. This is being done through an increased emphasis during supervisor training on techniques to teach and mentor on some of these other factors that may influence providers’ behavior. For example, during supervisor training, we engage in case scenarios that emphasize why clients expect certain services and certain strategies that participants may use to meet those expectations while still adhering to guidelines.

Figure 6. Proportion of health facilities meeting minimum standard of competency (90 percent) in adherence to negative malaria test results during most recent OTSS visit, by country.

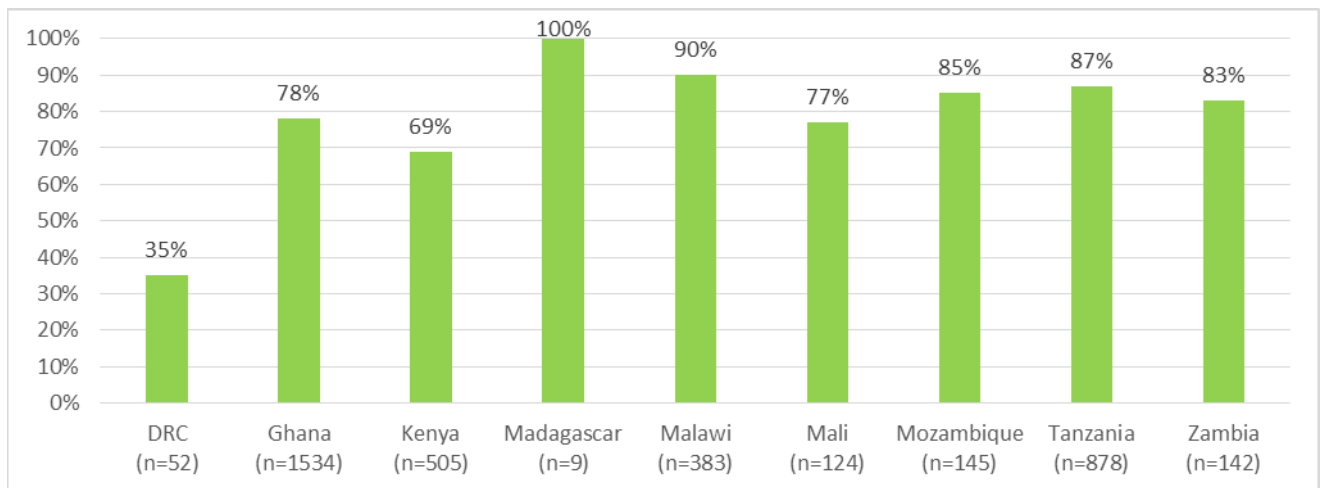


Table 7. Proportion of health facilities meeting minimum standard of competency (90 percent) in adherence to negative malaria test results, trend for subset of facilities with consistent visits, by country.

Country	N	Number of visits*	First Visit	Last Visit	Percentage point difference
DRC	21	4	5%	33%	28%
Ghana	810	2	71%	81%	10%
Kenya	165	2	64%	83%	19%
Madagascar	17	2	100%	100%	0%
Malawi (Joint OTSS)	169	3	77%	89%	12%
Malawi (Clinical OTSS)	99	2	78%	92%	14%
Mali	54	2	69%	91%	22%
Mozambique	60	3	85%	83%	-2%
Tanzania	204	2	67%	85%	18%
Zambia (Provincial)	31	2	71%	90%	19%
Zambia (Sub-district)	55	2	65%	82%	17%

*Visits includes all available data with the revised checklist in PY3 and PY4.

Provider adherence to a positive test by administering an ACT was better but still variable across countries and with considerable room for improvement, particularly in DRC, as shown in Figure 7, below. Improvement across visits as shown in Table 8 has been less dramatic than improvement in adherence to negative testing, probably due to a slightly higher baseline. Nonetheless, MalariaCare is working to improve adherence to positive testing by identifying the reasons why providers do not adhere, including those that other partners may help work to address, such as stock-outs of ACTs and other commodities. In PY5, MalariaCare will analyze data across countries to identify if there is a correlation between reported stock-outs and adherence. In various countries, as reported, current data seem to be inconclusive whether such a correlation does exist.

Figure 7. Proportion of health facilities meeting minimum standard of competency (90 percent) in adherence to positive malaria test results during most recent OTSS visit, by country.

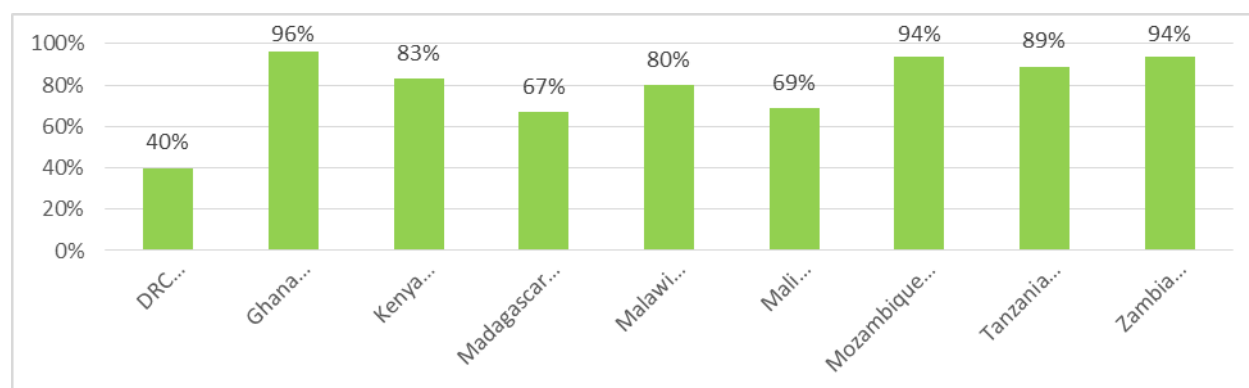


Table 8. Proportion of health facilities meeting minimum standard of competency (90 percent) in adherence to positive malaria test results, trend for subset of facilities with consistent visits, by country.

Country ⁺	N	Number of visits*	First Visit	Last Visit	Percentage point difference
DRC	20	4	50%	50%	0%
Ghana	890	2	96%	95%	-1%
Kenya	171	2	89%	89%	0%
Malawi (Joint OTSS)	177	3	82%	76%	-6%
Malawi (Clinical OTSS)	95	2	78%	82%	4%
Mali	57	2	72%	68%	-4%
Mozambique	65	3	85%	95%	11%
Tanzania	217	2	79%	88%	9%
Zambia (Provincial)	29	2	93%	100%	7%
Zambia (Sub-district)	55	2	95%	89%	-6%

*Visits includes all available data with the revised checklist in PY3 and PY4.

⁺ Madagascar is not included because only 2 facilities had sufficient trend data on ACTs prescribed or on positive test results, likely due to the low malaria prevalence. Thus adherence to positive test results could not be calculated for the vast majority of facilities.

A third approach to evaluating adherence and measuring compliance to WHO’s recommendation of testing prior to treatment uses the treatment register as starting point. It evaluates whether a patient who received an ACT did so based on a positive test result, received an ACT despite a negative test result, or got the ACT prescription without evidence of any test being performed. Results are variable across countries with room for improvement, particularly in Kenya (51 percent) and DRC (61 percent) — (Figure 8) - improvement has been shown in 7 of 8 countries over time between rounds of OTSS (Table 9).

Figure 8. Proportion of health facilities meeting minimum standard of competency (90 percent) in performing a malaria test prior to treatment with an ACT during most recent OTSS visit, by country.

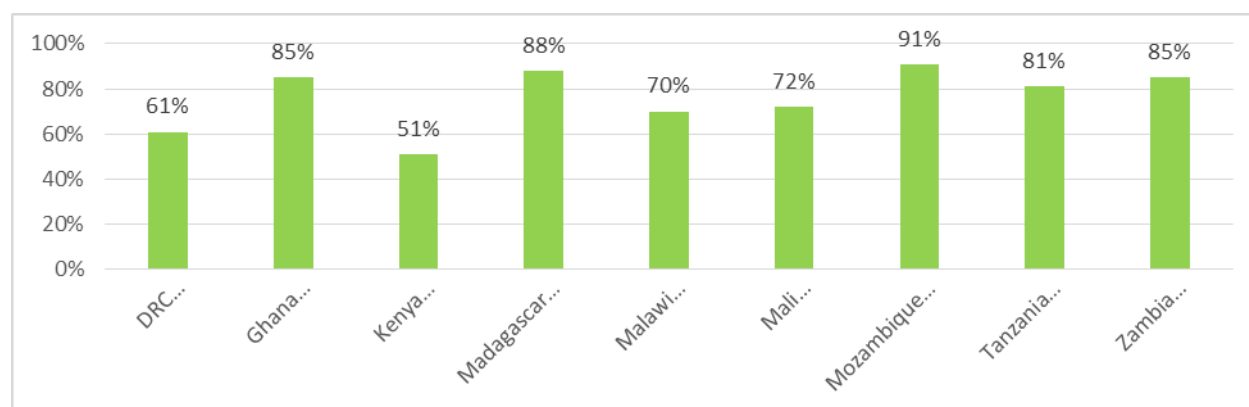


Table 9. Proportion of health facilities meeting minimum standard of competency (90 percent) in performing a malaria test prior to treatment with an ACT, trend for subset of facilities with consistent visits, by country.

Country [†]	N	Number of visits*	First Visit	Last Visit	Percentage point difference
DRC	23	4	57%	61%	4%
Ghana	949	2	77%	84%	7%
Kenya	213	2	70%	65%	-5%
Malawi (Joint OTSS)	176	3	52%	71%	19%
Malawi (Clinical OTSS)	102	2	62%	75%	14%
Mali	71	2	63%	77%	14%
Mozambique	62	3	77%	94%	16%
Tanzania	326	2	59%	81%	22%
Zambia (Provincial)	31	2	87%	90%	3%
Zambia (Sub-district)	66	2	70%	80%	11%

*Visits includes all available data with the revised checklist in PY3 and PY4.

[†] Madagascar is not included because only 3 facilities had sufficient trend data on ACTs prescribed or on positive test results, likely due to the low malaria prevalence. Thus testing prior to treatment could not be calculated for the vast majority of facilities.

4. Strengthen systems at the country level for malaria and other infectious diseases as applicable

Recognizing that provider performance is inherently linked to the capacity of the health system to provide the support structures needed for providers to perform their duties, MalariaCare has supported national malaria control programs (NMCPs) to strengthen key components of case management systems. In addition to examples throughout country chapters, a few activities with cross-cutting potential are listed here:

- MalariaCare, in addition to continuing to work closely with the WHO and Amref Health Africa to scale up ECAMM across Africa, tested additional criteria, which were developed to identify microscopists who have previously demonstrated high competence, to increase the probability that they achieve L1 and L2 accreditation as participants at the ECAMM itself. These selection criteria have been tested in three countries to date, and have shown to lead to improved passing rates. This should help countries better target human and financial resources when building a cadre of expert microscopists. MalariaCare is analyzing results from the latest session and will publish the results.
- MalariaCare has continued to move forward national archive of malaria slides (NAMS) development in DRC, Malawi, Zambia, and Madagascar to develop well-characterized and high-quality reference slides needed to conduct malaria microscopy training that includes an assessment of competency, and continuous training and monitoring activities to support QA systems. In Madagascar, Malawi, and Zambia, a training on mass slide development was conducted and donor collection is well underway. In the DRC, NAMS equipment and supplies were procured, and the project supported the initiation of sample collection and slide development for a NAMS for training and quality assurance by conducting NAMS development and PCR validation training for key INRB staff who are responsible

for developing the slide bank. We will continue to work with countries to identify donors and produce slides. It is anticipated that Ethiopia will serve as a regional bank for *Plasmodium vivax* (Pv) slides.

- MalariaCare is using the electronic data system (EDS) in seven countries (Mozambique, Ghana, Tanzania, Zambia, Mali, Kenya, and Malawi). The EDS has improved the use of checklists in the field, and improved data compilation and analysis. Data end-user training has occurred in 5 countries to empower national staff to be able to organize, analyze, and use data for decision making.
- Following the rapid training and roll-out in PY3 of injectable artesunate for treatment of severe malaria, MalariaCare collaborated with the NMCP, the College of Medicine, Malaria Alert Center and Queen Elizabeth Central Hospital in Malawi to strengthen a curriculum for severe malaria management and conduct training aimed at developing a cadre of clinical mentors who will work with low performing facilities to improve clinical performance.
- In Kenya and Mozambique, ‘malaria case management committees’ and ‘therapeutics committees’, respectively, were established at peripheral hospitals and facilities to strengthen local, sub-national ownership, accountability and management of malaria case management activities. OTSS indicators will be analyzed in these facilities to identify improvements that may be attributable to the activity.

In PY5, MalariaCare will continue to implement quality assurance activities to strengthen case management at the facility and, in some countries, at community level. Based on lessons learned, we will continue to strengthen and incorporate key components to maximize outcome and impact. Examples include the refined criteria for acceptance into WHO’s ECAMM to improve the proportion of microscopists reaching L1 and L2 qualification, techniques for training of both diagnostic and clinical supervisors in mentoring skills that focus on key areas of deficiencies such as adherence to negative test results and identifying signs of severe malaria, and in certain focus countries building capacity in management of severe malaria. In addition, lessons learned will be documented and shared through peer-review publications, webinars, and reports. Finally, MalariaCare has already begun and will continue the process of working with PMI, NMCPs, and other NGOs and implementing partners to transition activities as the project comes to a close.

Background

MalariaCare works to achieve the following objectives:

- To improve the accuracy of diagnostic testing for malaria to greater than 90 percent.
- To improve the percentage of patients with suspected malaria or febrile illness who receive a diagnostic.
- To improve the percentage of patients who receive appropriate treatment for malaria or other related illness consistent with results of a diagnostic test.
- To strengthen laboratory systems at the country level for malaria and other infectious diseases as applicable.

MalariaCare is led by PATH and supported by three other organizations: Medical Care Development International, Population Services International (PSI), and Save the Children. Each partner has extensive experience in designing and implementing malaria control programs in high-burden countries. The MalariaCare team's expertise includes laboratory strengthening, malaria diagnosis and treatment, program evaluation and research, and community-based management of disease in both the public and private sectors.

Introduction

This annual progress report describes accomplishments toward achieving MalariaCare’s objectives, intermediate results, and milestones during project year (PY) 4, covering the period from October 1, 2015, through September 30, 2016. It also discusses challenges faced by the MalariaCare team and next steps. The report is organized by global and country achievements. MalariaCare’s financial report is presented as Appendix A. Appendix B contains the project’s performance monitoring plans (PMPs), which present progress toward reaching specific targets. Finally, Appendix C includes the MalariaCare environmental mitigation and monitoring report.

The global achievements section describes progress toward reaching the project’s PY4 core work plan activities. Global work plan areas are:

- Project operations.
- Monitoring and evaluation (M&E).
- Advocacy and communications.
- Technical leadership.

The section on country achievements summarizes MalariaCare’s activities and progress toward improving diagnosis and treatment of malaria and other illnesses in the 17 countries listed below and depicted in Figure 9.

Accomplishments are described by each project objective.

- Burma
- Burundi
- Cambodia
- Democratic Republic of the Congo (DRC)
- Ethiopia
- Ghana
- Guinea
- Kenya
- Liberia
- Madagascar
- Malawi
- Mali
- Mozambique
- Nigeria
- Senegal
- Tanzania
- Zambia

Figure 9: Project year four MalariaCare countries



Global achievements

Project operations

The MalariaCare operations team—which consists of the finance and administration and field operations teams—facilitates country-based planning and implementation, budget development and financial tracking, partner communications, and the sharing of lessons learned through operations and technical advisory group meetings.

Key accomplishments

- Improved our financial tracking system to better monitor and support implementation of a program with an approved annual budget of \$18,616,773.
- Supported efficient implementation of project activities in 16 project countries, as well as preparation for implementation of the therapeutic efficacy study (TES) in Senegal, through frequent communication, troubleshooting on budget, human resources, and administrative issues. During the second half of PY4, implementation resumed in Guinea, and began in Burundi.
- Convened five technical advisory group meetings in order to discuss upcoming activities and various planning measures. The objectives of these meetings were to review and improve the quality assurance (QA) strategy and outreach training and supportive supervision (OTSS) checklist, plan and develop publications, and discuss project close-out strategies. The group also reviewed the content of the virtual microscopy distance-learning tool for planned rollout in PY5 in three countries. The advisory group includes members from all four MalariaCare partner organizations.
- Convened three operations advisory group meetings with representation from all partners. The group met to review country-level operations and help streamline subcontract development, reporting, budgeting, and invoicing processes. This session was also used to share ideas on and prior experiences with orienting project operations in Burundi, the latest addition to the MalariaCare portfolio. Solutions to country-specific operational issues and needs were also discussed during biweekly check-in calls with each country team.

Challenges

No significant challenges to report.

Next steps

- Continue to provide oversight and coordination support to in-country teams with an emphasis on transition and project close-out during the last nine months of the project.
- Focus on effectively managing project operations across all supported countries, communicating to keep United States President's Malaria Initiative (PMI) and all project partners informed of progress and challenges, and responding in a timely manner to those challenges.

Monitoring and evaluation

M&E work supports the design and implementation of project strategies and activities that support PMI objectives. M&E also ensures that project performance indicators align with PMI and the Roll Back Malaria Partnership indicators. M&E allows project management to continually review project performance and contribute to global scale-up of innovations that improve case management of malaria and other febrile illnesses.

Key accomplishments

Scale-up of Electronic Data System

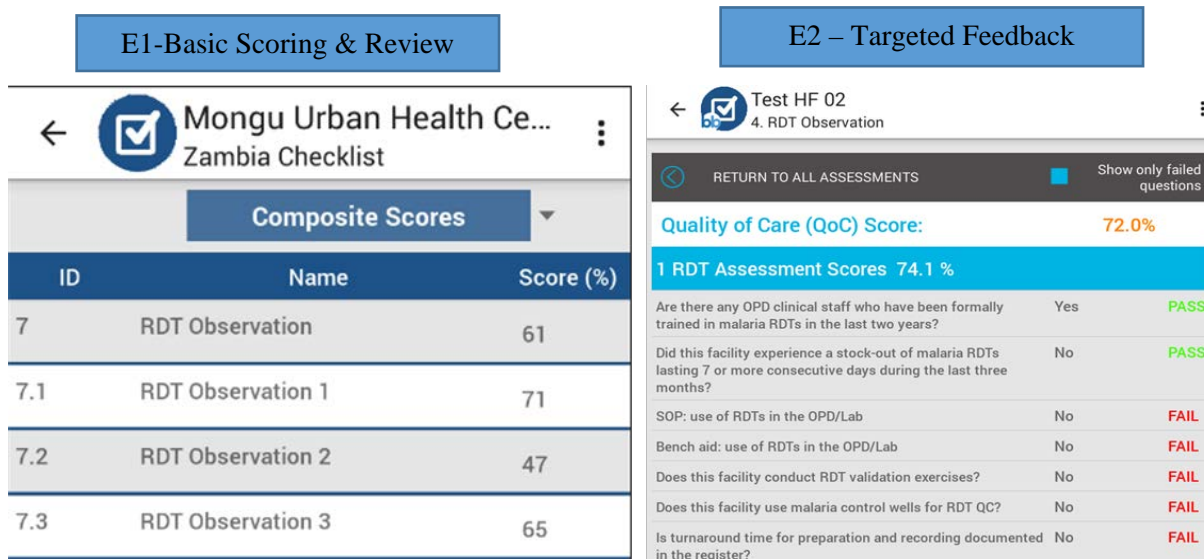
MalariaCare is now operating the Electronic Data System (EDS) at scale in seven countries (Ghana, Kenya, Malawi, Mali, Mozambique, Tanzania, and Zambia), with all OTSS supervision in these countries being conducted using the EDS. Since the start of EDS implementation in PY3, over 1,200 people have been trained as EDS end users (i.e., OTSS supervisors who use the tablet to record checklist information in the EDS); 20 rounds of OTSS using EDS have been conducted; and data for over 7,000 health facility OTSS visits have been submitted.

Based on lessons learned during PY3 and the first half of PY4, MalariaCare identified several key areas of improvement for the EDS, and released a new version of the application, called E2, in June 2016. Since then, four countries have implemented E2 with great success (Kenya, Mali, Mozambique, and Tanzania). Key areas of improvement include:

- **Automated sending when internet connection found:** With E1, supervisors in several countries, and Mozambique in particular, would receive an error message when they tried to send data and the internet connection was poor, requiring them to attempt to resubmit the data several times. With E2, supervisors now mark the module *complete* and the application sends the data when it finds a good connection and signals to the supervisors that the data have been sent. Since implementation of E2, no supervisors had mentioned having difficulty sending data.
- **Better access to previous visit data:** With E1, supervisors only had access to previous health facility assessments done on a specific tablet. In E2, MalariaCare has created a dynamic connection between the application and the data stored in the EDS District Health Information Software version 2 (DHIS2) online platform. Now, supervisors have access to the most recent visit data for all health facilities they are assigned to, regardless of which tablet they use. This feature provides supervisors with critical information to help them follow-up on key issues and gaps identified at previous visits.
- **Targeted feedback module:** With E1, supervisors were provided with summary scores and the ability to go back and review the content of the completed checklists (see Figure 10 below). In E2, supervisors receive the scores, but can also view a clear “Pass/Fail” review screen which helps them to focus on key areas for improvement when working with health facility staff.

Together, these E2 improvements have improved the functionality of the EDS, making it a user-friendly tool that enhances the quality of the OTSS visits. In PY5, MalariaCare will complete the roll-out of E2 during the next round of OTSS in the three remaining countries that are still using E1.

Figure 10. The EDS Feedback Module



Data quality improvement

MalariaCare scaled up data quality assurance (DQA) by creating DQA dashboards in the EDS DHIS2 for each of the seven countries. With EDS, data are available for review on the EDS DHIS2 dashboard as soon as supervisors submit their electronic forms. Working together, headquarters and in-country staff routinely monitor the data coming in as OTSS is taking place, and conduct follow-up with supervisors when data are missing. The transition from a paper-based to an electronic system with increased oversight and feedback has led to a dramatic improvement in data completeness. Figure 11 provides a summary of the data completeness for our six key indicators in four countries as they transitioned from the paper-based system to successive rounds of OTSS. Improvements of 30 percent or greater were seen in all indicator areas, with five of the indicators at over 85 percent completeness by the second round of OTSS. The proportion of facilities with scores for microscopy remains low. Further discussions with country program staff have revealed that this is due, at least in part, to lack of microscopy supplies and lack of staff who conduct microscopy at facilities. This limits supervisors’ ability to observe microscopy procedures.



District and regional supervisors discuss OTSS results following data user training, during lessons learned workshop, Tanzania.

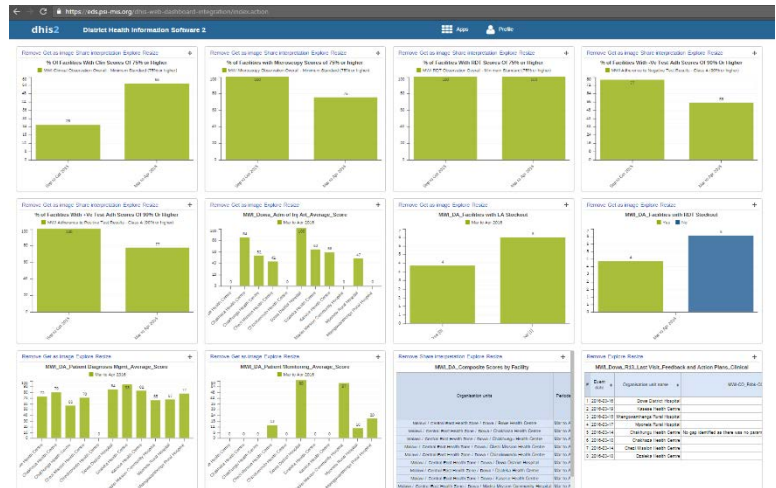
national health management information system (HMIS) for many countries, the EDS data user training either builds on participants' existing DHIS2 capacity, or offers participants transferable skills which they can then use to monitor key HMIS malaria indicators. Although each country has an EDS DHIS2 performance dashboard that they can use to track progress, by the end of PY4, Tanzania, which by July 2016 had trained all regional malaria staff in data use, was the only country to fully transition from Word-based reporting to reviewing data in DHIS2. In PY5, as data users in more countries are trained, we will continue to transition countries to the EDS DHIS2 reports.

Because EDS utilizes the DHIS2 platform, three MalariaCare M&E staff members attended a two-and-a-half-day training led by Akros in Washington, DC, in February 2016. The training engendered a better understanding of the system and its dashboard features for appropriate facilitation of in-country training and support to local

teams.

M&E staffing

A new regional senior M&E officer was hired. He operates from the PATH office in Kisumu, Kenya, and supports M&E activities in Kenya, Tanzania, Malawi, Mozambique, and Zambia. In addition, MalariaCare hired a part-time M&E consultant in Zambia. Both new staff members have previous experience working with DHIS2 and mobile health (mHealth) systems, and have been trained on MalariaCare's EDS DQA process. These positions will be instrumental in further cascading DQA data review to the national, regional, and district levels within each of these countries, with the goal of improving data quality and project results.



Example of EDS dashboard

Conferences

A MalariaCare headquarters senior M&E officer/team lead and an epidemiologist from Zambia's National Malaria Control Centre (NMCC), sponsored by the project, attended the World Health Organization (WHO) M&E Reference Group (MERG) semiannual meeting in Istanbul, Turkey, in October 2015. The focus on M&E systems in pre-elimination settings offered an opportunity to think through the challenges as some MalariaCare countries, such as Zambia, move toward elimination. The NMCC epidemiologist presented Zambia's progress in improving surveillance and in using routine data sources to track and treat cases in low-prevalence areas. This

conference also allowed MalariaCare to reconnect with the global discussions on integrating data systems and standardizing data collection tools and systems.

Challenges

During the initial EDS data user training activities, where key NMCP staff were trained to use the DHIS2 interface to interpret and analyze OTSS data, MalariaCare noticed differences in capacity across countries; these differences are primarily due to the level of familiarity with DHIS2 and with MalariaCare's OTSS process. Based on this finding, MalariaCare developed a simplified EDS DHIS2 training curriculum for lower-level staff. This is geared more toward helping them to interpret and update existing EDS DHIS2 dashboards, rather than developing their own data inquiries and graphs to illustrate them. As we learn more about existing capacity within each country, MalariaCare will continue to adapt future training and support to each country's context and capability and, thus, their needs. MalariaCare also has had difficulty in effectively sharing detailed OTSS results that include specific district- and health facility-level information with supervisors. This information is important in supporting supervisors to identify common issues and track progress within their area of oversight. As a result, we created the Word-based reports, referred to above, for OTSS countries until each country is ready to transition. At the same time, limitations in the EDS DHIS2 platform itself make it challenging to develop visualizations as rich as those made through Stata analysis and Word-based reporting. For example, DHIS2 does not have an easy tool for analyzing only facilities that were visited consistently over time, or by visit number, rather than date. Finally, in some cases, programming bugs and internet connectivity issues in using E1 caused delays in submitting EDS data. With real-time data review, MalariaCare has been able to identify these cases and worked to ensure that the data are submitted. In countries where E2 has been released, internet connectivity poses much less of a challenge.

Next steps

- Continue to strengthen capacity for data use and develop and implement an appropriate EDS migration plan within each country.
- Conduct additional EDS training in selected countries to roll out data use to the regional/district levels, and continue to provide ongoing mentorship and support to existing data users. In order to transition the EDS system to governments or partners where possible, MalariaCare will work closely with the NMCPs and partners in each country to develop a transition plan; train national and regional personnel in the management and administration of the EDS; and provide ongoing technical support to the system managers for EDS administration.
- Share experiences with the wider M&E malaria community through targeted technical meetings and continued engagement with international M&E working groups such as the MERG of the Roll Back Malaria (RBM) partnership, and the WHO Surveillance, Monitoring and Evaluation Technical Expert Group (SME TEG), among others.

Advocacy and communications

MalariaCare's advocacy and communications activities seek to increase access to technical and programmatic information and to support the USAID communication with missions and governments. During this reporting

period, the project advanced global discussions on malaria case management and disseminated helpful information and tools to PMI staff, local service providers, and other global health colleagues to improve malaria diagnosis and treatment programs.

Key accomplishments

- Three symposium concepts and 13 individual abstracts on MalariaCare's work were submitted to the American Society of Tropical Medicine and Hygiene's (ASTMH) 2016 conference. Of these, two were accepted for oral presentations and ten for posters. An additional abstract was submitted as a late-breaker, with a decision pending.
- In addition, a MalariaCare staff person from the DRC was invited to co-chair an ASTMH panel focusing on QA of malaria case management in his country.
- In March, the Communication Initiative Network (in part supported by USAID) highlighted MalariaCare's 2014 publication *Barriers to Expanded Malaria Diagnosis and Treatment: A Focus on Barriers Which May Be Addressed through Advocacy, Communication, and Training Interventions* on their website and in a newsletter.
- The MalariaCare website experienced strong traffic in PY4, with 10,420 views and 4,540 unique visitors.
- In collaboration with country teams, MalariaCare provided project results, reports, and other documentation requested by PMI Missions, and responded to dozens of requests from the public seeking information on MalariaCare's work.
- The MalariaCare website continued to grow in PY4, with new country case studies and technical resources.

Challenges

No significant challenges to report.

Next steps

- Maintain a focus on generating peer-reviewed publications on MalariaCare field work and findings. The team will produce, edit, place, and promote these documents.
- Continue to organize webinars and assist with documentation and sharing of program achievements and lessons.
- Transition website content and other project documentation to PMI and partner websites, and develop other end-of-project documentation as requested.

Technical leadership

MalariaCare's technical leadership activities continue to improve comprehensive care of the febrile patient, with a primary focus on malaria within the context of other life-threatening illnesses such as pneumonia, diarrhea, and sepsis. In PY4, more emphasis was placed on clinical care of patients with severe disease, in addition to the work on uncomplicated febrile illness and on expanding in-country capacity to provide targeted mentoring. Together

with our work to improve the ability to develop local data-driven action plans to address identified gaps, we continue to emphasize a systems approach that includes all levels of the health care system and multiple team members and departments within a facility. Our work may also lead to new global recommendations in case management, as we conduct and evaluate innovative strategies related to diagnostic accreditation, and continue to improve MalariaCare's QA system that encourages low-cost and local solutions to common problems.

Key accomplishments

- Strengthened the training of supervisors to be effective mentors. In both supervisor and clinical case management training conducted in eight countries, the project expanded training techniques for both clinicians and laboratorians. This includes role-playing and simulation to demonstrate and evaluate techniques that supervisors can use to constructively provide feedback, demonstrate proper skills, and work with mentees and facility leadership staff to develop action plans for sustainable improvement in their work.
- In 2015 MalariaCare, in collaboration with WHO, introduced additional selection criteria to determine the best-qualified candidates among those who met course entry requirements for external competency assessment for malaria microscopy (ECAMM) accreditation. Those who met the additional criteria, having passed a pre-ECAMM course with an Level 1 (L1) or L2 certification in the same calendar year, were 3.7 times more likely to attain WHO certification for malaria microscopy.
- Continued to strengthen diagnostic QA across project countries. For example, the national diagnostic QA framework for the DRC, which was developed in collaboration with the National Laboratory Services and the US Centers for Disease Control and Prevention in Atlanta, was launched in April 2016 by the Ministry of Health (MOH) in the DRC. The MOH also adopted the MalariaCare OTSS checklist as a national tool, recommending to all malaria case management implementing partners to support implementation nationwide.
- In order to rapidly improve case management performance in poorly performing facilities identified during OTSS, MalariaCare developed intensive mentoring interventions in both Malawi and Mozambique. The intervention was designed as a peer-to-peer intensive mentoring visit to focus on improving the weakest performance indicators. Supervisors or peers from higher performing facilities are trained on mentoring skills and on use of OTSS data to guide onsite observation and targeted mentoring. Intensive mentoring performance is measured by pre-/post-intervention OTSS performance as compared to non-intensive mentored control facilities receiving standard OTSS. The intervention outcomes are discussed in the Mozambique and Malawi sections of this report.
- Building on the two-part mentoring curriculum for severe malaria, we have developed training tools to improve management of patients with severe malaria. This includes clinical management, focusing on the complications of severe malaria, as well as the importance of microscopy in identifying and following response to treatment. While the electronic tablet used for data collection during OTSS was not able to accommodate the originally developed severe malaria mentoring curriculum, we have built upon the latter and incorporated severe malaria management into clinical training. In Malawi, we have included the use of the NMCP severe malaria checklist during OTSS, following the roll-out of injectable artesunate. In Mozambique, we have formed malaria committees at five facilities to focus on the inpatient care of severe malaria.
- The project team has worked to disseminate lessons learned from our work. During PY4, that dissemination has included (i) four manuscripts for publication that are currently under development, one of which has been

cleared by PMI for submission, with three to follow during the first quarter of PY5; (ii) submission of thirteen abstracts to ASTMH focusing on country-level progress, of which twelve have been accepted for oral or poster presentation; and (iii) a webinar on QA of case management.

Challenges

MalariaCare, as a global mechanism, has to search continuously for the most efficient and effective ways to respond to requests for technical assistance and implementation support across its large portfolio. The introduction of the EDS system has allowed the team to find better targeted responses and allocate its resources where needed most, or where impact is expected to be highest. Strengthening the validity of this data is key to making better technical recommendations.

Next steps

- Continue to consolidate previous accomplishments and transition sustainable achievements to the national governments and stakeholders. We will continue to strengthen the links between activities in the QA system with the goal of continuously improving the quality of case management and transitioning technical capacity to the in-country NMCPs.
- Document and share the project's multi-country experiences and lessons learned through publication of peer-reviewed articles highlighting lessons learned, success stories, and other project briefs. In addition to the four peer-review articles under development focusing on diagnostic competency, we will develop a similar set of peer-reviewed publications focusing on clinical competency, adherence to testing and treatment, and specific activities in MalariaCare's QA mechanism targeted for evaluation as compared to control facilities (intensive mentoring, malaria hospital committees). In addition, we expect to host three webinars in PY5.
- Continue efforts to expand training initiated in the first half of PY4 to additional focus countries within the portfolio. The expansion of training (to include improving mentoring skills and improving the ability to manage severe disease) has been well received, and is expected to lead to improved skills of supervisors, clinicians, and laboratorians. EDS allows us to more rapidly identify gaps, which has led to improvements working with supervisors and health management teams to use data to address these deficiencies through targeted action plans to a more effective use of resources. We will continue to build this capacity during training, OTSS visits, and LLWs, and we will evaluate additional inexpensive local solutions, such as intensive mentoring, to address weaknesses. By building capacity in areas that have been neglected, and by focusing on locally derived data-based decisions, we expect to transition MalariaCare technical innovations effectively as the project comes to an end.

MalariaCare will include findings from three additional focus countries on the expanded criteria for ECAMM accreditation. It will continue to collaborate and share findings with the WHO case management team, Amref Health Africa, and other relevant partners. This will be done to use results to adjust and revise criteria for participant selection, in an effort to improve outcomes through efficient use of resources.

- Participate in conferences will help us disseminate our key findings and lessons learned on a global scale.

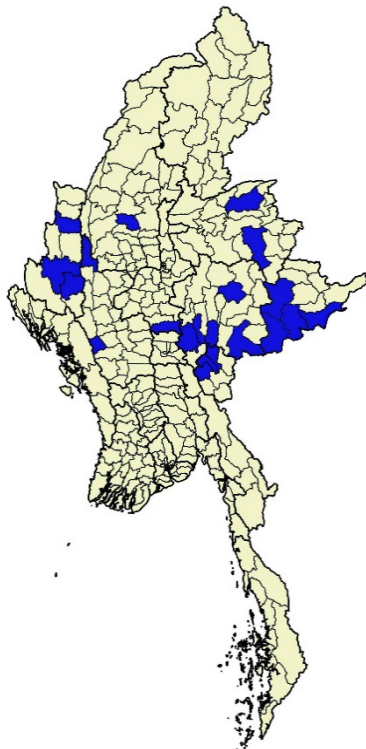
Burma

Introduction

Since May 2015, MalariaCare has supported PSI's Sun Network, a network of rural community health service providers (CHSPs) and Sun Quality Health (SQH) private physicians, which provides basic health services in both urban and rural townships. MalariaCare's support focuses on malaria case management, an addition to the integrated package of services provided by the Sun Network. The Sun Network malaria program currently includes 1,861 CHSPs and 797 SQH providers, 39 diagnostic professionals and four counselors/social workers. The other components of the franchise—including service delivery for family planning, diarrhea, HIV, tuberculosis, and pneumonia—are supported by The Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund), the Bill & Melinda Gates Foundation (Gates Foundation), and the Millennium Development Goal Fund. In the current reporting period, MalariaCare supported 384 CHSPs and 16 SQH providers through training and supervision support to improve malaria diagnosis and treatment in 17 high-burden, malaria-endemic townships. Below is a map of the townships where MalariaCare is currently working.

Key accomplishments

- Sun providers operating in MalariaCare-supported townships tested 56,581 suspected malaria cases within the period September 2015 to August 2016. This represents a significant increase in RDT tests performed compared with the number of tests (16,820) performed in the previous year.

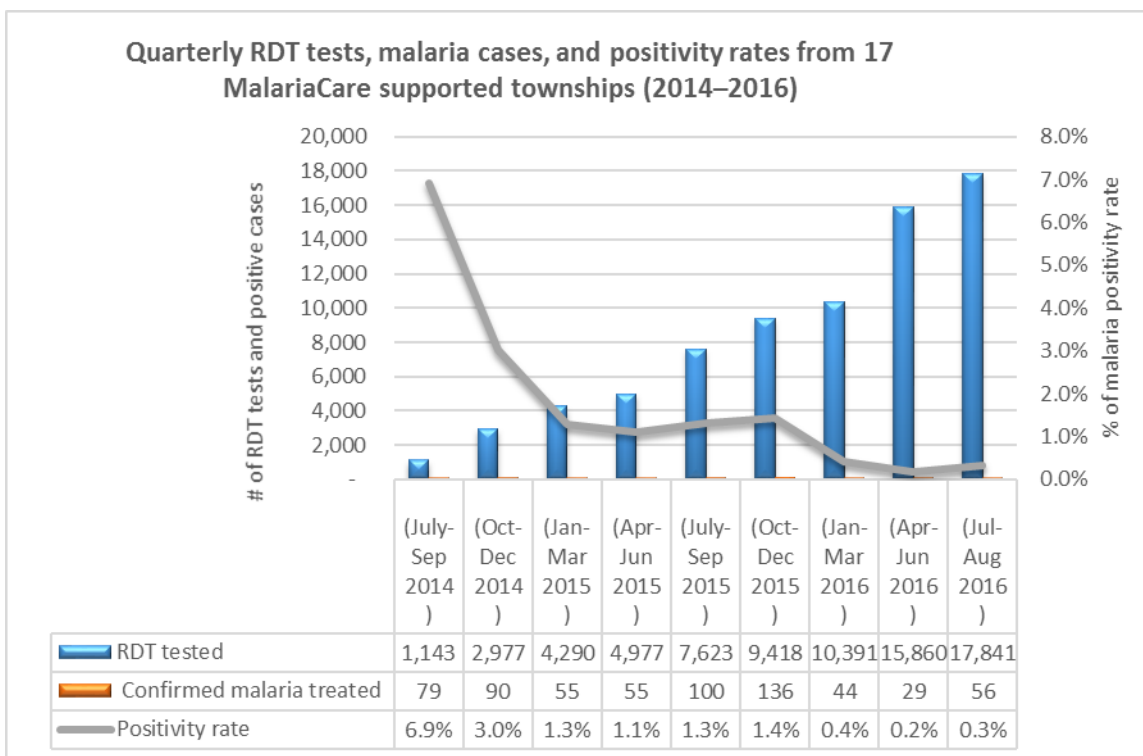


- Through PMI support, 340 malaria cases were identified in this reporting period, of which 290 cases were recorded in their malaria client report forms as receiving treatment per national guidelines, and 29 positives were referred to other facilities for management of severe and complicated malaria. The remaining 21 of these 340 cases likely represented source facility recording errors, and field teams are working with providers to reduce such clerical mistakes. The PSI/Burma's management information system (MIS) data show that 85 percent of confirmed malaria cases (290 among 340 positives) received early diagnosis and high-quality treatment according to national guidelines.
- PSI has encouraged CHSPs to conduct active case detection during their field visits or "mobile trips" to the new settlements, mobile migrant worksites, and small cut-off villages by testing all fever and malaria suspected cases. The purpose of this is to cover the population at risk for malaria who generally have limited access to malaria services. Due to ongoing encouragement, the CHSPs were much closer to meeting the

target tests conducted in PY4 as compared to PY3. In PY3, CHSPs conducted 34 percent of the targeted number of tests (16,820 of 49,200 targeted tests completed) whereas in PY4, CHSPs conducted 70 percent of the targeted tests (56,581 of 81,600 targeted tests completed).

- Although the number of RDT tests increased (performing 3.36 times the number of screening RDTs in PY4 compared to those done in PY3), the malaria positivity rate in 17 MalariaCare project townships continues to decline—from 6.9 percent in 2014 to 0.3 percent in 2016 - findings also consistent with the abrupt decline of reported malaria cases across Burma in recent years.¹ Figure 12 below presents RDT testing rates, confirmed malaria treated, and malaria positivity rates from PMI-supported MalariaCare townships.

Figure 12. Distribution of quarterly malaria case management with positivity rates from MalariaCare townships (2014–2016).



- The project recruited and trained 1 new SQH doctor in Laikha Township in Shan State and provided refresher training for 15 enrolled SQH doctors from other townships, for a total of 16 supported in PY4. Both the new and the refresher training included sessions on appropriate malaria diagnosis and treatment, waste management, recording and reporting of malaria cases, and implementing best practices for steady supply chain management.
- In coordination with the respective Township Medical Officers (TMOs), the project conducted village mapping in four new townships where malaria services will be expanded in PY5—Mongton, Monghsart, and Mongpyin in Eastern Shan State, and Langkho in Southern Shan State. The mapping will allow the project to quickly deploy its activities in the new township.

¹ According to the Burma Malaria National Strategic Plan, the number of malaria cases reported annually – comprised of a combination of cases reported to the NMCP through routine reporting and from additional cases reported by implementing partners to the NMCP - show a steady decline in the last four years of record: from 480,586 (391,058 NMCP + 89,528 implementing partners) in 2012 to 182,452 (108,766 NMCP + 73,686 implementing partners) in 2015.

- MalariaCare/Sun Network recruited and trained 104 new CHSPs (from 17 townships), and conducted refresher training for 280 currently enrolled CHSPs on the diagnosis and treatment of uncomplicated malaria in accordance with the national guidelines. A total of 384 CHSPs were supported in PY4.
- The project conducted active case detection through 155 mobile trips to improve malaria case detection in worksites and nearest uncovered villages of intervention townships, specifically those areas which have limited access to formal health services. Mobile trips are field visits conducted by CHSPs to perform active case detection through RDTs and facilitate health education sessions with the community. Each mobile trip was carried out by two CHSPs and one community health services liaison (CHSL). During these trips, the team performed RDT testing for anyone from that area/village who had a fever within the last week, traveled to a forested area within the previous two weeks and who requested testing. Of the 16,338 tests performed, a total of 56 cases (a 0.3 percent positivity rate) were identified—10 *Pf* cases, 45 *Pv* cases, and one mixed infection. All positive cases were treated per the national guidelines.
- The team procured and disseminated information, education and communication (IEC) materials for clinical providers and clients. These included malaria treatment guideline charts for all providers, waste management guidelines for CHSPs and a waste management reference manual for SQH providers. Posters and pamphlets were developed to encourage patients to sleep under a long-lasting insecticidal net (LLIN), seek treatment from a trained provider within 24 hours of onset of fever, demand RDT testing when providers are considering a malaria diagnosis and complete the full course of QA-ACT antimalarial treatment once prescribed.
- The project conducted monitoring and supportive supervision for CHSPs and SQH medical professionals. Health service officers (HSO) visited all SQH providers monthly to provide onsite technical training as well as supportive supervision focused on adherence to treatment guidelines. HSOs and CHSLs conducted monthly monitoring visits to CHSPs in 17 townships. During these visits, HSOs and CHSLs collected data for on-time reporting to the field office, and ensured that providers had access to a consistent supply of commodities. This helps Sun Network providers to learn about the importance of data recording and reporting mistakes, get up-to-date technical knowledge on malaria, and receive a consistent supply of commodities and IEC materials.
- A Sun Network annual review meeting was held at Kalaw Township, Southern Shan State, in December 2015 for area managers, junior HSOs, and health service supervisors (HSSs). The PSI headquarters malaria program team in Yangon presented achievements and lessons learned from project activities completed in 2015. The main discussion points for MalariaCare during the review meeting included the expansion to a new township, Tangyang, encouraging additional testing in PY4 and reducing malaria confirmed cases not treated according to the national guidelines. During this meeting, the team learned that passive case detection alone does not lead to meeting the targets for testing. In addition, with passive case detection, migrant workers and people from high-burden pocket areas were not getting access to malaria care services beyond the mobile activities that were only conducted during the malaria season. Therefore, MalariaCare took action by implementing active case detection throughout the year via monthly mobile education and testing trips to each township, rather than during the malaria season only. The selection of the new settlements, mobile migrant worksites, and remote villages to conduct mobile malaria services was done in discussion with respective TMOs. For the malaria-confirmed cases that did not receive treatment per the national guidelines, the

operations team committed that they would conduct close monitoring of treatment performance in the future, and would take action for any data-recording mistakes made by providers.

- The project managed and analyzed provider data through the PSI/Burma MIS. Progress toward test and treat targets on training activities, meeting budget targets, challenges identified, and lessons learned was presented in quarterly coordination meetings with the field office managers and program teams. During these meetings, participants discussed solutions and corrective action, including how to encourage the provider to conduct more testing, complete the training within the target period, and monitor the provider to reduce data-recording errors. To reduce data-recording errors, MalariaCare will be revising the incentive system in 2017 to encourage complete and correct data management. The revised incentive system will not only be based on testing performance, but also on the submission of correct and complete data.

Challenges

Challenge

Solution

Given declining malaria cases trends, CHSPs detected few positive cases after providing RDT testing to all fever cases in the community. They were not, however, provided tools to treat non-malaria fever cases.

Starting in PY5, PSI will initiate the integrated malaria community volunteer program. The program’s objective is to build capacity and equip community volunteers to recognize, diagnose, and treat malaria, diarrhea, and anemia per national guidelines. New and current CHSPs will receive either a new or refresher training in malaria case management, but will also participate in an additional integrated training, which will cover diarrhea and anemia management. CHSPs will also be supplied with paracetamol and multivitamins to be distributed to non-malaria fever cases, if needed.

With distribution of ACTs to all CHSPs and SQH providers, there is a risk of increased stock-outs in the central warehouse, and of expired drugs in stock with providers who have low caseloads of malaria.

The PSI program management team has analyzed 2015 distribution data with field teams. Starting in PY4, the PSI field teams closely monitored the stock balance with providers. However, as stock balances are not captured in the monthly client record forms for SQH providers, PSI’s operations and program management teams plan to create a new form to include this element and identify a more timely way to access that data. In addition, PSI has provided malaria commodities free of charge starting in PY4, so HSOs or junior HSOs can move stock from providers who have a low caseload to those with a high caseload.

The project had planned to recruit 20 to 25 SQH doctors; however, only 16 are currently enrolled.

In several townships, no private physicians could be recruited—either because all private physicians were working for other organizations, or no practicing private physicians were present. Further, some previously enrolled SQH providers have disassociated with the program due to a low malaria caseload or because they moved out of the township. Many SQH providers also work for the government, which means that they are stationed in a location for two years at a time, after which they may move on. Despite challenges in meeting SQH targets, CHSP targets for PY4 were met.

Next steps

- Continue to support malaria case management activities in the 17 townships, and expand to 4 additional high-burden townships—Langkho, Mongping, Monghsat, and Mongton—in Shan State, for a total of 21 townships supported. The project will recruit approximately 80 CHSPs within those new townships.
- Organize approximately 4 new recruit training sessions for CHSPs and 20 refresher training sessions for already enrolled CHSPs. Onsite refresher training will be conducted for existing SQH doctors.
- Procure additional job aids to promote improved and high-quality provider adherence to standards related to the use of sharps boxes, disposable gloves, and other small items. Moving forward, the project team will use the 17 procured motorbikes to conduct monitoring visits.

Burundi

In early PY4, MalariaCare, USAID Burundi, and PMI initiated discussions regarding a role for MalariaCare to assist with the implementation of case management QA activities in Burundi. An initial scope of work was



discussed during an introductory trip in April 2016, and a revised work plan was finalized during the annual MalariaCare work planning retreat held in Washington, DC, in which the newly hired Burundi program coordinator participated. The finalized work plan was submitted to PMI (for PY4–PY5) in late August 2016, and approved in late September 2016. MalariaCare’s QA approach includes training, OTSS, LLWs, and improved quality of case management data collection, analysis, and use for programmatic action. Technical assistance will include training and direct support to implement technical interventions. To strengthen the quality of malaria case management, MalariaCare will support the NMCP and partners to update policies and guidelines related to case management, provide diagnostic and clinical case management training to establish a national pool of trainers/supervisors to serve

as onsite mentors during OTSS, and support OTSS in hospitals and health centers. In PY4, MalariaCare focused on establishing a framework for project operations in Burundi and working with the NMCP and other stakeholders to prepare for upcoming activities starting in early PY5 (October 2016). MalariaCare provides technical support at national level and targets OTSS in 18 districts with high malaria burden.

Key accomplishments

- With PMI approval, MalariaCare hired two consultants to lead project activities in Burundi, a program coordinator/clinical advisor who started in July 2016, and a diagnostics advisor who started in August 2016. Recruitment of a logistics officer started as well, and should be completed in early PY5.
- MalariaCare also worked closely with FHI 360 to develop a plan for FHI 360’s Bujumbura office to provide operational support for implementation of activities.

- As part of project start-up, MalariaCare’s program coordinator, representatives of the USAID Mission in Burundi, and the NMCP worked closely together to introduce and orient the MOH to MalariaCare’s activities. Following a series of meetings and presentations, all stakeholders came to agreement on the technical and geographic scope of activities submitted in MalariaCare’s revised work plan.
- With PMI approval, MalariaCare was also able to prepare the groundwork for several upcoming activities, including development of training materials for malaria diagnostic refresher training (MDRT), preparation for clinical case management training sessions planned for early PY5, procurement of slides and other project supplies, and identification of training participants who will become OTSS supervisors later in the year.

Challenges

Challenge	Solution
Starting up new project/establishing project operations without PATH registration in Burundi.	To address this, MalariaCare: Held meetings with the MOH to introduce MalariaCare and worked with MOH, the Ministry of Foreign Affairs, and the USAID Mission in Burundi to ensure that all stakeholders are in agreement on MalariaCare’s activities. Negotiated a subagreement with FHI 360 to provide operational support for MalariaCare activities in Burundi.
Inability to support health facilities throughout the country, as requested by stakeholders, due to limited resources/budget.	To address this, MalariaCare will focus interventions (such as OTSS support) to district hospitals, with the exception of 90 health centers selected from 18 malaria hyper-endemic districts.

Next steps

- MalariaCare will begin rapid implementation of planned activities early in PY5.
- To refresh the skills of potential OTSS supervisors, MalariaCare will first conduct a series of malaria diagnostic and clinical case management refresher training sessions for laboratory technicians and clinicians early in PY5. Those that perform well will then be invited to participate in an OTSS supervisor training before the start of OTSS.
- OTSS supervisory and mentoring teams will be supported to conduct two rounds of OTSS to district hospitals and selected health centers. An LLW will then provide a forum to review health facility performance data and develop action plans to correct weaknesses and strengthen high-quality case management for both uncomplicated and complicated malaria.
- At the national level, MalariaCare will support the development of a malaria microscopy quality assurance framework and provide technical assistance to update national guidance related to single-species RDT use.
- At the district level, MalariaCare will build the capacity of district health management teams (DHMTs) to conduct OTSS with the aim of continuously enhancing the quality of malaria case management at the health facility level. Support will be targeted at district hospitals and health centers in provinces with a high malaria burden.

- OTSS data will be analyzed routinely to help supervisors and local decision-makers identify strengths and gaps in health facility performance. Supervisors will then use these findings to provide targeted feedback to health providers during subsequent OTSS visits.
- As MalariaCare enters its final year, the team will work closely with NMCP and partners to document and share project results and lessons learned.

Cambodia

Since 2013, MalariaCare has supported Population Services International/Population Services Khmer (PSI/PSK) to improve QA systems for malaria case management and associated information systems in Cambodia’s private sector. PSI/PSK operates in the four districts highlighted in Figure 13. Engaging the private sector to provide appropriate malaria case management and surveillance is critical in Cambodia, as private providers play a large role in managing suspected cases. While ongoing QA is a vital component of any program, it is critical in

Cambodia, given frequent shifts and subnational variation in the country’s national treatment guidelines in response to antimalarial drug resistance. A focus of the project was to upgrade and promote an electronic management information system, developed to operate within the DHIS2 platform. The project also supported the development of mHealth tools, tailored to the private sector, but adaptable across multiple sectors and health areas. In the first year of implementation, the project focused on supporting private-sector providers offering fever case management services, strengthening collection of malaria caseload data, and improving monitoring. In the second year, the project utilized lessons learned to improve monitoring and the



Figure 13. Map of Cambodia’s districts

ability to respond to specific needs within the regional malaria community in response to artemisinin-based combination therapy (ACT) resistance. The third and final year of the project has focused on improving the quality of services and data provided by a growing network of private-sector providers. The goal is to promote the use of evidence for decision-making at all levels of Cambodia’s health system, and to ensure strong collaboration with the National Center for Parasitology, Entomology and Malaria Control (CNM), Cambodia’s national malaria control program. MalariaCare’s work in Cambodia has generated regional and international interest. Thanks to the positive results and reputation of the program, activities will be maintained after the close of MalariaCare with support from other donors, such as the Global Fund and the Bill & Melinda Gates Foundation.

Key accomplishments

Since 2003, over 4,042,950 RDTs and 2,064,870 ACTs have been sold through the private sector in Cambodia. With support from MalariaCare, the project was able to enhance the quality of private-sector fever case management, establishing a rigorous QA assessment program and allowing for customized supportive supervision visits that provide the right types of clinical guidance and onsite training, at the right frequency. The program has been a pioneer in mHealth in Cambodia, improving the completion rates, timeliness, and accuracy of both quality

and caseload data from the private sector. The following section outlines progress toward key objectives across all three years of the project.

PY2 Objectives (first year of MalariaCare Cambodia project)

To ensure QA protocols and systems are in place and adhered to by private-sector health care providers treating febrile patients:

- Recruited a team of dynamic QA officers who were limited in formal health training but well-versed in administering surveys. Out of the five hired, four of the original officers have remained with the project for all three years.
- Developed a set of QA protocols and a checklist to assess private providers in their administration of fever case management. The checklist was based on global best practices. This QA checklist formed the foundation for further development of the QA program. Data from the checklist were submitted electronically; results were then weighted and providers “scored” against this set list of criteria.
- Developed a clear training curriculum for the QA team, including modules on: (a) the correct use of the tablet for electronic data collection; (b) data upload and data extraction from the system; (c) interpersonal skills to conduct an effective QA assessment (including probing without prompting for answers); and (d) the ability to walk a provider through a simulated malaria case scenario.



Photo credit: PSK Cambodia

To consolidate multiple data points and upgrade the current Malaria Information System (MIS) and data collection tools to provide CNM with live access to data from the private sector:

- Finalized the project’s electronic database within the DHIS2 architecture and began uploading caseload and QA visit data to the system. Early dashboards focused on performance monitoring and tracking malaria epidemiological data.
- Log-ins for the electronic system were shared with CNM and other key stakeholders, allowing them access to the full range of data collected during QA assessments.

PY3 Objectives

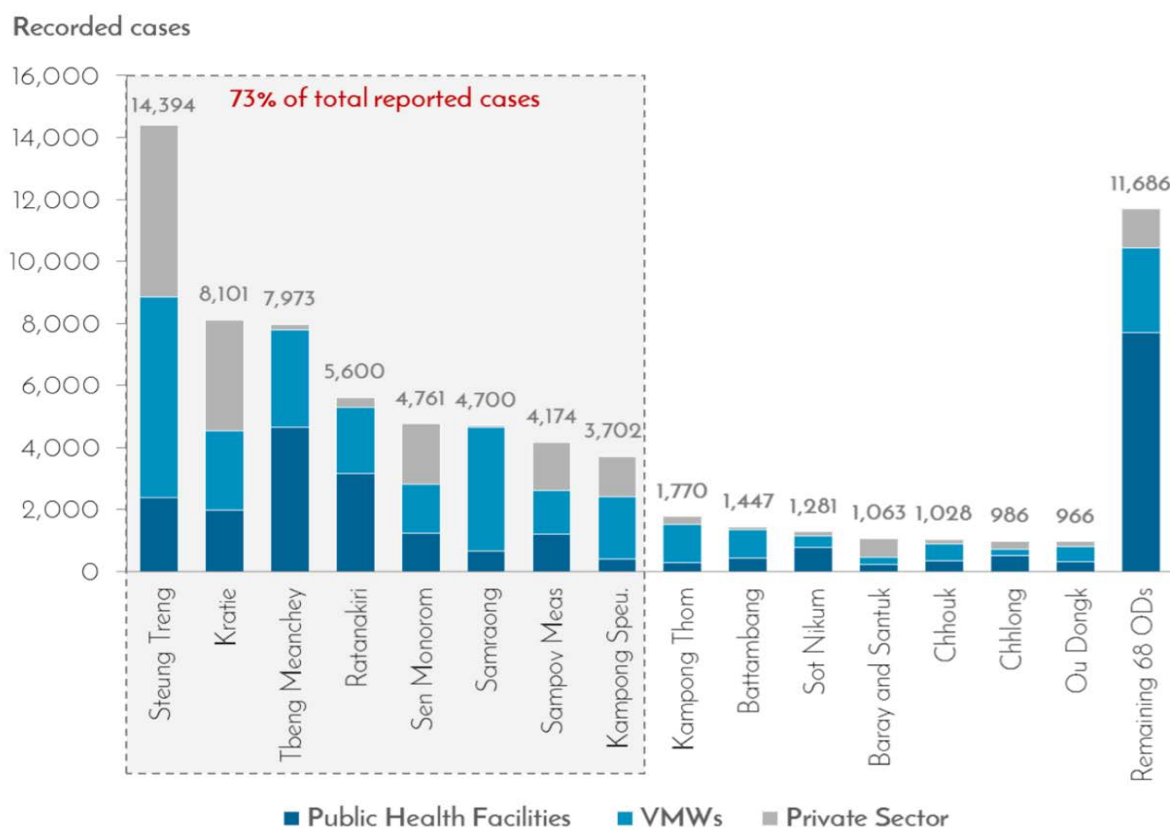
To improve targeting of support to private-sector health care providers treating febrile illness through established QA protocols:

- Formalized PSK endorsement of the QA and Surveillance Standard Operating Procedures to ensure standardized assessment and data collection procedures among QA officers and assessment teams. Additionally, secured approvals from CNM to implement.
- Promoted a collaborative process that allowed for buy-in from field-based staff and improvements to the methods and operational processes.
- Conducted joint monitoring visits with CNM to enhance national ownership.

To strengthen malaria surveillance data collection:

- Linked project activities to objectives of the Malaria Elimination Action Framework (MEAF) “to enhance the surveillance system to, by 2017, detect, immediately notify, investigate, classify and respond to all cases and foci to move toward malaria elimination.”² In PY3, several steps were taken to contribute to this goal:
- Updated daily registers; started development of the Malaria Case Surveillance (MCS) app; hired additional surveillance staff; developed a surveillance dashboard; and established a surveillance technical working group.
- Included private-sector data in national policy documents, one of the great successes of PY3. The graph below (Figure 14) represents the first time that private-sector data were included in a national policy document. Because of the high quality of the data in DHIS2, CNM had confidence in the figures and was willing to include this information in the MEAF.

Figure 14. Malaria Cases Recorded in Public and Private Sector by OD (2014)



PY4 Objectives³

To improve harmonization of data systems and strengthened data management within the national malaria response and across donors:

- During the last year of the project, PSK became a key contributing member of the Cambodia National Malaria Elimination Taskforce, supporting the development of terms of reference and national guidance documents.

² Ministry of Health (MOH) Cambodia. *Cambodia Malaria Elimination Action Framework (2016–2020)*. Phnom Penh: MOH; 2016. Available at <http://www.malariaeradication.org/knowledge-hub/cambodia-malaria-elimination-action-framework-2016-2020>.

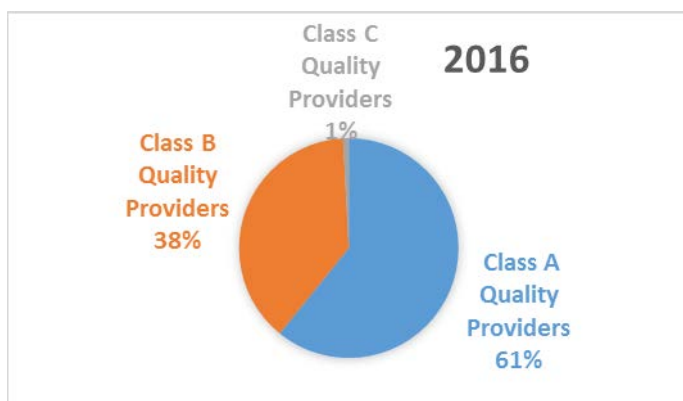
³ This PY4 annual report for Cambodia concurrently serves as the final programmatic report for the project. Therefore, additional detail has been provided.

The project team facilitated national Surveillance Technical Working Group meetings and contributed to a national surveillance operations manual that was circulated for final reviews in October 2016.

To improve the quality of malaria case management in the private sector (private-sector outlets and worksites):

- In PY4, conducted over 900 QA visits across a network of 538 public-private mix (PPM) providers, and 183 plantation malaria workers (PMWs).
- As shown in Figure 15 below, an increasing proportion of providers were categorized as Class A providers (over Class B and C), indicating a significant trend in quality of care improvements. Given the addition of new provinces during the transition of CNM to PSK management (Tier 1 and Tier 2 division), the project anticipated reporting of lower scores for new providers in the short term, as providers not supported by the project had not received training. Consequently, the team paid special attention to new network members, particularly in areas of demonstrated high transmission. Fortunately, there was no impact on the overall provider quality of care scores. For most of PY4 (in 2016), only 1 percent of the providers in the PPM and PMW networks were ranked C. The improvements in provider scores are likely due to targeted supportive supervision, comfortable interactions with a known team of PSK staff, familiarity with the program, and a better understanding of fever case management.

Figure 15. Classification of providers, 2016, Cambodia



- Enhanced data management through finalization of the Health Network Quality Improvement System (HNQIS), an electronic, tablet-based tool. HNQIS is fully functional without the need for internet connectivity and operates using an Android application linked with the information management system DHIS2. The system consists of four modules designed to support the focus areas above and is applicable to a range of health provider networks. Please see the Annex for further details on this tool.

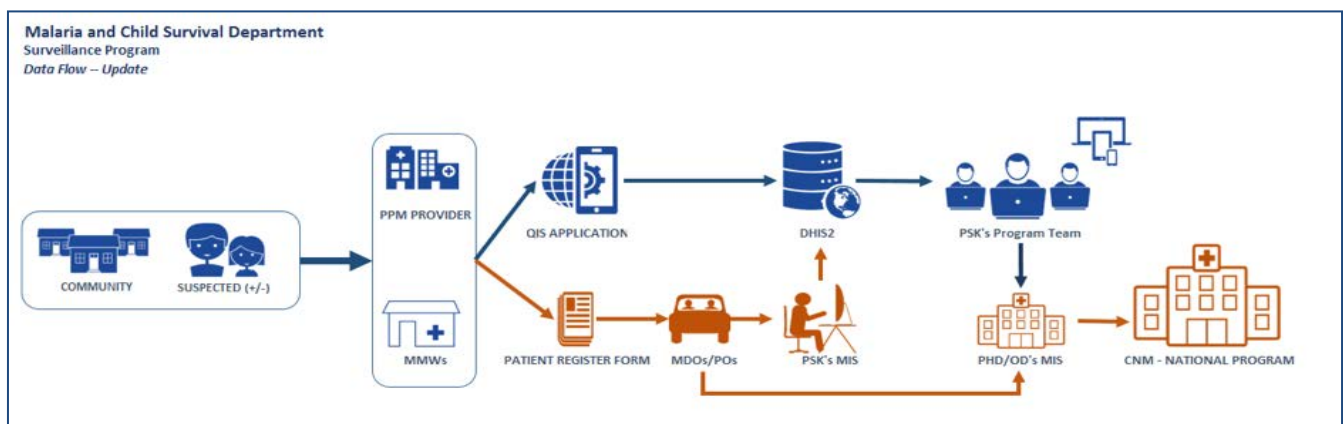
To improve malaria surveillance:

- The foundation for any effective health intervention is the availability of a quality data set, which provides routine reports on key performance indicators and is presented in a way that allows decision-makers to monitor performance and identify implementation issues. Collecting this data is vital to providing the CNM with a more accurate picture of the national malaria caseload, including the geographical areas—and ultimately the outlets—that require targeted support.
- Since the project started collecting data (August 2013), a total of 274,668 suspected malaria cases have been tested, and 45,762 of these cases who tested positive for malaria have been treated with appropriate first line ACTs.

- Developed the national Malaria Surveillance Operations manual; finalized the MCS application, following extensive consultation with stakeholders, pre-testing and design iteration; and established a dedicated “surveillance team” within PSK.
- Extensive preparation, advocacy, proper design, and pre-testing facilitated smooth transition to electronic reporting. During phase 1, the new MCS app was rolled out to 100 private providers (funded by MalariaCare, May/June 2016). During phase 2, the app was rolled out to an additional 100 providers (funded by the Global Fund, June/July 2016). During phase 3, the app was rolled out to the 500 remaining providers in the network (funded by the Global Fund, August/September 2016).

The flowchart below (Figure 16) shows the changes in data flow between the former paper-based system and the new electronic reporting system.

Figure 16. Surveillance data flow



In the paper-based model data was collected on a monthly basis and were physically carried to both PSK headquarters and the operational district offices (Figure 17). There, the data were manually entered in aggregate (by provider as opposed to patient line listing), and incorporated into both the national MIS and PSK’s DHIS2 platform, respectively. The data only reached CNM, often incomplete and erroneous, up to two months late. The new electronic system (shown in blue), utilizing the MCS app, improves the efficiencies in time, travel, and human resources. Data is entered by the providers into a phone and transmitted immediately to PSK’s DHIS2 (by patient line listing as opposed to aggregate provider data). The data is checked by the program team and then sent electronically to the operational district level staff where it is merged with the MIS.

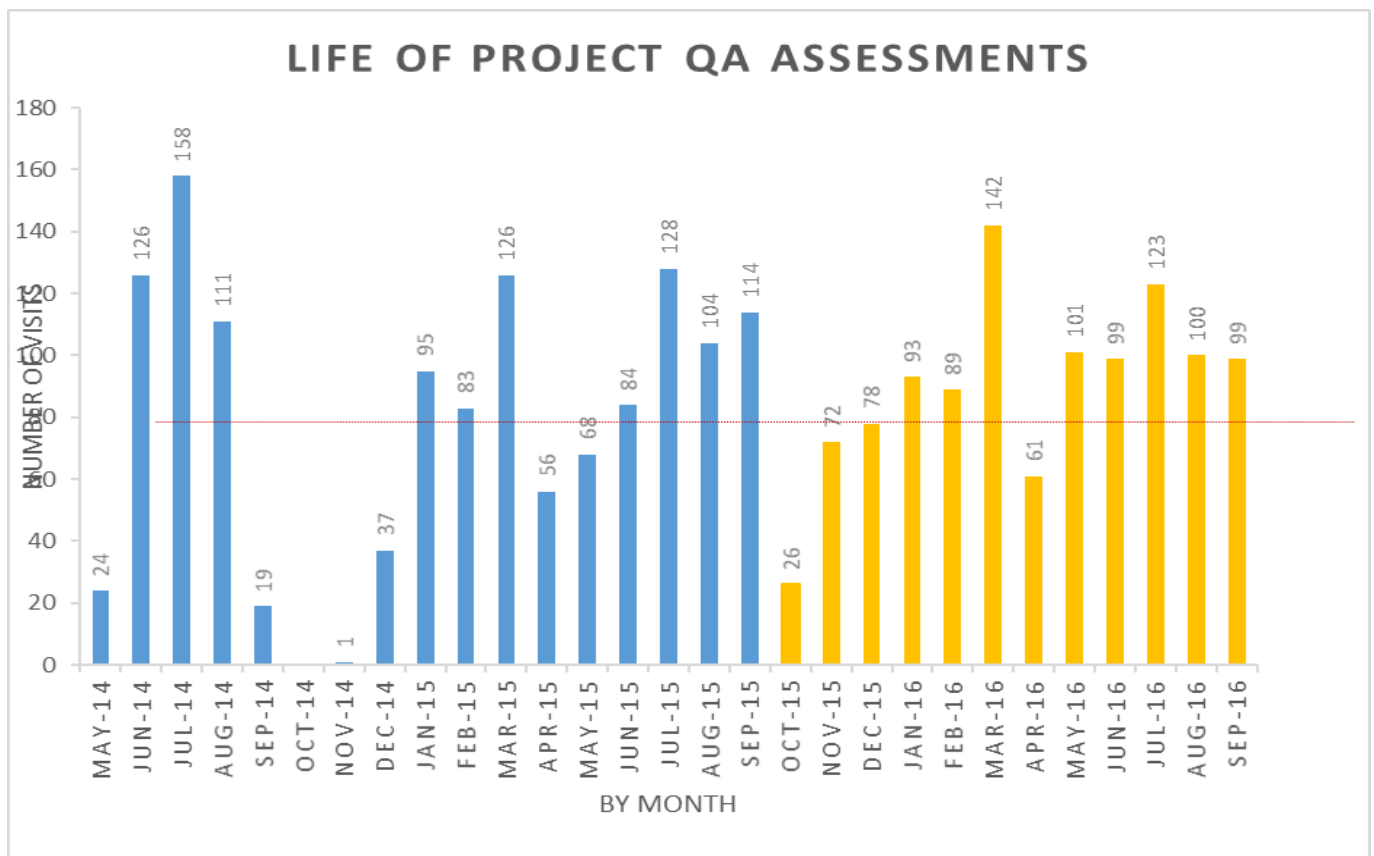
Figure 17. Paper-based daily patient register

The form is titled "Public-Private-Mixed Modality Malaria Patient Register Form" and includes the PSK logo. It contains several sections:

- Header: Patient Name, Age, Sex, Date.
- Registration Info: Site Name, Site ID, Site Type, Site Category.
- Registration Date: A grid for recording dates from 1 to 31.
- Registration Status: A grid for recording registration status (e.g., New, Recurrent, etc.).
- Registration Details: A table with columns for Date, Symptoms, Current Illness, and various test results (RDT, PCR, Giemsa, etc.).
- Registration Summary: A table for recording quantities of supplies used and received.
- Registration Notes: A section for recording additional information.

The following section outlines key project results from 2014–2016.

Figure 18. Number of quality assessments conducted in project supported sites, 2014–2016.



With funding from MalariaCare, the project conducted 2,417 QA visits over the life of the project, including over 1,000 QA visits in PY4 alone. During the three years of the project, the network of project-supported PPM providers expanded from 385 to 538, and the number of PMW worksites grew from 45 to 123, reaching 183 PMWs. As the QA assessment tool was designed specifically for private providers, QA officers were able to

target providers at appropriate intervals and offer customized guidance and support during visits. The tool also enabled the QA coordinator and program managers to generate data in real time.

As presented in Figure 18 QA teams routinely exceeded the project’s target of conducting 80 QA visits per month. Of note, fewer visits were completed in October 2014/October 2015 pending budget approval for the next year. Fewer visits were conducted in April due to public holidays in Cambodia.

Figure 19. Provider QA Assessment Scores by Category, 2014–2016.

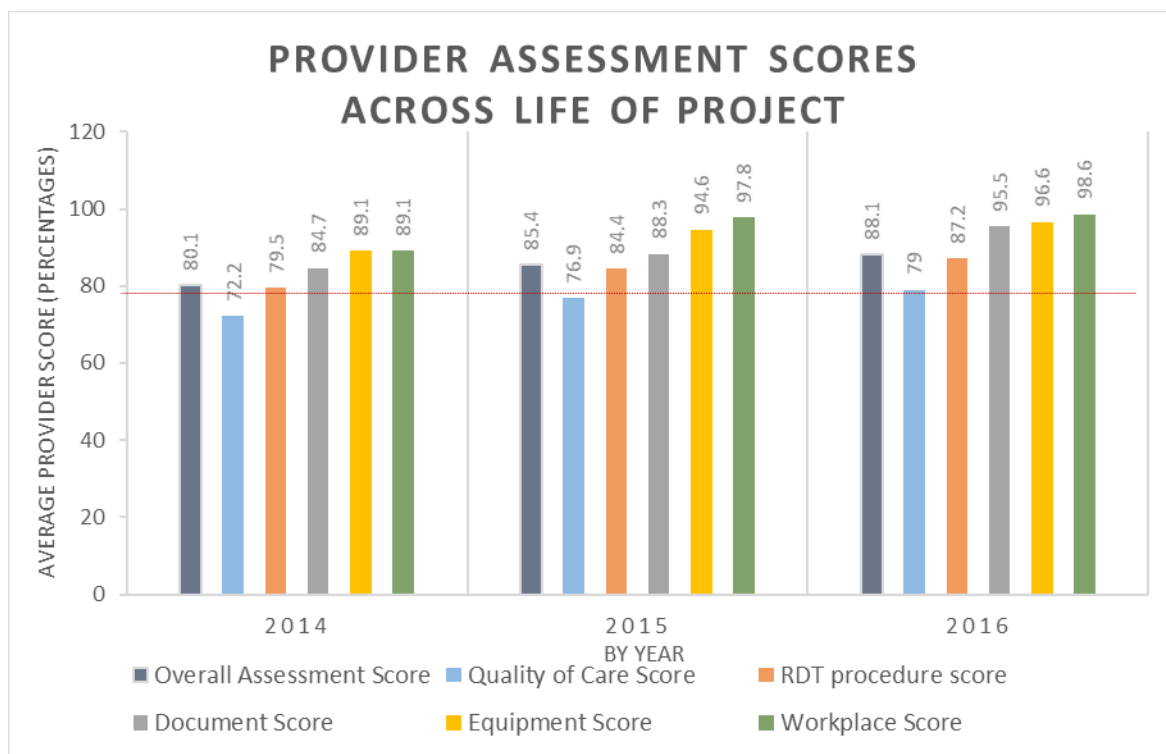


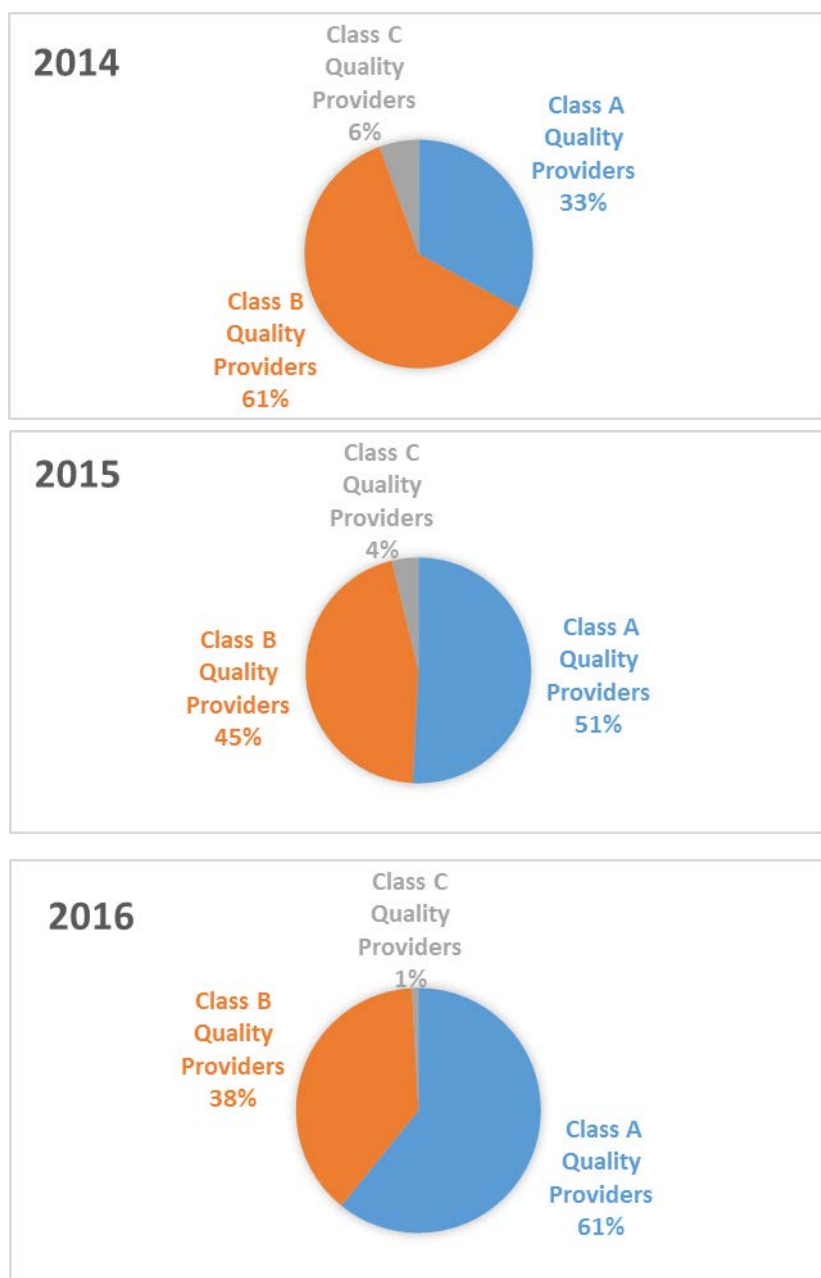
Figure 19 indicates consistent improvement in provider assessment scores across all five categories of evaluation:

1. Quality of care: Ability to assess danger signs, assess symptoms and ask patient history, correct treatment according to outcome, appropriate management of negative cases or appropriate referral.
2. RDT procedure ability: Demonstrated provider safety, patient safety, administration of RDT, appropriate disposal of biohazards.
3. Documentation: Accuracy and correctness of patient register.
4. Equipment: Appropriate storage of commodities, lighting, cleanliness and privacy.
5. Workplace: Stocking all essential tools (gloves, job aids, tests, treatment, sharps bin, timer)

The sixth category is an overall score, calculated by the individual indicators and weighted according to importance. The target performance for each category was 80 percent. While providers improved across all categories across the life of the project, scores were typically highest on the workplace and equipment

components. QA officers and medical detailing teams then targeted support to help providers improve documentation, RDT procedure, and quality of care scores. Providers consistently scored lowest on quality of care, as this component is derived from a series of basic skills, including appropriate assessment of danger signs. Over the course of the project, the project team realized that we were inappropriately assessing the providers' ability to identify danger signs by not capturing performance appropriately. For example, during simulated provider-patient exchanges, providers frequently failed to *verbalize* their assessment of danger signs (including coma, extreme pallor, and inability to sit or stand, all of which would be assessed *visually*); and as such they were being penalized/marked down on the tool. To maintain consistency across the project, and with other regional programs, the assessment of danger signs format has not yet been altered, but providers are increasingly well trained in verbalizing the symptoms that they are observing, or otherwise looking for.

Figure 20. Provider Class breakdown by Year



The three pie charts to the left (Figure 20) represent the breakdown in proportion of the highest-ranked providers (Class A), with the middle-ranked providers (Class B), and finally the lowest-ranked providers (Class C). Across the three years of implementation, supportive supervision, and QA assessments, Class C providers consistently moved upward in ranking, with a reduction in Class C providers by 5 percentage points. In 2016, only 1 percent of the providers in the PPM and PMW networks were ranked C. There was an increase by 10 percentage points in Class A providers between 2015 and 2016.

The improvements in provider scores are likely due to targeted supportive supervision, comfortable interactions with a known team of PSK staff, familiarity with the program, and as a result, a better understanding of fever case management.

Figure 21. Testing and treatment rates 2013–2016.

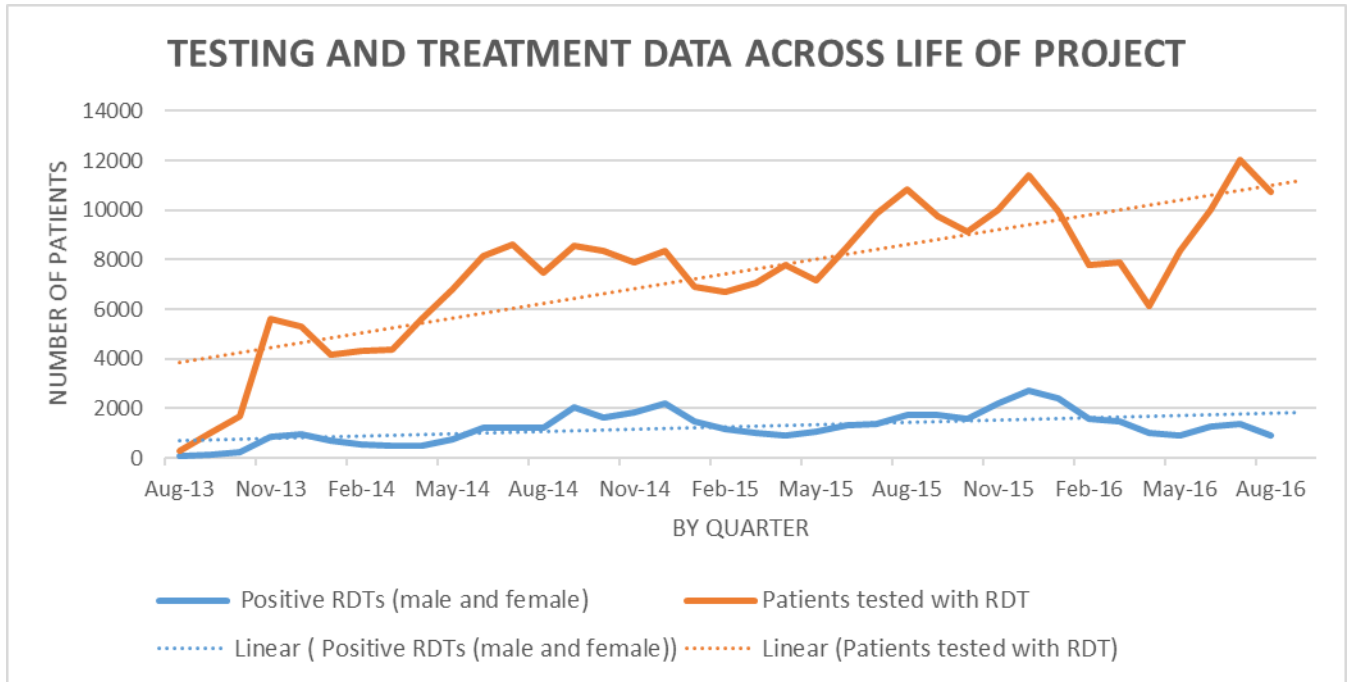
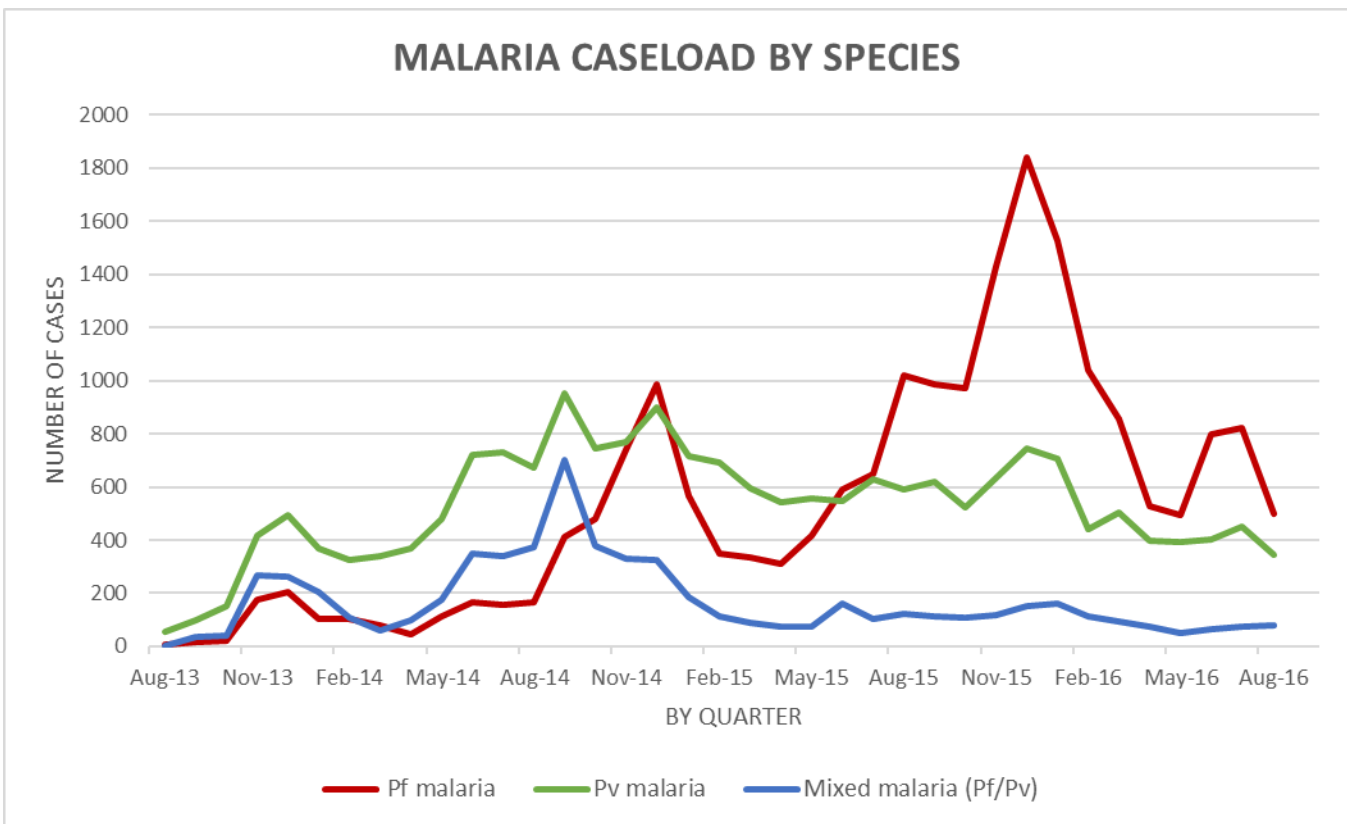


Figure 22. Malaria Caseload according to Species



In addition to monitoring the performance of providers and ensuring an effective and positive primary health care experience for beneficiaries, funding from MalariaCare has also allowed the team to contribute trusted and validated caseload data (utilized internally and externally) to monitor malaria epidemiology and service uptake. Figure 22 above represents the increases in suspected cases receiving an RDT from project-supported providers, as well as the correlating increase in patients found to be positive for malaria. The graph clearly shows the seasonality of malaria in Cambodia, with cases spiking during the rainy season months of December and January, dipping gradually into the hot and dry months of March through June, and then climbing again in August. Tracking testing and treatment data has also helped the project manage commodities, such as knowing when to request buffer stock. The RDT figures are slightly less consistent, with a fairly large trough in April of 2016, believed to be a result of a long holiday mid-month. Such a large drop seems anomalous, and figures in May through June seem to represent a “catch up” for the low testing rates in April. This information has been incredibly valuable not only for the project, but also for the CNM, Cambodia’s Malaria Elimination Task Force, and regional stakeholders such as the WHO, international researchers, and a wide range of donors.

Of great importance to the Malaria Elimination Task Force is trend data surrounding the prevalence of *Pf*, *Pv*, and mixed infection (Figure 21). There was a dramatic uptick in cases of *Pf* in July 2015, which has led to sustained higher rates of *Pf* over *Pv*. This is concerning on a number of levels, as *Pf* can lead to severe or complicated malaria and is the variation that leads to mortality. It is also concerning because of the spread of ACT-resistant parasites, now confirmed in most provinces, according to the latest therapeutic efficacy studies. The project presented this information at an emergency outbreak investigation discussion hosted by CNM, after concerns emerged surrounding the rise in cases of *Pf*. The project’s data was in line with the findings of other implementing partners, and a formal investigation was launched. *Pf* cases remain the majority in 2016, and PSK will continue to track and share this valuable data with CNM and partners for a better understanding of the changing malaria epidemiology in Cambodia.

Key challenges and lessons learned

Key challenge/lesson learned	Solution
Coordination with CNM, partners, and multiple donors	Under the new Global Fund implementation structure, CNM will lead implementation of public- and private-sector efforts in provinces designated as Tier 1 for artemisinin resistance. As such, CNM has stated that they will oversee implementation of the public-private mix program in provinces where the PSK currently supports 217 providers. As CNM's approach will be different (excluding QA and real-time reporting), the team has developed transition plans, including raising additional funds to support the continuation of QA and electronic reporting within CNM managed provinces.
Delays in development of national Malaria Information System	Due to bottlenecks in CNM's public-sector data management system, it has been difficult to access data from the public sector, including from both the health facility and community level. To help address this challenge, the project team worked closely with CNM to plan for upcoming enhancements to the national information management system.
Sustainability of electronic reporting.	As with any new technology, there are concerns about the long-term sustainability and unknown challenges related to electronic reporting. PSK addressed these concerns as follows: The team liaised with multiple stakeholders to get both advice and buy-in and presented the process and outcomes at many meetings and conferences, advocating for the use of the tools. Adoption has not yet been universal; however, with increasing evidence of the success of the program, the team is hopeful that they can contribute to a change in the way the private sector is involved in fever case management and how it reports. This technology could easily be adapted for other health areas, increasing its value and potential importance among other departments.
Demonstrating the success of electronic reporting will take time	PSK will continue to monitor the use and perceptions of providers using the electronic reporting application, and will document the process to provide evidence for implementation by other partners. However, a full evaluation of the technology will need to be conducted after the tool has been in use through at least one cycle of peak malaria season.

Underlying challenge: translating evidence into policy and implementation

PSI/PSK spent the last three years generating a wealth of valuable data on models for successful engagement with the private sector, tools for tracking malaria data, ways to improve the quality of primary care across a diverse cadre of providers, and approaches to increase collaboration and coordination at subnational and community levels. Over the course of the MalariaCare project, these data has been shared, discussed, presented, documented, and debated. PSI/PSK have been staunch advocates for the use of open-source DHIS2 software for use as the national MIS, to avoid the pitfalls and delays associated with developing a standalone system and to be in alignment with the numerous other countries around the world utilizing this tool. PSK has shared each piece of software developed, both the concepts and the backend technology, and offered to provide training and guidance for further study or roll-out. The transparency and spirit of collaboration have been acknowledged and welcomed, but have rarely led to effective collaboration. The debate over DHIS2 continues. The need for an effective QA system remains a topic of every national meeting, however, limited progress is noticeable.

Change takes time and management, and the adoption of new tools, approaches, and methods is to be carefully weighed and considered. However, the complexity of the situation in Cambodia makes for an extremely difficult operating environment. The worrying spread of ACT resistance across the country, the challenges with core Global Fund funding, frequently changing actors, and new epidemiological evidence all require attention and a coordinated response. PSK will continue to advocate for improved quality of fever case management, to strengthen the surveillance systems and, above all, to continue to demonstrate the important contribution made by a network of private providers toward malaria elimination.

Recommendations

As MalariaCare has only enrolled 538 PPM providers (49% of the national representative group), the majority have not received case management support. We recommend that PMI and other funders (BMGF and GF) support the CNM to adopt an effective PPM QA and surveillance approach, focused on several limitations: PPM providers do not report consistently, they do not receive supportive supervision visits, and they do not undergo any form of training or quality of care assessment.

It is recommended that continued support and technical guidance be provided to CNM on data and reporting systems. The current MIS, for example, is human resource–intensive. The future electronic information system/platform to be selected by CNM will require further technical support to ensure that the system is manageable, sustainable, and fit for the purpose.

Transition and sustainability

1. Continuation of activities.

Because of the progress made by the MalariaCare intervention, the Global Fund and the Gates Foundation have agreed to integrate QA assessments and electronic data collection into the complete PPM and the plantation programs. Activities are funded starting on October 1. Both funders saw important value in maintaining this quality of care program, and in using DHIS2 for decision-making on a daily basis.

2. Uptake of private-sector QA by CNM.

The CNM has reviewed the QA protocol developed by PSI/PSK. They have reviewed the checklist and commented on it. They have written the QA approach developed under the MalariaCare project into new projects funded by the Global Fund, which will support malaria case management activities in Tier 1 areas, including community-level interventions through village malaria workers. CNM will be using the project-developed checklist when district staff go out to conduct QA assessments and will soon begin to use the electronic checklist on tablets procured for this purpose by the Global Fund.

To ensure a smooth transition, PSK is in a position to provide ongoing support as the CNM rolls out this component on their Global Fund grant. PSK has funding from the Global Fund and the Gates Foundation to provide training to subnational staff (at Operational Districts and Provincial Health Departments) on both the QA approach as well as the electronic checklist. While the systems (private-sector information systems and public-sector MIS) are not yet fully integrated, the interoperability of DHIS2 would allow for smooth integration once CNM has selected an MIS system.

3. Regional extension.

Based on the project's experience in Cambodia, the PSI regional malaria program has opted to utilize the QA methodology developed under MalariaCare. This program is funded by the Gates Foundation. It aims to contribute toward malaria elimination in Laos, Vietnam, Cambodia, and Burma. The program also has a private-sector focus which started in January 2016.

The transition and sustainability components outlined above could contribute to the institutionalization of high private-sector quality of care in the region, and could be applied also to other health areas. The continuation of activities, through different channels, will help ensure that activities that were implemented under MalariaCare will not suffer any gaps in terms of geographical coverage. CNM also remains committed to longer-term sustainability of these approaches, demonstrated by their inclusion of QA assessment teams in their Global Fund grant, and as a primary focus of the Case Management Working Group.

Environmental impact statement

In line with MalariaCare's approved environmental monitoring and mitigation plan, the project has ensured that all project-supported case management training (including RDT training) and supervision activities have adhered to national guidelines on proper waste management:

1. Safe collection of potentially infected body fluids or tissue samples.
2. Proper disposal of sharps and potentially infected body fluids/tissues into collection receptacles.
3. Appropriate disposal and/destruction of these infectious waste materials.

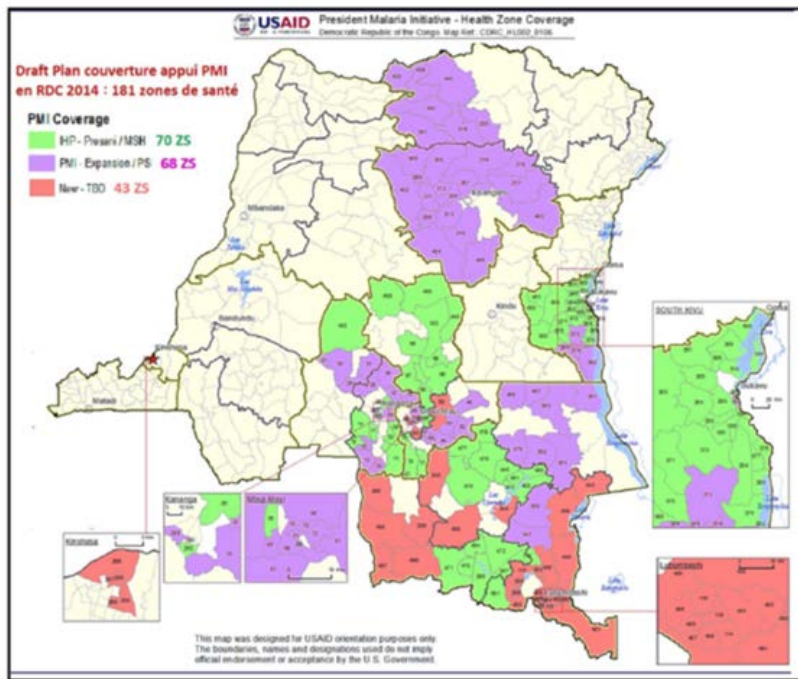
Note: This project does not have an inventory or assets to report.

Democratic Republic of the Congo

Introduction

In the DRC, MalariaCare supports the national malaria program (Programme National de Lutte Contre le Paludisme, or PNLP) and other malaria-linked entities of the MOH, such as the national diarrheal disease program (Programme National de Lutte Contre les Maladies Diarrhéiques, or PNLMD) and provincial bureaus, to implement the malaria case management QA strategy. This strategy aims to improve adherence to the WHO test and treat guidance, which calls for every febrile patient to be tested for malaria and treated in accordance with the test results. During PY4, MalariaCare continued to work on improving the quality of malaria diagnosis and clinical care across 44 health zones. These zones are highlighted in red in Figure 23, which shows MalariaCare-supported health zones in relation to other PMI-supported health zones.

Figure 23. PMI-supported health zones in DRC



At the national level, MalariaCare strengthened the infrastructural capacity of the Institut National de Recherches Biomédicales (National Biomedical Research Institute, or INRB). At the provincial referral level, MalariaCare conducted training and onsite supportive supervision visits. At the community level, MalariaCare supported the following institutions to establish community health sites in remote, hard-to-reach villages in Haut Katanga Province: PNLP, the Haut Katanga Health Provincial Division, and the national program for the control of diarrheal diseases (PNLMD), which oversees integrated community case management (iCCM) of childhood illness.

Key accomplishments

Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent.

- Collaborated with the PNLP and the National Biomedical Research Institute (Institut National de Recherches Biomédicales, or INRB) to identify 20 participants from central and provincial health facilities and institutions to participate in an advanced MDRT, to refresh the diagnostic skills of staff who act as laboratory supervisors during OTSS. Pre- and post-test training scores were used to identify gaps in knowledge and to evaluate performance improvement.

Course participants were trained on and evaluated for practical microscopy skills (microscopy parasite infection detection, identification of *Plasmodium* species, and counting of whole blood parasite load) and for basic malaria knowledge critical for patient care (theory evaluation) (see Table 2 for a summary of WHO equivalent scoring). At post-test, significant improvements were noted in all test categories, with average scores improving by 12 to 45 percentage points (see Table 10 below). Participants demonstrated particular competence in parasite detection (average score 91 percent; median 93 percent; range 80 to 100 percent) and understanding malaria management theory (average score 94 percent; median 96 percent; range 57 to 100 percent). While the results for practical skills for species identification and parasite counting still showed

room for improvement, participants did improve significantly in both categories (average scores by 29 percentage points and 35 percentage points, respectively) from a relatively low baseline. MalariaCare believes that the lab OTSS supervisors will be able to mentor their colleagues effectively in using microscopy to identify infected patients.

Table 10. Malaria diagnostics refresher training (MDRT) microscopy practical pre- and post-test results, DRC (n=20).

Competency area	Average pre-test score (median [range])	Average post-test score (median [range])	% point change in average score
Parasite detection	79% (82% [55%–100%])	91% (93% [80%–100%])	12
Species identification	47% (43% [14%–71%])	76% (75% [54%–96%])	29
Parasite counting	14% (0% [0%–50%])	49% (50% [19%–88%])	35
Theory evaluation	49% (50% [26%–74%])	94% (96% [57%–100%])	45

Course participants are now expected to lead in establishing relevant laboratory procedures within their facilities, to share their knowledge with colleagues, and to continue to work as laboratory OTSS supervisors in order to implement the malaria case management QA system in their province.

Four of the best performers from this course were then supported to participate in the WHO ECAMM course at Cheikh Anta Diop University in Dakar, Senegal. Two participants received WHO L1 accreditation; one participant received L2 accreditation; and the fourth attained L4 competency.

- Performed a basic MDRT in Lubumbashi. This course refreshed diagnostic skills (microscopy and RDT testing) and theoretical knowledge for 22 laboratory OTSS supervisors from provincial- and peripheral-level laboratories in Haut Katanga, Haut Lomami, Lualaba, and Tanganyika provinces.

During this course, which targets participants with lower microscopy skill levels and is graded less stringently than the advanced MDRT (see PMP indicator definitions), trainees were evaluated for basic practical microscopy skills (microscopy parasite infection detection, identification of *Plasmodium* species, and counting of whole blood parasite load) and on basic malaria knowledge critical for malaria diagnosis (theory evaluation) (see Table 11 below). The best overall performances were in parasite detection (average 75 percent; median 73 percent; range 18 to 100 percent), species identification (average 65 percent; median 71 percent; range 0 to 100 percent), and theoretical knowledge (average 60 percent; median 59 percent; range 30 to 91 percent). While final performance for parasite counting was on average only 43 percent, the participants improved significantly from their baseline, by 40 percentage points from an average pre-test score of 3 percent. These findings indicate a marked improvement in capacity, still with room for improvement in key areas.

Table 11. Improvements between average basic malaria diagnostics refresher training (MDRT) pre- and post-test scores (n=19), DRC.

Competency area	Average pre-test score (median [range])	Average post-test score (median [range])	% point change in score
Parasite detection	66% (73% [36%–91%])	75% (73% [18%–100%])	9
Species identification	31% (29% [0%–71%])	65% (71% [0%–100%])	34
Parasite counting	3% (0% [0%–25%])	43% (25% [0%–100%])	40
Theory evaluation	20% (22% [0%–48%])	60% (59% [30%–91%])	40

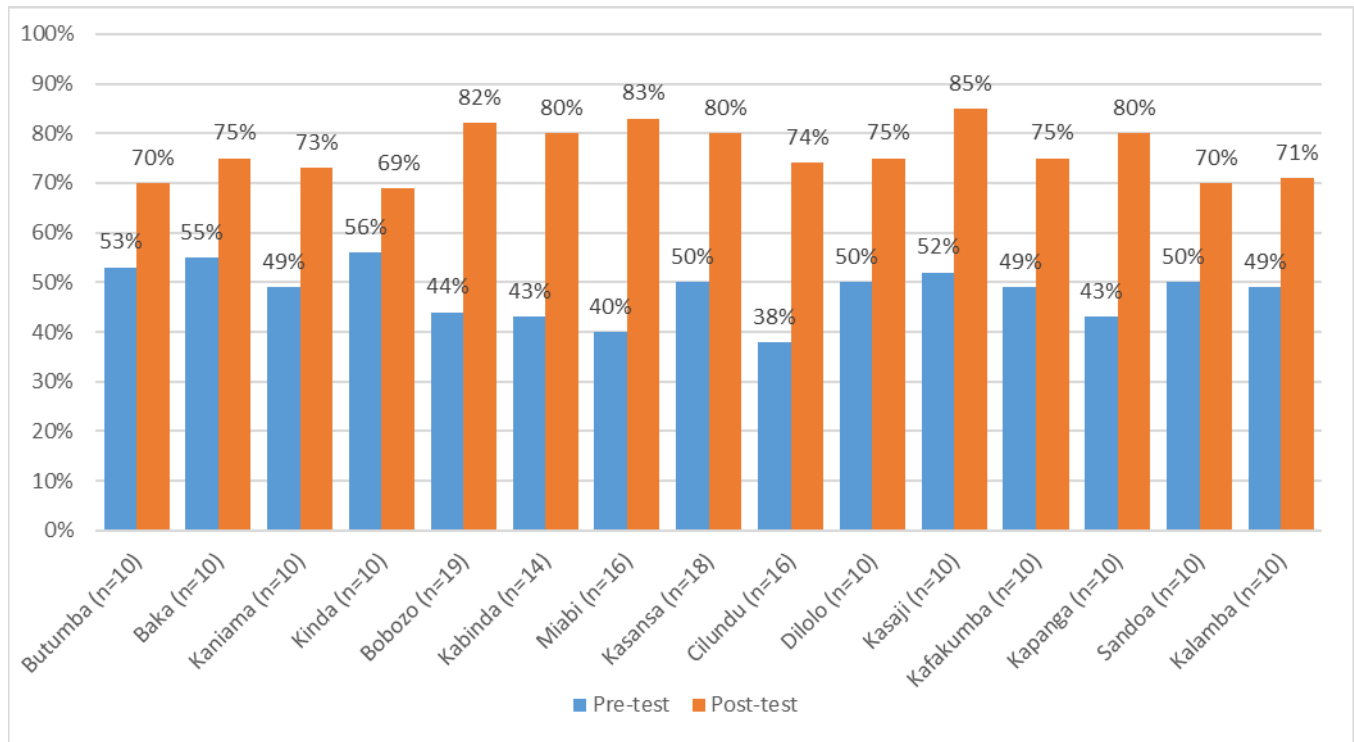
Note: Three participants who lacked pre-test scores due to late arrival on the first day of the MDRT were removed from analysis.

- Hosted a dissemination meeting for the national diagnostics QA manual. This document, which was finalized in PY3, had not seen the uptake that was anticipated. Consequently, MalariaCare supported a formal, two-day launch meeting of the manual, bringing together national representatives from the INRB, PNLP, and MOH with provincial and health zone stakeholders to review and adopt the manual in order to encourage its dissemination to health facility laboratories.

Objective 2: Increased percentage of patients suspected to have malaria or a febrile illness who receive a diagnostic test for malaria.

- Completed the RDT QA cascade training for individual health care workers from health facilities in the 15 health zones in five provinces not reached during PY3. This one-day training, which was led by the clinical and laboratory supervisors and two health zone management team members trained in PY3, included training on kit storage and testing procedures, common technical errors, and use of test results in clinical decision-making. The sessions conducted in PY4 reached 1,835 head nurses, who are expected to return to their facilities and provide on-the-job training to those responsible for conducting RDTs. See Figure 24 below for a summary of performance by health zone.

Figure 24. Average pre- and post-test score from RDT QA training for health facility workers, DRC.



Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illness—consistent with the result of the diagnostic test.

- Conducted case management refresher training for 54 clinical supervisors in two regional sessions. This course provided refresher training on the national case management guidelines to new and existing provincial-level supervisors who conduct OTSS visits in MalariaCare’s 13 target provinces. Prior to the training, MalariaCare worked with the PNLN to develop modules and other training materials, as a national curriculum for case management refresher training does not exist in the DRC. Each session was co-facilitated by MalariaCare clinical experts, national and provincial PNLN representatives, and representatives from the University of Kinshasa and University of Lubumbashi. Over the course of four days, participants received training on national case management policy; diagnosis and treatment of malaria; special cases and severe malaria; pharmacovigilance; and procedures and guidelines for management of biomedical waste. A fifth day was spent conducting field visits to nearby health facilities to assess clinical case management practices through clinical observations of facility staff records review. On average, participants made improvements between the pre- and post-training evaluations. The average pre-test score of 59 percent (median 60 percent; range 3 percent to 89 percent) increased by 12 percentage points to a post-test average score of 71 percent (median 69 percent; range 51 percent to 86 percent).
- Conducted OTSS supervisor refresher training for clinical and laboratory OTSS supervisors. This training, which took place in three regional sessions following the LLWs, provided supervisors with an in-depth review of supportive supervision approaches and mentoring techniques, with the goal of improving the quality of onsite training and problem-solving support provided during OTSS visits. In addition, supervisors

participated in practical training on the use of the OTSS checklist through role-playing exercises and a day of field visits to a nearby health facility. This included practicing observations and providing feedback to health care providers.

- Conducted three rounds of joint clinical/laboratory OTSS (Rounds 7, 8, and 9). During Round 7, national and provincial supervisors visited the same 41 facilities that received OTSS support during PY3. Rounds 8 and 9 expanded to reach an additional 16 facilities, for a total of 57 facilities now enrolled in OTSS.
- Participated in three technical collaborative meetings with the SIAPS project. SIAPS supports malaria case management at health zone–level facilities in the 44 PMI-assigned health zones in which MalariaCare also has limited work. In PY4, the project provided technical assistance to SIAPS to implement its activities by reviewing the SIAPS checklist in order to integrate indicators from the MalariaCare RDT observation checklist. This led to the determination of common strategies and approaches in OTSS for the overlapping areas, and to an integrated supervision checklist for health zone–level supervisors. MalariaCare also planned to provide additional technical assistance to SIAPS by observing facility-level OTSS visits. However, because of scheduling delays by partners, these OTSS visits were not implemented. Plans to review OTSS data for those facilities that sent providers to the RDT QA training conducted by MalariaCare have hence been delayed, resulting in an inability to collect the relevant data on RDT observation checklists. MalariaCare will continue to follow-up with SIAPS to obtain these data in order to determine if further technical support is needed for RDT QA at this level.
- Supported the PNLP, the Haut Katanga Health Provincial Division, and the National Program for the Control of Diarrheal Diseases (NPCDD) to establish 53 community health sites in nine health zones in Haut Katanga province. Eighteen members of the health zone management teams and three provincial supervisors were trained in the national standards for assessment of malaria, diarrhea, and respiratory disease; iCCM management tools; and training techniques.

Following the training-of-trainers, 42 head nurses from health facilities and a community leader from each of the nine health zones participated in relais (community health worker) supervisor training. This training focused on reviewing national iCCM guidelines and site management tools, management and mentorship skills, and the role of community health site supervisors. Pre- and post-tests were conducted to assess participant understanding. Performance improved from an average score of 5 percent (range zero to 38 percent) at pre-test to an average score of 56 percent (range 38 to 85 percent) at post-test. According to the post-test results, 45 (88 percent) of the 51 participants met the minimum score (50 percent) at the end of training.

Following their training, the health zone management teams conducted an iCCM training for 100 relais from the 53 identified health sites. Over the course of six days, participants were trained on identification of danger signs in patients; assessment, management, and treatment of malaria,



A community health worker practices giving a rapid diagnostic test (RDT) during integrated community case management (iCCM) training in Sakania Health Zone.

diarrhea, and respiratory diseases; proper RDT use; and referral of severe cases and use of prereferral treatment. A 13-question pre- and post-test were administered to measure participant knowledge. Average performance improved from 8 percent (median score 0 percent; range 0-8 percent) to 56 percent (median score 54 percent; range 8-92 percent). The most common weakness noted in all nine health zone sessions was the inability to use respiratory counting to help distinguish pneumonia from other causes of cough. The skills of relais and head nurses were reinforced over the course of two post-training follow-up visits to each health zone, which occurred in April and August 2016.

To build effective community support for the iCCM activities, the health zone management teams also provided a one-day training to 53 community health care site management committee members. This training introduced the national iCCM management strategy and oriented committee members to the reporting and supervision structure led by health center head nurses.

Per national guidelines, two rounds of post-training follow-up visits were conducted to each of the community health sites to improve the capacity of relais in case management, the management of medicines in the health sites, and in use of data collection tools. At the end of the second round of post-training follow-up visits, more than 90 percent (94 of the 106 relais) were able to properly manage cases under the supervision of the health zone management team (HZMT) and the head nurses. The post-training follow-up visits also served as capacity strengthening exercises for the 27 HZMT members and the 45 head nurses in the supervision of the relais.

MalariaCare also supported the official launch of iCCM activities in Haut Katanga Province by procuring and distributing iCCM kits (containing materials and data collection/reporting tools) to the trained relais at the 53 community health sites. Bicycles were also procured to support their work.

- In late PY4, MalariaCare, in collaboration with the Haut Katanga provincial health division, conducted an assessment of the three new health zones that were selected for community health site development: Kashobwe, Kilwa, and Pweto. By using the criteria laid out by the national guidelines for the development of community health sites, 33 potential sites were identified that met the requirements of having a total population $\geq 1,500$ and located ≥ 5 km from a health center. Options were narrowed to identify 18 sites—six in each health zone—that will be developed in PY5.

Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.

- Supported the initiation of sample collection and slide development for a national archive of slides (NAMS) for training and quality assurance. It conducted NAMS development and polymerase chain reaction (PCR) validation training for key INRB staff who are responsible for developing the slide bank NAMS. The first training focused on sample collection and slide development for 11 INRB staff members, including laboratory technicians and physicians. There was significant improvement in knowledge, from average score of 58 percent (median 58 percent; range 50 percent to 70 percent) at pre-test, to 79 percent (median 78 percent; range 55 percent to 90 percent) at post-test. The participants were able to produce eight sets of slides (a total of 1,572 slides) during the training (see Table 12 below for a breakdown of the slides created). The second training, on PCR validation, was provided to four INRB staff who had previous experience on conducting PCR assays. MalariaCare provided reagents and supplies for use during this training. A pre- and post-test were administered to assess each participant's baseline knowledge of PCR and the QA subject areas to be

covered during the training. Performance improved from an average score of 51 percent (median 55 percent; range 20 to 75 percent) at pre-test to 81 percent (median 83 percent; range 70 to 90 percent) at post-test. Following this training, the INRB teams were supported to conduct field visits to collect the necessary samples for slide development in accordance with the approved NAMS protocol. Difficulties in securing *Plasmodium ovale* (*Po*), *Plasmodium malariae* (*Pm*), and mixed infection samples during the first field visit delayed sample collection; it is anticipated that all samples will be obtained during the first quarter of PY5.

Table 12. Slide sets prepared during MalariaCare DRC national archive of malaria slides (NAMS) training, DRC.

	Number of Donors	Parasite density (p/μL)	Total slides
Negative slides	3	N/A	837
<i>P. falciparum</i>	1	79,719	149
<i>P. falciparum</i>	1	56,627	150
<i>P. falciparum</i> + <i>P. malariae</i>	1	51,000	160
<i>P. falciparum</i>	1	33,686	176
<i>P. falciparum</i>	1	332	100

- Conducted three regional LLWs—in Kinshasa, Kisangani, and Lubumbashi—for 45 provincial supervisors following the year’s first round of OTSS. During the LLWs, supportive supervision data for each participating province were presented and reviewed by the provincial supervisors. Additionally, MalariaCare representatives provided an overview of how health facility scores are calculated. They emphasized the importance of full completion of the OTSS checklist to ensure that reliable data is used to focus on areas of poor performance. On the second day of the LLW, supervisors discussed best practices for providing mentorship in facilities and common issues identified; they then developed action plans for improving upon identified weaknesses. Notably, poor clinician adherence to national guidelines in treating patients and poor record-keeping in health facilities were identified by supervisors as key challenges in all three workshops.
- Participated in the first two meetings of the revived national malaria case management technical working group. During the first meeting, MalariaCare provided an overview of OTSS data and the working group prepared and finalized the training materials to be used at the case management refresher training for provincial supervisors. Because national case management training materials did not exist, it was agreed that the working group would meet again following the update of the national case management guidelines to create a national curriculum and materials for case management training. A larger workshop was held in July with additional technical participants in order to review and update the national case management guidelines, and to align with current WHO recommendations. These guidelines are expected to be formally launched by the PNLP by the end of 2016.
- Supported the INRB’s participation in the WHO Stepwise Laboratory Improvement Process Towards Accreditation (SLIPTA) program by providing it with the necessary laboratory reagents.
- Procured basic parasitological diagnostic supplies for five newly established reference laboratories in Haut Katanga, Sud Kivu, Kasai Oriental, Lulua, and Tshopo. During OTSS Round 8, MalariaCare also conducted

an assessment of the parasitology diagnostic infrastructure of the seven newly established general reference hospitals in Kasai, Lomami, Sankuru, Haut Lomami, Lualaba, Tanganyika, and Bas-Uele provinces. The results of this assessment were shared with the PNLP to improve the capacity of these laboratories in quality malaria diagnosis.

Progress made on key MalariaCare indicators

Trend data

To date, nine rounds of OTSS have been conducted in the DRC (eight of them under MalariaCare). Over that period, the number of facilities ever covered expanded from 15 facilities in Round 1 to 41 in Round 6, and expanded again to 57 by the end of PY4.

Performance scores for a subset of OTSS facilities visited in Round 6 and again during the most recent round (Round 9) provide some insight into the progress that can be made on key indicators that OTSS seek to improve. Figure 25 summarizes the proportion of facilities meeting MalariaCare targets in these two rounds. Of the 57 OTSS facilities visited, 37 were visited in both Round 6 and Round 9; among these 37 facilities, the proportion of facilities with sufficient data to calculate performance scores ranged from 43 percent (or 16 facilities) for RDTs, to 62 percent (or 23 facilities)

for testing prior to treatment. For clinical case management, a new checklist was introduced and scores often could not be calculated; consequently, results are not presented here. Improvement in scores was demonstrated for testing prior to treatment; additionally, all facilities with RDT scores available in both rounds attained the minimum performance target by Round 9. Negative test adherence also improved dramatically, although test adherence in the DRC has been found to be significantly lower than in other MalariaCare countries: only 33 percent of the facilities met the MalariaCare negative test adherence target by the end of PY4.

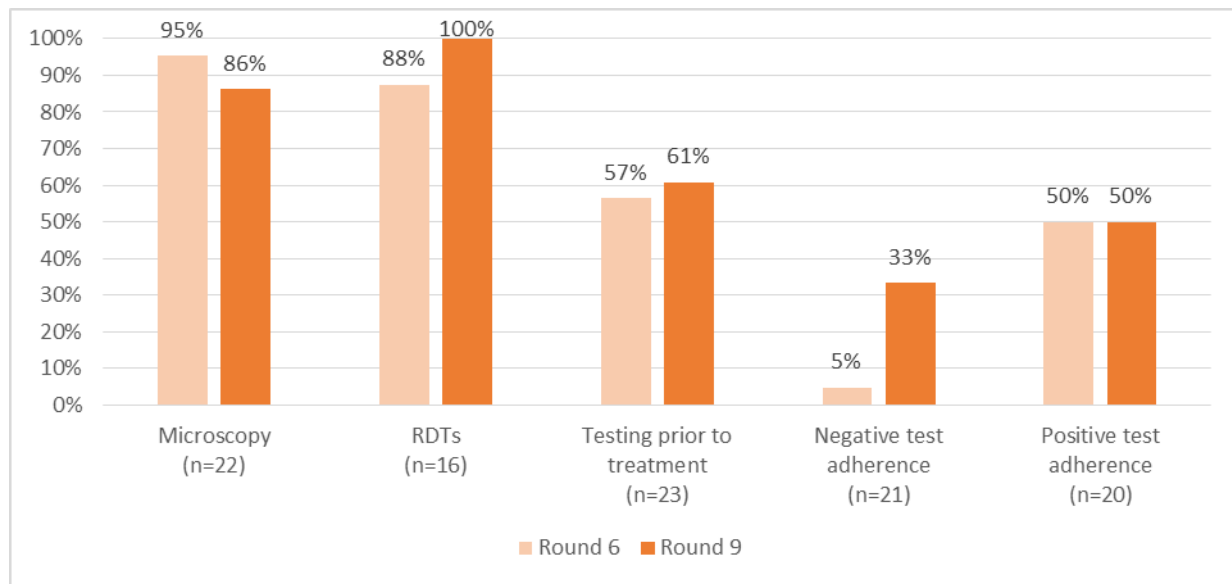
The proportion of facilities meeting targets for adherence to positive test results did not improve with time, suggesting that consistently prescribing ACTs for malaria-positive patients remains a challenge. Data show that of the 69 observations of antimalarial treatment being prescribed during Round 9, ACTs were prescribed in only 43 percent of cases, followed by artesunate (28 percent) quinine (22 percent of observations), and others (7 percent). These results have highlighted the need for intensive clinical case management QA interventions to target all first-line providers. In addition, the proportion of facilities meeting the minimum performance target for microscopy declined from 95 percent to 86 percent. Diagnostic competencies tend to decline with time where no sustained effort is made to maintain skills. MDRTs must be accompanied by OTSS and additional follow-up interventions, such as testing panel administration and mentoring, to maintain skills. Staff turnover may also be a contributing factor.



An HGR Kansele laboratory technician conducting malaria microscopy during an OTSS visit.

Photo credit: PATH DRC

Figure 25. Proportion of facilities meeting the minimum performance target (75%) for competency indicators and overall performance target (90%) for adherence indicators, Round 6 versus Round 9, DRC.



Most recent visit

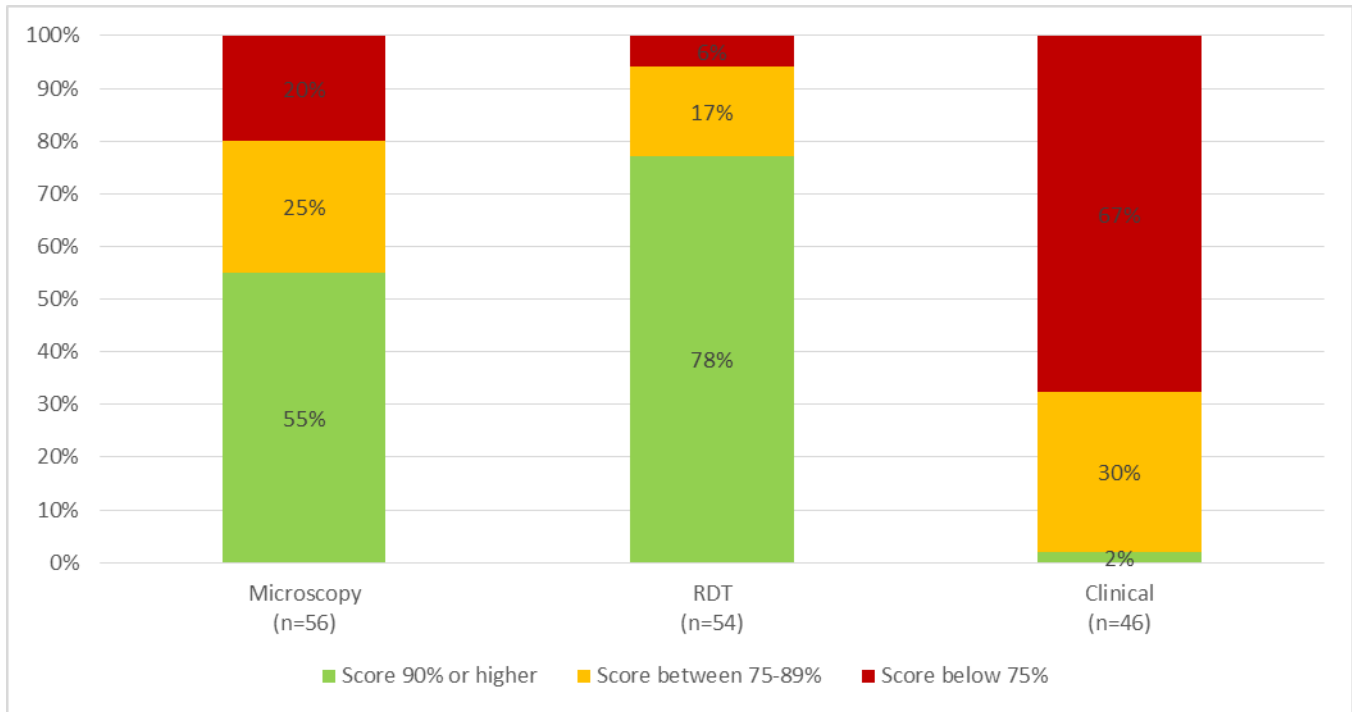
Performance on key competencies

Figure 26 summarizes the most recent performance results on competency measures available for all health facilities visited in PY4 (57 facilities in total). A total of 56 facilities (98 percent) visited had at least one full microscopy observation to calculate a score. The majority of these facilities were found to score at a level of 75 percent or greater, and 55 percent of facilities met the overall target score of 90 percent. Among key minimum standard steps, the most commonly missed step was using a standard 10 percent Giemsa solution (on average, 77 percent of lab staff observed did so). Supervisors realized that most lab technicians used 3 percent Giemsa instead of the standard 10 percent.

For RDTs, 94 percent of facilities with available scores met MalariaCare’s minimum performance target, and 78 percent met the overall performance target. The most commonly missed steps were labeling the cassette (average facility performance was 79 percent) and checking the expiration date (average facility performance 80 percent).

Among facilities with available clinical case management scores, the reverse of diagnostic performance was found for OTSS facilities in the DRC: only 33 percent of facilities were found to meet or exceed minimum performance targets (i.e. score 75 percent or greater). Correctly conducting key febrile case management steps—such as checking for signs of severe malaria, ordering a malaria test, and prescribing in accordance with the test result and diagnosis—was observed for over half of observations at each facility on average. However, performance on these steps lags behind that for other MalariaCare countries. For instance, average health facility performance on checking for at least one sign of severe malaria was 61 percent.

Figure 26. Proportion of health facilities meeting minimum (75%) and overall (90%) targets on microscopy, RDT, and clinical competencies during the most recent OTSS visit in PY4, DRC.

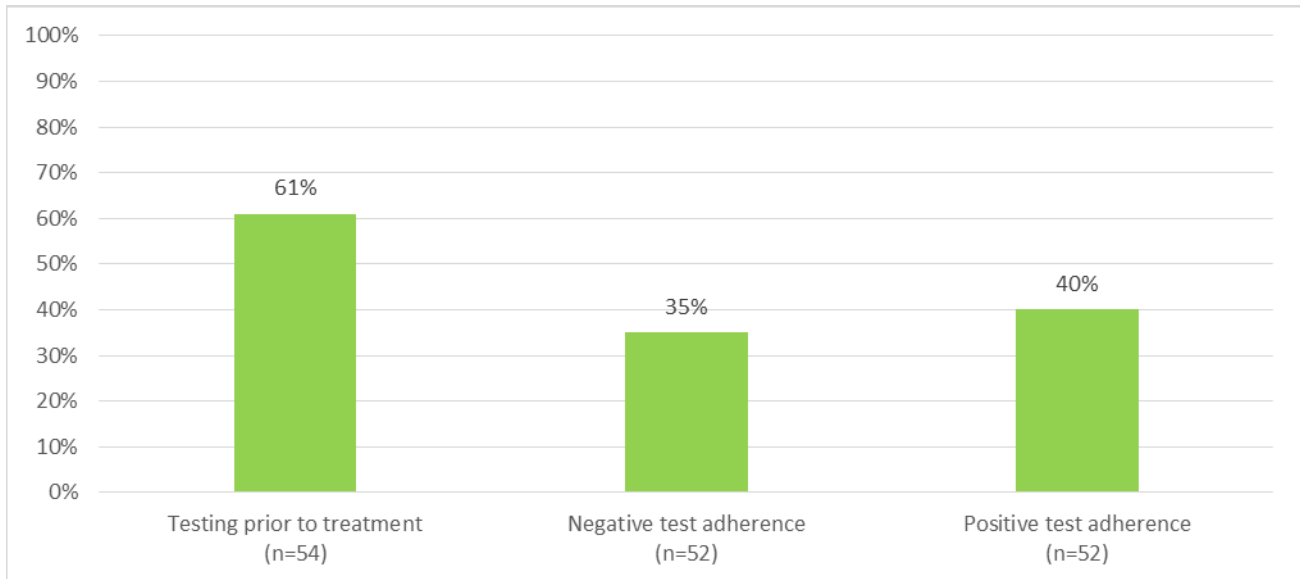


Note: Due to rounding, percentages presented here may not sum to 100%; and the proportion of facilities meeting the minimum performance target is most accurately calculated as 100% minus the number reported as not meeting the minimum performance target (i.e. scored below 75%).

Measures of adherence

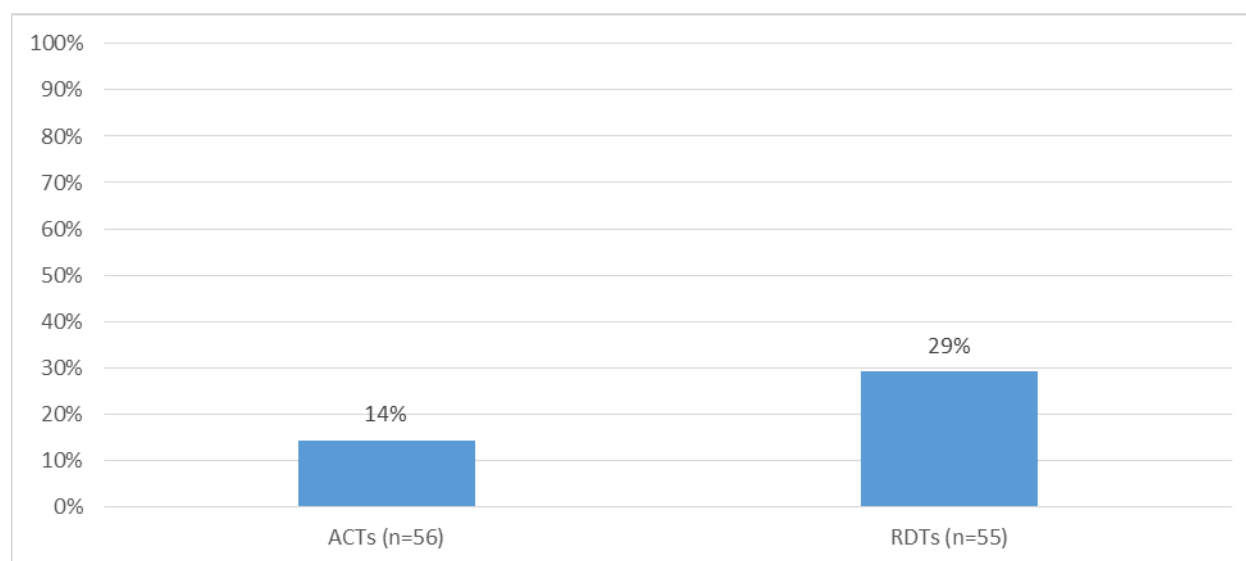
Figure 27 summarizes the proportion of facilities meeting targets for MalariaCare’s three adherence measures for the most recent visit available. In order to attain these targets, 90 percent or more of sampled ACT records must have a corresponding test result found in the registers, and 90 percent or more of a sample of test results must have a corresponding ACT record found (or not found, in the case of negative test adherence). Although trend analysis for this indicator in other MalariaCare-supported countries suggests that further improvement can be made with continued OTSS visits, performance on adherence to positive testing in the DRC appears to be lagging behind due to lack of consistent use of ACTs as stipulated by the national guidelines. This is possibly linked to lack of generalized case management training, since OTSS does not reach all health providers. Additionally, fewer than half of facilities in the DRC met targets for adherence to both negative and positive test adherence. A detailed analysis of the results shows that of those patients receiving antimalarial treatment, only 43 percent received ACTs in accordance with the national guidelines. This is an interesting finding, underscoring the need for publication and dissemination of revised national guidelines accompanied by expanded clinical case management training.

Figure 27. Proportion of health facilities meeting overall performance target (90%) on testing before treating and adherence to test results during the most recent OTSS visit, DRC.



Although MalariaCare’s mandate does not include the management of commodities, the OTSS checklist collects information on RDT and ACT stock-outs so that supervisors can determine whether stock-related issues influence performance related to diagnostics and treatment. Figure 28 presents the proportion of facilities reporting a significant stock-out (i.e., lasting more than seven days) in the three months prior to the OTSS visit. Among facilities with data, RDT stock-outs appear to be more common than those for ACTs: 29 percent of facilities reported a significant stock-out of RDTs, whereas 14 percent did so for ACTs. Although stock-out issues appear to affect some OTSS facilities in the DRC, these were not found to be substantially more serious than in other MalariaCare countries with higher testing and positive test adherence levels. Thus, in addition to clinical case management training that will address knowledge and practice gaps, OTSS supervisors in the DRC should continue to work with health providers to identify and address other key barriers to the testing of suspected febrile cases and adherence to test results.

Figure 28. Proportion of health facilities reporting a stock-out of ACTs and RDTs lasting more than 7 days during the 3 months prior to the most recent OTSS visit, DRC.



Challenges

Challenge

Delays in the roll-out of the second iteration of EDS at the global level led to a delay in shifting OTSS in DRC to electronic data collection.

Solution

To maintain the implementation timeline, supervisor training, the LLWs, and OTSS Round 8 went forward without the EDS component. Due to limited resources and the short time left on the project, MalariaCare will not introduce EDS in the DRC.

Next steps

- In its final year of implementation, MalariaCare will continue to implement activities focused on improving quality-assured case management of malaria and other fever-causing diseases, with primary focus at the national and provincial levels in nine provinces.
- Prepare the PNLP to conduct OTSS in non-PMI provinces by providing training on OTSS methodologies and best practices; share OTSS tools and data analysis capacity; and facilitate training for clinicians, laboratory staff, and supervisors.
- Establish community health sites in three additional health zones by training relais in iCCM and head nurses on iCCM and supervision; identify support for supervision and monitoring for iCCM sites to be incorporated into the regular health zone management team supervision scheme; and identify partners to support the incorporation of other disease areas, such as pneumonia and diarrhea, into the care package at iCCM sites.
- Enable the PNLP to implement a nationwide malaria diagnostic QA program that includes proficiency testing, training, and capacity-building for malaria microscopists by completing development, validation, and operationalization of the NAMS.

Ethiopia



Introduction

Since PY1, MalariaCare and the International Center for AIDS Care and Treatment Programs (ICAP) have worked in collaboration to support the Ethiopian Public Health Institute (EPHI) to meet key objectives under the Capacity-Building Directorate. The EPHI plays a key role in the delivery of diagnostic services, including QA at every level of the health care system. With the support of PMI, EPHI has focused on building the human and material resources necessary for operationalizing its overall QA plan for central- and regional-level reference laboratories. In support of this objective, MalariaCare supports EPHI through two major activities:

1. Accreditation of an expert group of microscopists from the national and regional reference laboratories to serve as mentors in training and QA activities.
2. Completing NAMS validation.

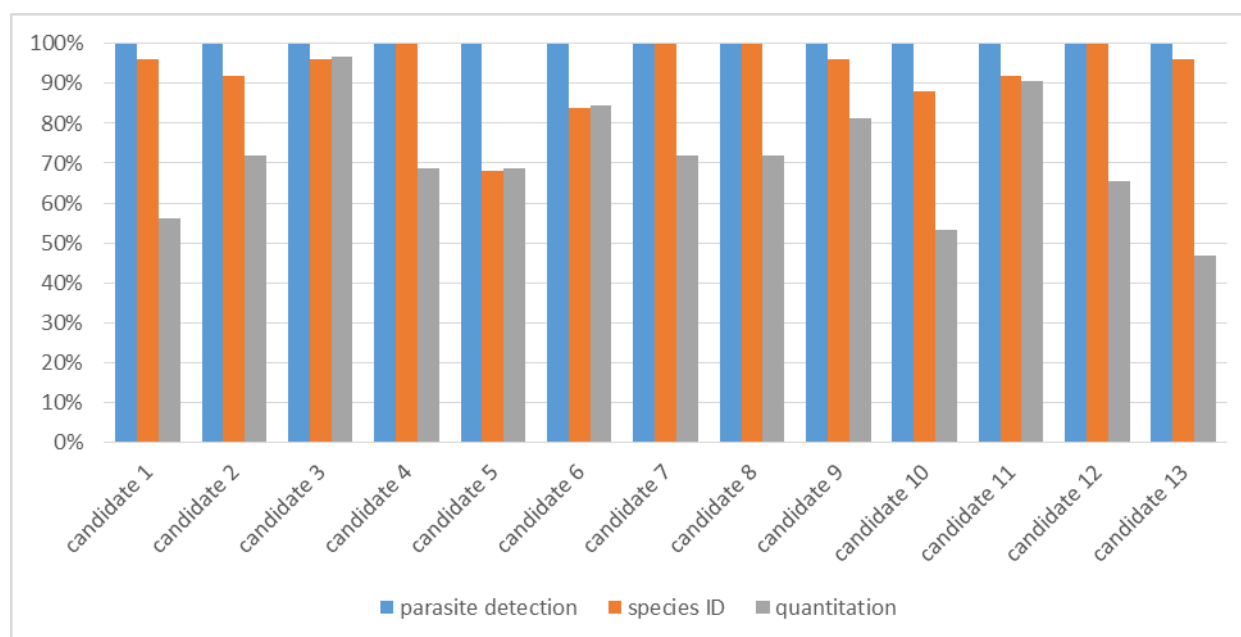
Key accomplishments

No activities were carried out under MalariaCare global objectives 1 through 3.

Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.

To ensure high-quality health system diagnostic outputs, in PY4 the Ethiopian Federal Ministry of Health (FMOH) initiated a plan to accredit reference-level staff by international standards in malaria microscopy. The national- and regional-level program included preparatory ECA (pre-ECA) and WHO ECAMM courses. Previous attempts in international ECAMM between 2010 and 2012 resulted in only 6 of 27 (22.2 percent) of laboratory staff passing at L1 (one or 3.7 percent) or L2 (five or 18.5 percent), and an average class accreditation score of L3 (see Table 2 for a summary of WHO scoring). In order to improve outcomes, MalariaCare worked with EPHI and PMI partner ICAP to develop an ECAMM preparatory training program that included WHO reference materials for malaria microscopy, access to the WHO slide bank for one month prior to the actual WHO ECAMM course, and a five-day pre-ECA refresher training and competency assessment using WHO slide sets. All of the 13 participants in the pre-ECA course who passed the three components that make up the assessment (parasite detection, species identification, and quantitation) scored the equivalent of WHO L1 (n=10) or L2 (n=3). Pre-ECA scores on parasite detection, species identification, and parasite counting/quantification are presented in Figure 29. As in other MalariaCare-focus countries, parasite-counting scores are lower than parasite detection. Species identification scores, however, are higher in Ethiopia, likely a result of the mixed epidemiology of malaria, with approximately 25–35 percent of cases caused by *Pv* (WHO).

Figure 29. Pre-ECA competency assessment post-test scores, Ethiopia (n=13).



In December, MalariaCare supported the 13 national (EPI) and regional (Adama, Bahir Dar, Tigray, Nekemte, and Dessie) reference laboratory staff to attend the WHO ECAMM session held in Adama, Ethiopia. All participants passed the ECAMM with L1 (61.5 percent) or L2 (38.5 percent) accreditation, an accomplishment that was called an “historic performance” by the WHO. These positive outcomes suggest that high-quality preparation for the ECAMM can improve outcomes.



Participants from the Malaria Microscopy Refresher Training and WHO External Competency Assessment of Malaria Microscopy courses in Adama, Ethiopia (Oromia State).
Photo credit: International Center for AIDS Care and Treatment Programs.

In 2015, the WHO agreed to sponsor the validation of five national slide banks from the Africa region, including Ethiopia, by the Research Institute of Tropical Medicine (RITM) in Manila, the Philippines. Six current WHO-certified L1 microscopists from the Philippines performed the validation. A total of 12 slides per donor were equally divided and read between the six validators in a blinded and independent manner. Percent agreement was calculated for each type of diagnosis among the validators. A final composite diagnosis was then established for each donor (defined as ≥ 70 percent agreement among all validators and with PCR results). In late September 2016, RITM released the validation report to EPI for 29 blood donors. The report is currently under review by EPI for finalization of the inventory of the NAMS.

As a part of operationalizing the slide bank, MalariaCare assisted EPHI to finalize the slide database. Important reporting functions were added to the database that will enable EPHI to categorize their slides as *easy*, *moderate*, or *difficult* based on results from their proficiency-testing program. Additionally, MalariaCare worked with both the USAID Mission in Ethiopia and ICAP to create a list of standardized health facility names with coordinates (latitude and longitude) to upload into the database to prevent future data entry errors.

Challenges

Challenge	Solution
The involvement of multiple projects, partners, and individuals with differing priorities in the development of the Ethiopian NAMS has made it difficult to track progress, identify gaps, and finalize the activity according to the planned timeline. Additional but significant delays in validation were due to EPHI's apprehension in using external validators from RITM and not their own WHO-certified L1 experts.	Frequent communication between the USAID Mission and EPHI are expected to assist MalariaCare to navigate negotiations surrounding validation protocols, delays in submission of slides for validation, and review and reconciliation of the validation report for finalization of the NAMS database.

Summary of MalariaCare achievements over the life of the project

Activity/training	Outcome
Procured training materials and reference books for the national and regional laboratory staff and facilitated a pre-ECA course a week before WHO ECAMM to assess participant readiness.	Equipped a cadre of 13 Ethiopians to participate in the WHO ECAMM course.
ECAMM for 13 WHO-accredited L1 and L2 expert microscopists.	Supported the development of a cadre of expert microscopists who are accredited to internationally recognized standards for malaria microscopy.
Supported a technical expert from UCAD to provide a five-day training for three EPHI staff in the molecular biology department, which focused on basic molecular techniques needed for performing PCR to support slide bank validation. Supported a staff member to travel to UCAD to learn how to perform a PCR-based assay for <i>Plasmodium</i> species determination.	Equipped EPHI with the capacity to conduct PCR-based assays required for in-house validation of the slide bank (and for future slide development).
Assisted EPHI to characterize and validate all slide bank donors by PCR.	PCR results have been completed for 21 donors.
Supported validation of slide bank by RITM.	Slide bank donors validated by WHO-certified L1 microscopists.
Final revisions to slide bank database.	Provided EPHI with a final and quality-controlled slide bank database for management and reporting of slide bank-related activities.

Recommendations

High-density *Pf* donors are missing from the Ethiopian NAMS; however, EPHI has a number of validated *Pv* donors. It is recommended that EPHI engage in slide swaps with one of the four WHO-supported countries for slide validation:

- Amref Health Africa—Nairobi, Kenya.
- University of Lagos—Lagos, Nigeria.
- Kintampo Health and Research Institute—Kintampo, Ghana.
- Cheikh Anta Diop University—Dakar, Senegal.

It is recommended that WHO-certified L1 and L2 microscopists be provided continuous training and monitoring over the next three years. This could be partially accomplished by the distance-learning tool developed by Intellectual Ventures, which will be operationalized by Amref Health Africa. All experts can be considered for re-certification in three years' time.

Transition and sustainability

The finalization of the Ethiopian NAMS has created an opportunity for EPHI to implement a number of activities outlined in its national diagnostic QA plan. In the coming months, EPHI will roll out a national competency assessment for malaria microscopy, proficiency testing (PT) for health facilities conducting malaria microscopy, and refresher training for supervisors and national and regional reference laboratories. In the future, EPHI plans to build on its existing slide bank and intends to serve as a regional source for *Pv* samples.

To sustain EPHI's implementation of its QA plan, MalariaCare has provided the following tools to EPHI:

- MDRT training materials and grading template.
- PT scheme manual and grading template.
- Pre-ECA training materials.
- WHO malaria microscopy reference materials.
- NAMS database.

Ghana

Introduction

In Ghana, MalariaCare has continued to implement malaria case management QA activities and promote sustainability of the project's interventions by further strengthening the partnerships with key stakeholders. In PY5, project activities have been bolstered by collaborative relationships at the national, regional, and district levels, allowing MalariaCare to effectively use its resources and provide leadership in the core areas of malaria diagnosis and treatment. MalariaCare implements diagnostic capacity-strengthening activities in all ten regions, and works in the Upper East, Upper West, Brong Ahafo, Ashanti, and Eastern regions to improve the quality of clinical care for malaria and M&E activities. See Figure 30 for a map of the Ghana regions.



Figure 30. Map of Ghana's regions

Key accomplishments

Objective 1: Scale up and improve access to and availability of high-quality malaria diagnostic services, with a focus on the lower health facility level.

- Provided supervisor refresher training for 41 laboratory OTSS supervisors from all ten regions. The two-day training focused on supervisors' mentoring skills, providing guideline updates on diagnosis and treatment of malaria, and reviewing the laboratory OTSS checklist. The aggregate score on supervisor competency in skills and knowledge on supportive supervision increased from a mean score of 71.8 percent (median 70 percent; range 40 to 93 percent) at pre-test to a mean score of 91.7 percent (median 95 percent; range 75 to 100 percent) at post-test. The training ended with supervisors planning their itinerary for conducting supervision visits.
- Following the refresher training for the lab OTSS supervisors, MalariaCare supported the Clinical Laboratory Unit (CLU) of the Institutional Care Division (ICD) to conduct two rounds of laboratory OTSS. The first round of OTSS (Round 11) was conducted in November 2015, with visits made to 187 health facilities across the ten regions. In August 2016, during OTSS Round 12, visits were made to 199 health facilities. In total, 379 facilities with labs were visited at least once during lab OTSS in PY4. The visits were used to reinforce weak areas identified during previous visits and also to train and mentor staff on microscopy and RDT skills, assess adherence to case management through patient record reviews, and provide feedback on identified issues and challenges within facilities. MalariaCare technical advisors, in collaboration with national supervisors from the Ghana Health Service, conducted ten days of monitoring and oversight visits to assess and ensure the quality of the OTSS visits. See Table 13 below for a summary of overall performance scores over both rounds of OTSS.

Table 13. Average overall performance scores for facilities visited for laboratory outreach training and supportive supervision (OTSS) in PY4, Ghana (out of 379 facilities visited).

Competency area	Overall average health facility (HF) score (most recent visit)	Total # of HF	Target	% of HF scoring at or above target	# of HF at or above target
Microscopy*	90%	307	90%	53%	164
Rapid diagnostic test (RDT)*	92%	264	90%	65%	171
Adherence to negative test results	84%	348	85%	59%	207

*NOTE Ghana's microscopy and RDT observation checklists differ from those in other countries; thus, results cannot be compared.

- Following the recommendation made in a CDC technical assistance trip report, MalariaCare discussed and agreed with the NMCP and PMI to reprogram funding from the implementation of a national competency assessment of malaria microscopy (NCAMM) to the development of a PT scheme, an external QA process. The PT scheme is implemented in health facilities with microscopy infrastructure to improve skills in malaria diagnostics for a larger number of laboratory staff. MalariaCare collaborated with the CLU and NMCP to conduct a one-day training on the PT scheme. Participants included the six Ashanti region laboratory OTSS supervisors, seven national-level laboratory supervisors, and a biomedical scientist from Kintampo Health

Research Centre (KHRC). Following the training, participants then rolled out a pilot of the PT program in Ashanti region during Round 12 of OTSS. The lessons learned from the pilot will be used to guide nationwide implementation of PT by the CLU.

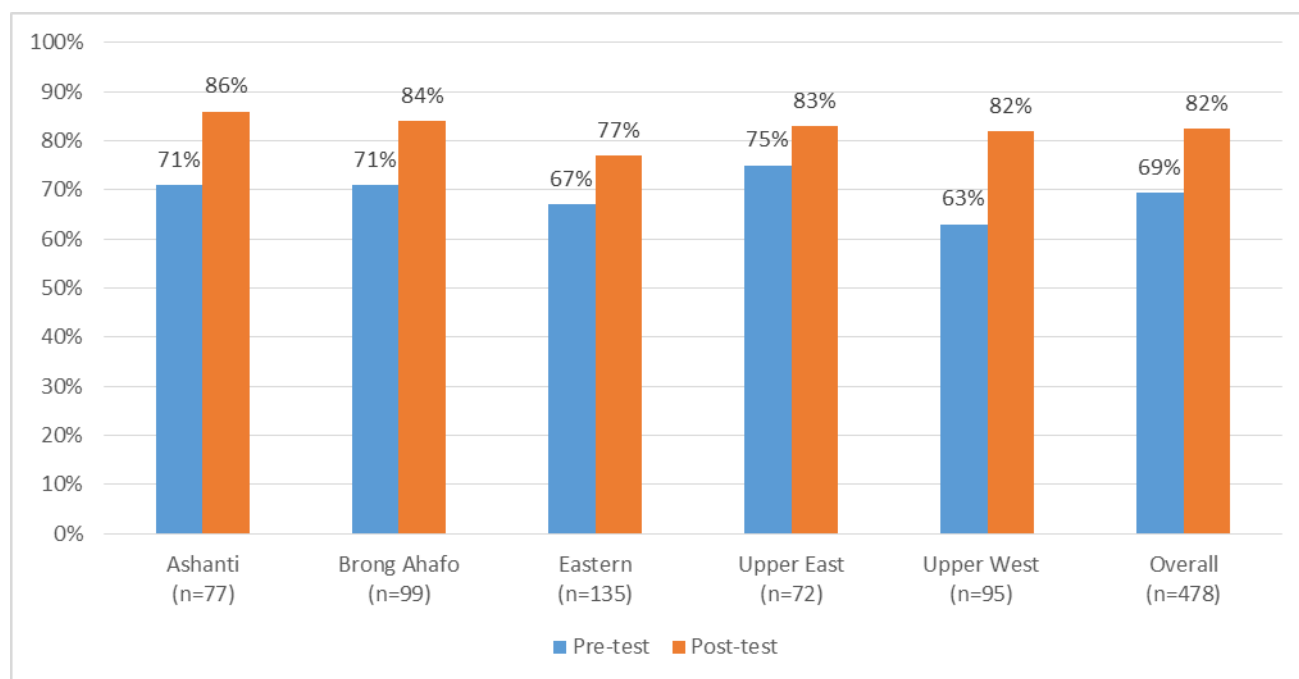
Following the training, PT was piloted in 28 health facilities in Ashanti during OTSS Round 12. Prior to the lab OTSS visits, PT panels consisting of ten slides were shipped to each of the 28 selected health facilities. Completed forms were received from 27 out of 28 health facilities (96 percent). Instructions were provided to the laboratory heads to have laboratory staff read the slides and document findings on the electronically generated answer forms before the arrival of the supervisors. During the OTSS visit, laboratory supervisors read the slides themselves and provided feedback and mentoring to laboratory staff based on the answers they reported. This helped build skills in identification of various species—including *Plasmodium malariae*, *Plasmodium ovale*, and low level parasitaemia—and in parasite quantification. PT results indicated that 11 out of 27 (41 percent) facilities reached the target of ≥ 80 percent for parasite detection, 4 out of 27 (15 percent) reached the target of ≥ 80 percent for species identification, and 11 out of 27 (40.7 percent) met the target of ≥ 40 percent for parasite quantitation.

- Supported the NMCP to develop and finalize the national QA manual for malaria microscopy and RDT use in Ghana by providing technical input during the development and review stages. The manual is currently being printed for distribution nationwide.
- Successfully completed the final stage of establishing a NAMS. The two-step process for WHO slide bank validation protocol, which included molecular analysis of all blood donors by PCR (completed in PY3), and microscopic validation of blood donors by six WHO L1 microscopists (two slides/reader) were finalized in PY4. Currently, the slide bank is hosted in KHRC. In PY5, standard operating procedures (SOPs) to guide the operational management of the bank will be finalized in collaboration with the NMCP, CLU, and KHRC. It is expected that the NAMS will be used for refresher training, PT, and other QA activities. In PY5, KHRC will be supported to obtain species uncommon in Ghana, such as *Pv*, to include in the bank to improve microscopist skill in species identification.

Objective 2: Scale up and improve access and availability to high-quality malaria treatment with a focus on the lower health facility level.

- Conducted malaria case management and RDT training for 492 newly posted health care workers, including clinical nurses, medical doctors, and physician assistants. The one-day training included modules on uncomplicated and severe malaria, malaria in pregnancy, and RDT use. Overall post-test scores showed an increase over the pre-test scores by 13 percentage points, from 69 percent at pre-test (median 71 percent; range 23 percent to 93 percent) to 82 percent at post-test (median 83 percent; range 20 percent to 99 percent). See Figure 31 below for a summary of performance by region.

Figure 31. Regional pre- and post-test scores, malaria case management training for new Ghana Health Service staff, Ghana (n=478).



- Conducted refresher training for 685 clinical and M&E OTSS supervisors, who make up 112 district and 5 regional supervision teams. Held in 19 sessions, the two-day refresher training included practical sessions on RDT use and appropriate waste disposal, supervision and mentoring skills, clinical management of malaria, and data management. During the sessions, end-user training on the EDS was introduced. Knowledge and skills in all four areas of the training—case management, RDT use, supervision skills, and data management—were assessed. In general, the mean pre-test score of 72 percent and median score of 76 percent, increased to post-test mean and median scores of 81 percent and 83 percent, respectively. The greatest change in average score from pre- to post-test was in supervision skills, which increased from 63 percent (mean 67 percent; range 0 to 100 percent) to 77 percent (median 79 percent; range 16 to 100 percent).⁴ See Table 14 below for a summary of performance scores by indicator.



Refresher training for clinical outreach training and supportive supervision (OTSS) supervisors using the electronic data system (EDS).

Photo credit: MalariaCare Ghana

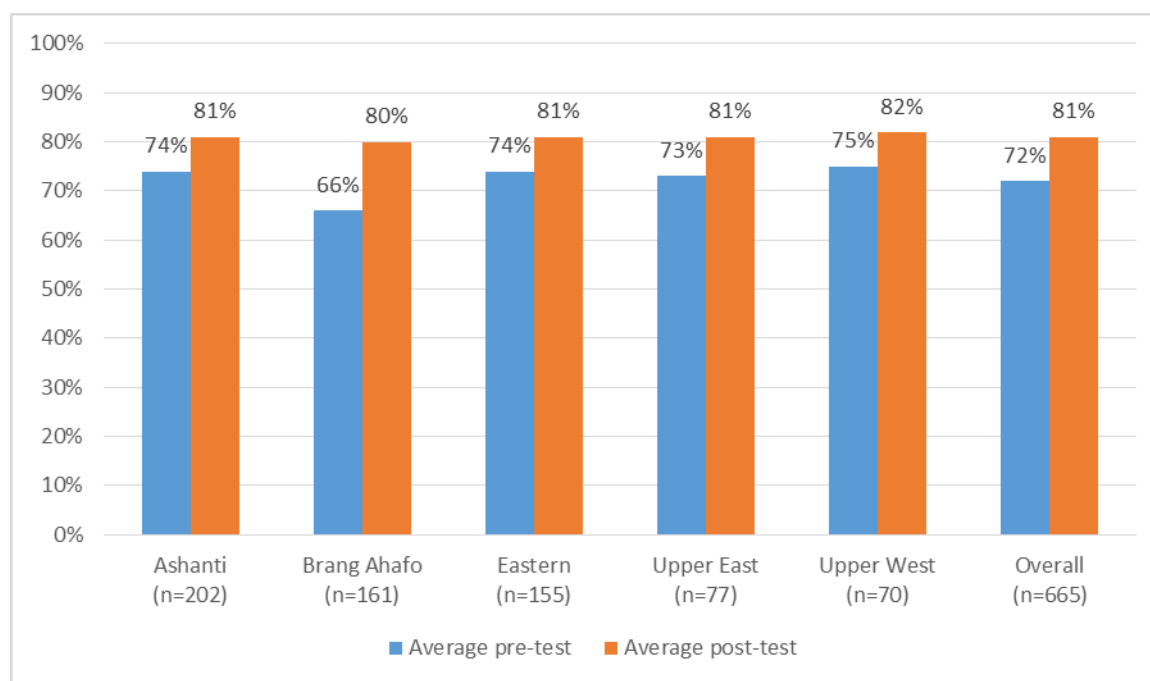
⁴ Some participants returned pre-tests with blank or incomplete sections, leading to some zero scores.

Table 14. Average performance scores by area, clinical and monitoring and evaluation (M&E) supervisor training, Ghana.

Indicator	Pre-test mean (median [range])	Post-test mean (median [range])	Mean improvement by percentage point
Case management (n=665)	72% (76% [0%–98%])	81% (83% [2%–100%])	9
Rapid diagnostic test use (n=671)	82% (83% [0%–100%])	91% (94% [28%–100%])	9
Supervision skills (n=673)	63% (67% [0%–100%])	77% (79% [16%–100%])	14
Data management (n=673)	60% (63% [0%–100%])	70% (74% [5%–100%])	10

Supervisor performance across regions tended to be uniform, with pre-test scores between 72 percent and 75 percent in all regions except Brong Ahafo, which had a slightly lower overall pre-test score of 66 percent. In all regions, post-test performance improved to at least 80 percent. See Figure 32 below for a breakdown of average pre- and post-test scores on case management by region.

Figure 32. Average case management pre- and post-test scores for clinical supervisors, Ghana (n=665).



- Supported five regions to conduct two rounds (Rounds 5 and 6) of joint clinical and M&E OTSS. Each district supervision team (1 in each of the 118 districts) was made up of four individuals, including at least one health information officer and clinician (either a medical doctor or physician). Supervisors provided onsite support to facility staff in malaria data capture and reporting, clinical case management, RDT use, and general facility management. Regional teams provided backstopping support to the districts in supervising large facilities within the districts. A team of MalariaCare technical advisors provided support to selected district teams within the regions. During Round 5, internal server errors prevented some checklists from being uploaded onto the EDS database. Challenges were shared and solutions offered to improve the

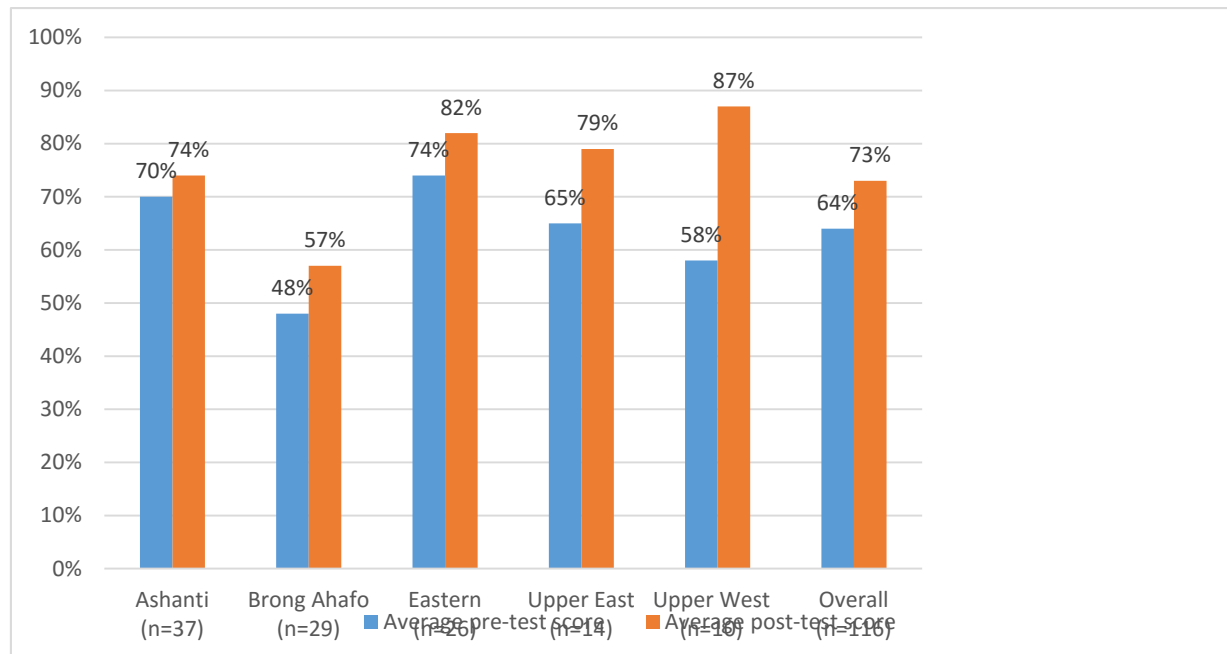
implementation of Round 6 by sharing a list of frequently faced challenges and their solutions with all supervisors.

- Supported the training of 256 medical school lecturers/preceptors from the medical schools at the University of Cape Coast, University of Science and Technology, University of Ghana, and University for Development Studies on the updated national malaria case management guidelines. Over the course of two days at each school, participants received training in uncomplicated and severe malaria, malaria in pregnancy, RDT use, biosafety/waste disposal, and epidemiology. This curriculum review was not conducted as planned at the University of Health and Allied Sciences because the medical school had not yet started training on clinical modules. Accordingly, the curriculum review and update training will occur in PY5.
- Finalized and released an Android application that provides malaria case management training material, such as guidelines, protocols, and job aids. This application is now available for free download by supervisors, tutors, students, and health care providers to use as a convenient, portable reference library during practice. Following the launch of the app, MalariaCare will informally evaluate the update and usefulness of the application in consideration of rolling out a similar approach in other project countries.
- Conducted an assessment of the participants of the community health officer (CHO) internship program that was implemented in PY3, with the objective of measuring the quality of health care delivered. The CHO's impressions of the program and adherence to malaria test results were assessed through a checklist and review of patient records prior to and after the training. Findings from the assessment of the CHO internship program demonstrated improvement in adherence to malaria diagnostic testing prior to treatment. Adherence of CHOs to negative test results for malaria increased from 78 percent prior to CHO internship to 100 percent after training. The assessment and feedback provided by CHOs indicate that the internship program had a positive impact on CHOs' approaches to managing febrile illnesses, and consequently the health outcomes of their clients.

Objective 3: Improve the accuracy, reliability, and availability of health information management systems.

- Trained a total of 116 district health information officers on malaria data management at the health facility level. This training included modules on completion of consulting room registers, use of malaria reporting forms, and conducting of data quality audits. Post-test performance increased to 73 percent (median score 79 percent; range 6 percent to 100 percent) from 64 percent (median 63 percent; range 0 to 95 percent) during pre-test (see Figure 33 below).

Figure 33. Pre- and post-test results, health information officer data management training, Ghana.



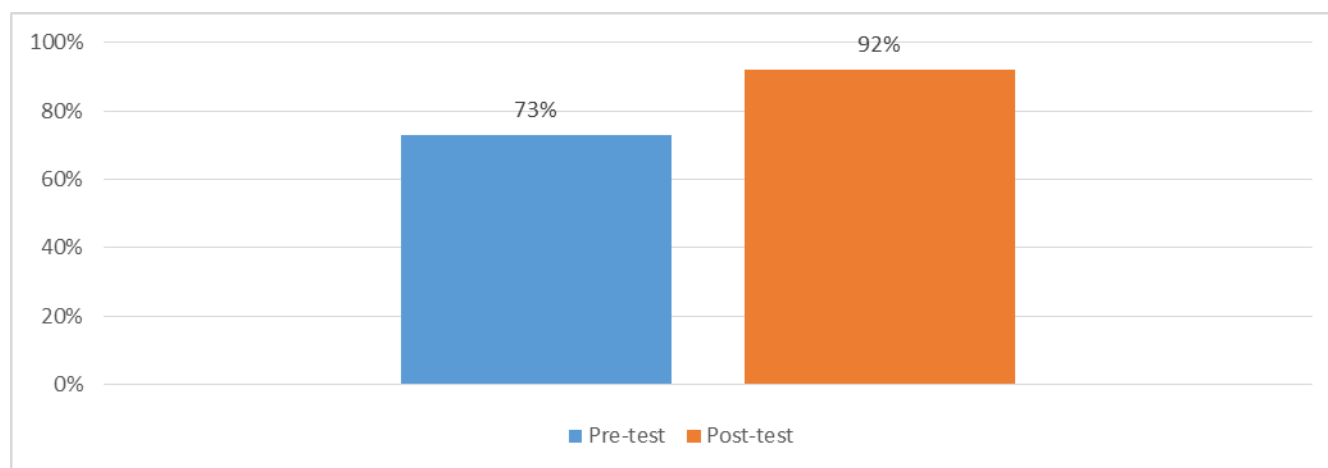
- Trained a total of 685 supervisors on accurate completion of the consulting room register and use of EDS during joint clinical/M&E supervisor training. Knowledge and skills gained in the data management training module (consulting room register completion and EDS) increased from an average pre-test score of 60 percent (median score 63 percent; range 0 to 100 percent) to 70 percent (median 74 percent; range 0 to 100 percent) at post-test. Supervisors also received refresher training on data quality management and improvement at the facility level.
- To improve the quality of malaria data captured and reported by health information officers and data managers at the health facility level, MalariaCare worked with the NMCP to develop a malaria data management job aid. This job aid is currently undergoing the finalization and approval process at the NMCP.
- In PY4, MalariaCare rolled out the use of EDS to conduct clinical and M&E OTSS for two rounds (Round 5 and Round 6). During each round, supervisors are instructed to visit 80 percent of the OTSS-eligible facilities in each of their districts, and visit all eligible facilities over the course of two sequential rounds. In PY4, a total of 1,937 unique facilities were visited, which represents approximately 7 percent of all health facilities in Ghana, or 60 percent of the facilities in the five regions where MalariaCare works (Ashanti, Brong Ahafo, Eastern, Upper East, Upper West).^{5,6}
- Provided EDS data user training to district health information officers, clinicians, and the district director of health services (Figure 34). Participants trained on reviewing, editing, analyzing, and using OTSS data in the EDS DHIS2 platform. A total of 301 data users were trained, with participants improving from a pre-test

⁵ US President's Malaria Initiative. Ghana Malaria Operational Plan FY2016

⁶ Ghana Health Service. Health Sector in Ghana, Facts and Figures 2010, Retrieved October 26, 2016 from <https://s3.amazonaws.com/ndpc-static/CACHES/NEWS/2015/07/14//2010+GHS+Facts+and+Figures.pdf>

score of 73 percent (median 75 percent; range 0 to 100 percent) to a post-test score of 92 percent (median 95 percent; range 60 to 100 percent).

Figure 34. Average performance of OTSS supervisors during EDS data utilization training, Ghana (n=290).



During OTSS visits, M&E supervisors provided onsite mentoring to data managers at 1,582 (Round 5) and 1,415 (Round 6) health facilities. In addition to providing coaching on malaria reporting and routine systematic M&E issues, supervisors also conducted data verification exercises on select malaria indicators that are routinely captured in Ghana’s health management information system, DHIMS2. (See Figure 35 for trend analysis of data accuracy for facilities visited in Round 5 and Round 6).

- Supervisors provided informal training to health care workers on the correct use of multi-use buffer RDT kits during OTSS visits. These kits, which were introduced in Ghana late in PY3, include large bottles of buffer intended to be used for multiple RDT cassettes, instead of single-use buffer as previously supplied.
- Supported the introduction of a standardized clinical notes form during OTSS visits. The clinical supervisor provided onsite coaching on the appropriate use of the form as a guide to identify other causes of febrile illnesses. A total of 4,300 laminated copies of the standardized clinical notes were distributed to guide clinicians in lower-level facilities in properly and fully completing clinical notes for each patient. In addition, 2,000 flow charts to assist in the diagnosis and proper treatment of malaria were distributed to facilities during clinical OTSS visits.

Objective 4: Strengthen technical management ability at the regional level for implementing programs and activities.

- Conducted one-day joint work planning sessions with the regional health management team (RHMT) in each of the five MalariaCare-supported regions between October and November 2015. These joint work planning sessions were used to obtain buy-in from each RHMT for MalariaCare activities, and to develop joint activity implementation plans to ensure that the RHMTs are aware of and available for MalariaCare activities. Increasingly, these meetings have been used to work with RHMTs on their activity planning and implementation skills, for eventual transition of activity support from implementing partners to the regional government. MalariaCare also participated in 2015 annual and 2016 mid-year performance review meetings

in each region, where the team worked with stakeholders and established relationships with other implementing partners of the same area.

- Following joint clinical/M&E OTSS Round 5, LLWs were held in each of the project's five focus regions (including two sessions each in Ashanti, Brong Ahafo, and Eastern regions due to their size) to discuss OTSS data for decision-making, share lessons learned, agree on how to follow-up on action plans to ensure that the gaps identified during OTSS visits are addressed, and plan for the next round of clinical/M&E OTSS.



Participants in one LLW session in Kumasi, Ashanti region.

Photo credit: MalariaCare Ghana

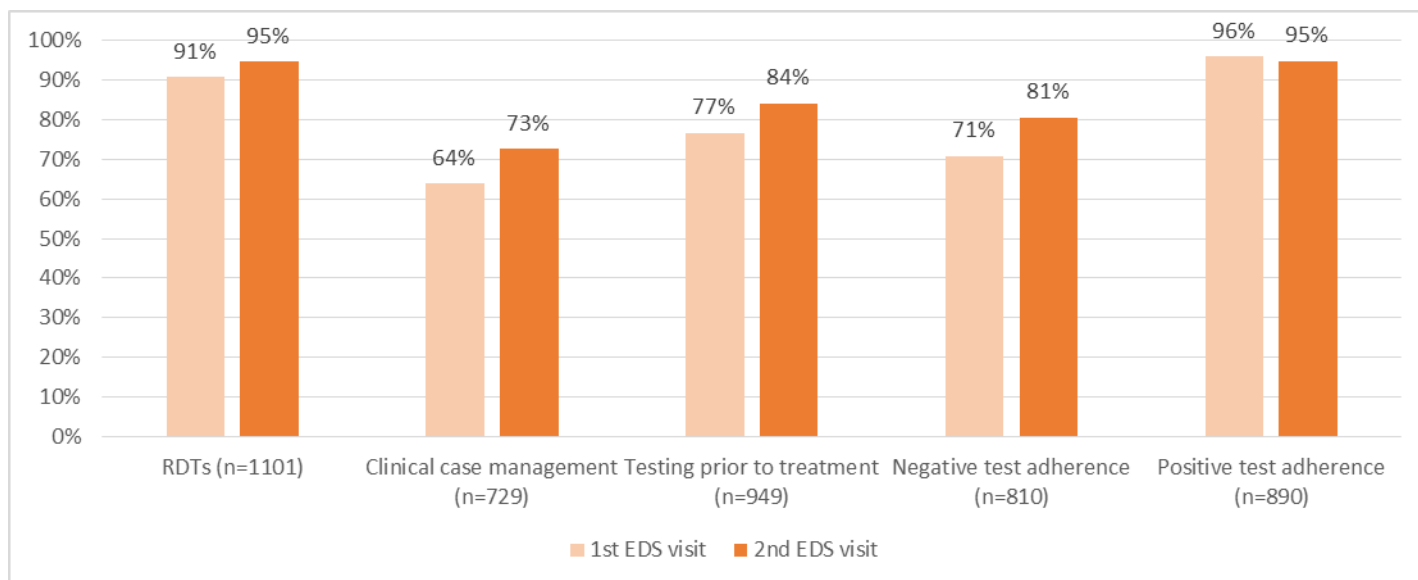
- A total of 353 regional and district OTSS supervisors participated in these LLWs. At the LLW, those district supervisors who participated in EDS data user training prepared and presented the OTSS performance data from their district to the group, using the EDS dashboard in DHIS2. These workshops were also used to foster closer relationships with the RHMTs in order to discuss and address challenges identified at the facility level, such as poor data management, stock-outs of malaria commodities, and needs for refresher training for staff and regular supervision.
- Contributed technical input to the NMCP by participating in multiple NMCP subcommittee meetings, including the case management working group, malaria in pregnancy working group, and M&E working group. During these meetings, MalariaCare representatives provided activity updates and contributed to the revision of policy documents and work plans. Participating in these working groups encourages stronger collaboration and harmonization of activities with the NMCP and other implementing partners.

Progress made on key MalariaCare indicators

Trend data

- Figure 35 and Figure 36 summarize improvements among facilities that received two clinical and M&E OTSS visits using the EDS tool (i.e., during the EDS pilot including ten districts; Round 5, and Round 6). Since supervisors are requested to visit 80 percent of facilities in each round and cover all facilities over the course of two rounds, a minimum of 60 percent of facilities are expected to have trend data for any two sequential rounds. Of the 1,937 facilities, trends could be calculated for only a portion of facilities, ranging from 38 percent (for clinical case management) to 58 percent (for RDTs). A disproportionate number of clinical supervisors had issues with pushing data during Round 5, which was later rectified in Round 6. Among these facilities, improvement was found for four out of five of MalariaCare's key indicators pertinent to clinical/M&E OTSS with positive test adherence remaining high between the two rounds. Notably, the proportion of facilities meeting the overall target for negative test adherence increased from 71 to 81 percent.

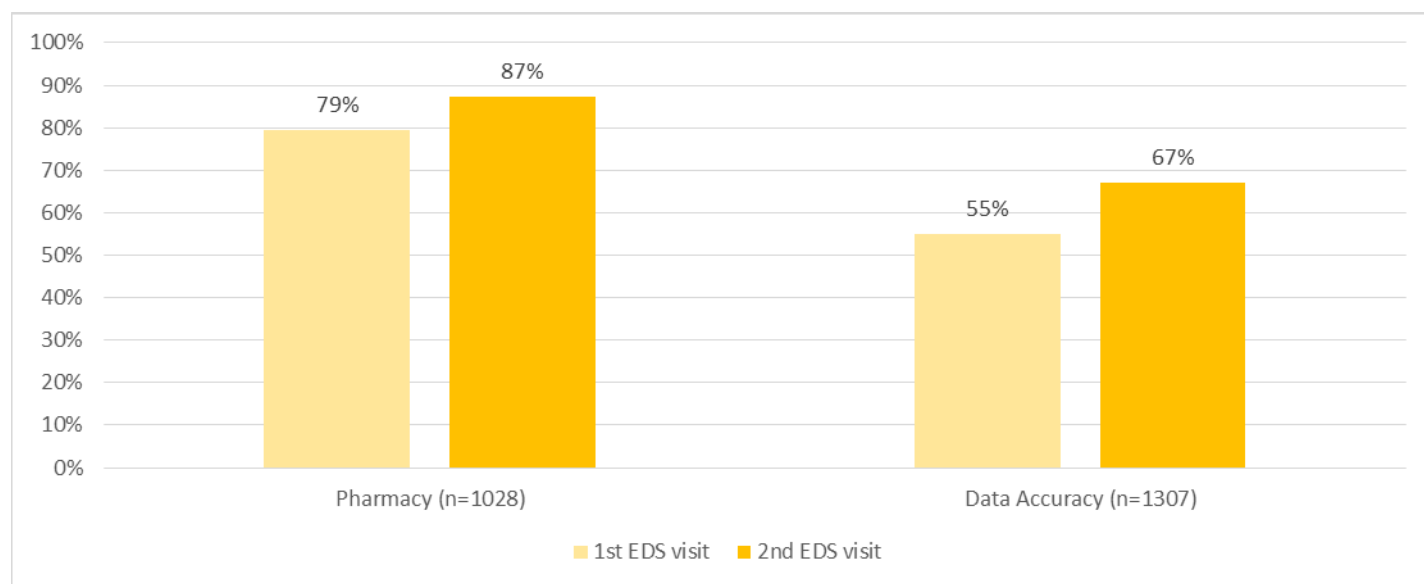
Figure 35. Proportion of health facilities meeting minimum performance target (75%) on competencies, and overall target on register measures (90%), 1st EDS visit versus 2nd EDS visit, Ghana.



- In addition to conducting clinical and M&E supervision, a pharmacist on the clinical/M&E OTSS supervisory team also assesses the state of the pharmacy and observes prescriptions being dispensed,⁷ while a district health information officer compares malaria-related patient figures in the registers with those entered into the district health information management software, version two (DHIMS2). Of the 1,937 facilities visited using EDS, 1,028 facilities (54 percent) had pharmacy observation scores for two rounds, and 1,307 facilities (or 68 percent) had data accuracy scores for two rounds. Improvement was seen among these groups of facilities as follows (Figure 36): By the second EDS-based visit, the proportion of facilities where pharmacy staff performed all of the checklist steps correctly increased from 79 percent to 87 percent. Similarly, the proportion of facilities, where all four indicators on malaria entered into DHIMS2 (uncomplicated malaria suspected; uncomplicated malaria suspected tested; uncomplicated malaria suspected tested positive; and outpatient department (OPD) malaria cases prescribed ACTs) match the registers within 10 percent, increased from 55 percent during the first EDS visit to 67 percent during the second.

⁷ Steps included in the pharmacy observation are: 1) clearly and meaningfully writes dosage on dispensed medication; 2) explains how to take the medication; 3) checks whether the patient has understood how to take the medication; 4) advises patient on potential side effects of the medication; and 5) observes first dose of antimalarial in the facility (if patient is under five years).

Figure 36. Proportion of facilities obtaining perfect pharmacy observation and data accuracy scores, 1st EDS visit versus 2nd EDS visit, Ghana.



Most recent visit

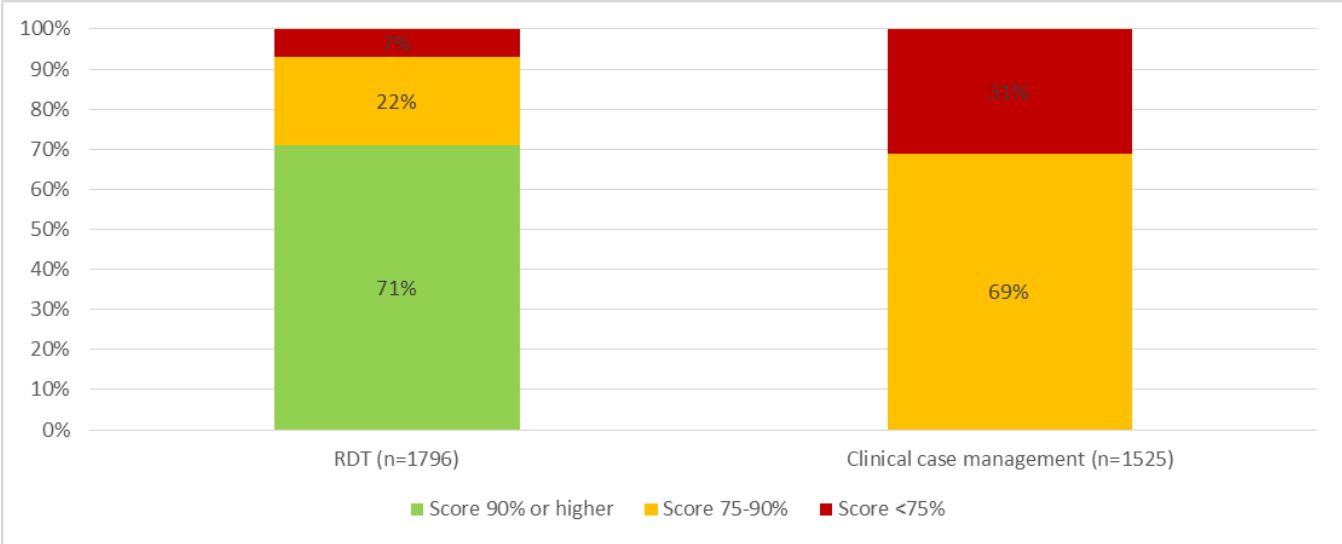
Performance on key competencies

Figure 37 and Figure 38 summarize performance on key competencies and adherence during the most recent visit, for all facilities with available data visited in PY4 (i.e., Round 5 and Round 6). At the time of writing, supervisors visited and sent EDS results for 1,910 facilities during these two rounds.

RDT performance could be calculated for 1,796 facilities (94 percent of facilities visited in PY4). Overall, RDT scores were high among these facilities, with 71 percent meeting the overall performance target. Performance on each step in the checklist was high: average health facility performance was over 80 percent, with the exception of labeling the cassette and documenting when the buffer is added (average performance was 74 and 71 percent, respectively).

Figure 37 also summarizes the score breakdown among facilities with available clinical case management scores (n=1,525, or 80 percent of facilities visited). Strikingly, although the majority of these facilities (69 percent) scored at the minimum performance target, no facilities met the overall performance target of 90 percent. These results indicate that although the most important (i.e., “minimum standard”) steps, such as ordering a malaria test or prescribing in line with the diagnosis, are done correctly most of the time, health providers at OTSS facilities rarely conduct a comprehensive physical exam or general history. For example, average facility performance on checking the patient’s heart rate was 57 percent; and performance for asking whether the patient was pregnant (if the patient was a female of reproductive age) was 55 percent. Despite these results, the trend analysis of a subset of facilities with data over two visits (Figure 35) indicates that clinical case management can improve with sequential visits, and supervisors will be encouraged to continue mentoring on steps that are key for properly diagnosing febrile illnesses.

Figure 37. Proportion of health facilities meeting minimum (75%) and overall (90%) performance targets on RDT and clinical case management competencies during the most recent OTSS visit, Ghana.

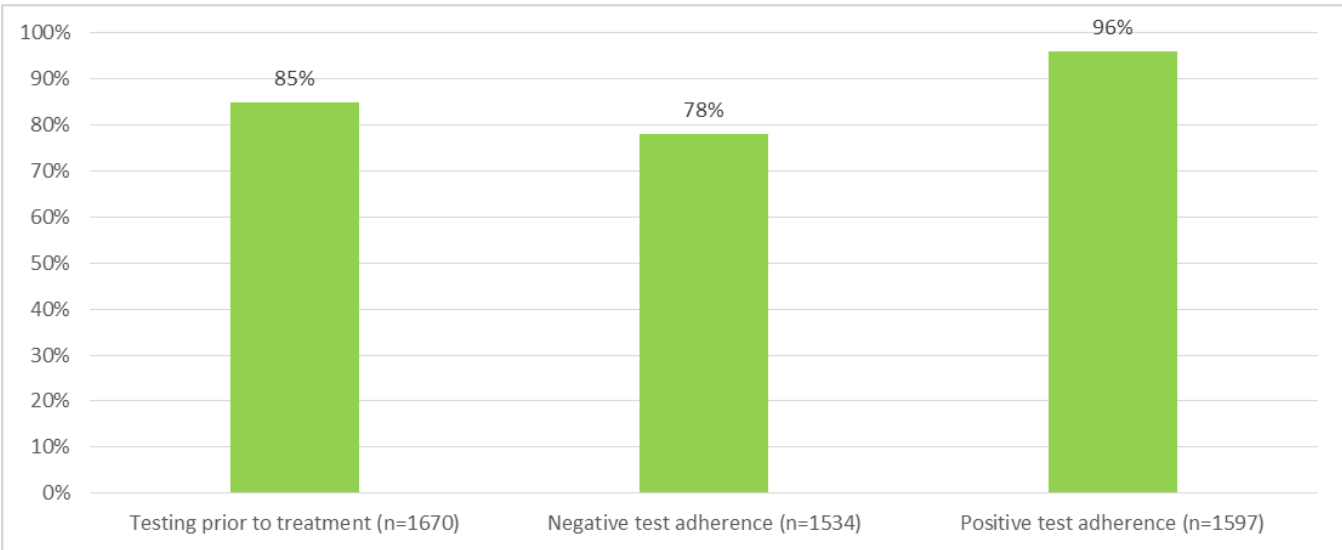


Note: Due to rounding, percentages presented here may not sum to 100%; and the proportion of facilities meeting the minimum performance target is most accurately calculated as 100% minus the number reported as not meeting the minimum performance target (i.e. scored below 75%).

Measures of adherence

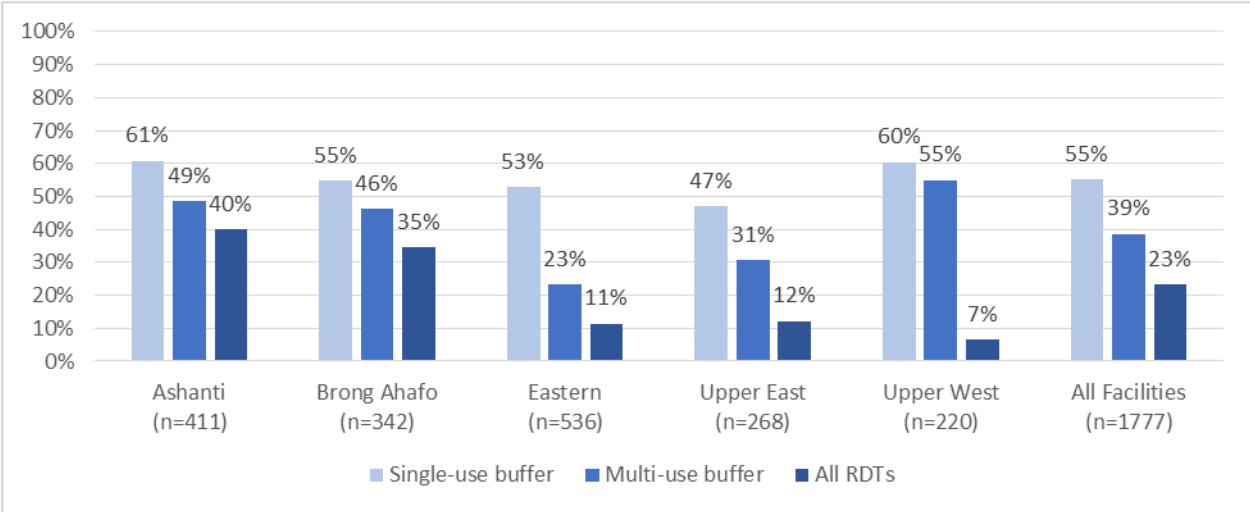
Figure 38 below summarizes OTSS performance for MalariaCare’s three measures collected from the register review. Data availability ranged from 1,534 facilities (or 80 percent of facilities visited in PY4) to 1,670 facilities (87 percent). Of the facilities, 85 percent met the target for testing before treatment (i.e., a test result was found for 90 percent or more of ACT prescriptions sampled). Similar to other countries, adherence to positive test results scores better than adherence to negative test results: 96 percent of facilities met the target for the former, whereas 78 percent for the latter.

Figure 38. Proportion of health facilities meeting overall performance target (90%) on testing before treating and adherence to test results during the most recent OTSS visit, Ghana.



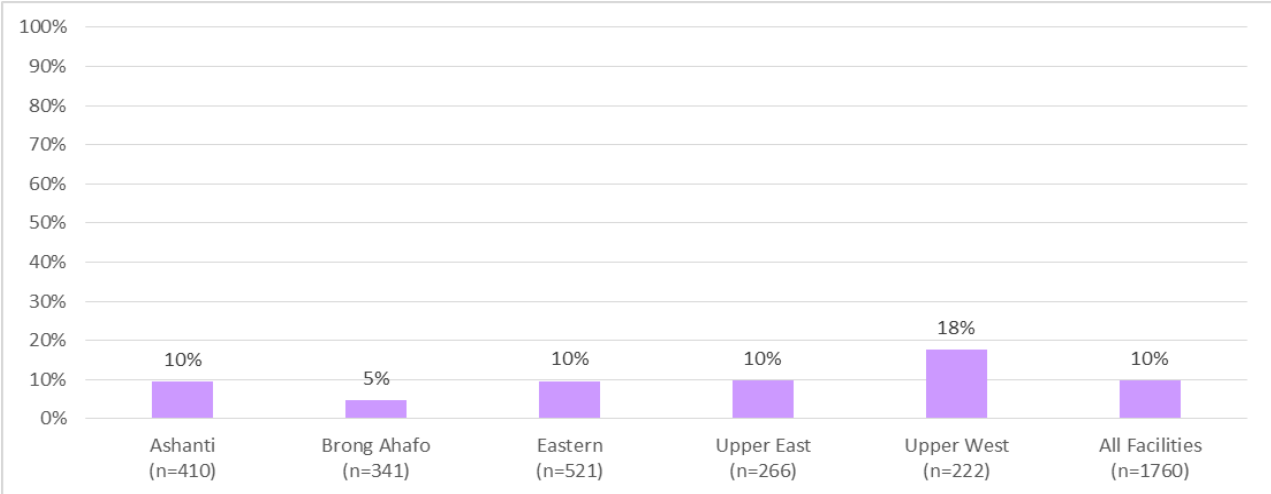
Beyond provider attitudes and record-keeping practices, performance on testing prior to treatment may also be affected by stock-outs of RDTs (Figure 39). Across all five regions, 23 percent of facilities visited in PY4 reported a stock-out of RDTs (both single- and multi-use buffer kits); however, this ranged from 7 percent in Upper West to 40 percent in Ashanti. Notably, Ashanti also had the lowest proportion of facilities meeting the testing prior to treatment target (69 percent of facilities met the target, compared with 85 percent of all facilities in Ghana).

Figure 39. Proportion of facilities reporting stock-outs of single-use and multi-use buffer RDTs lasting more than 7 days in the 3 months prior to most recent OTSS visit, by region and overall, Ghana.



Similarly, significant stock-outs of ACTs may impede the ability of providers to prescribe them for each and every positive test result. Figure 40 presents the proportion of facilities reporting significant stock-outs of a first-line ACT (artemether-lumefantrine, artesunate-amodiaquine, or dihydroartemisinin-piperaquine). ACT stock-outs were less frequent than those for RDTs, with 10 percent of facilities visited reporting a stock-out. However, although Upper West region reported the lowest rate of RDT stock-outs, it also reported the highest rate of ACT stock-outs (18 percent). This region also had a slightly lower proportion of facilities meeting targets for adherence to positive test results than any other region (90 percent, compared to 96 percent overall).

Figure 40. Proportion of facilities reporting stock-outs of a first-line ACT lasting more than 7 days in the 3 months prior to most recent OTSS visit, by region and overall, Ghana.



Taken together, it appears that stock-outs may influence MalariaCare’s indicators on testing prior to treatment and adherence to positive test results, since the regions reporting stock-outs most frequently also have lower average scores. However, the reverse (fewer stock-outs and higher scores) is not always true, indicating that there is still a need for supervisors to investigate the specific issues at each facility that prevent universal testing and treatment.

Challenges

Challenge	Solution
Competing activities in some districts delayed clinical/M&E OTSS Round 6 visits.	MalariaCare will plan with regions and districts to start activities earlier and give them adequate time for completion of OTSS
Challenges in pushing data to the EDS server following clinical/M&E OTSS visits.	Utilized new social media tools, such as chat groups for all supervisors, to enable MalariaCare staff to respond quickly to challenges and questions. This also facilitated rapid dissemination of resolutions to problems to other teams. In the next round of OTSS, an upgraded version of the EDS app (E2) will be introduced, which should address the majority of data pushing issues encountered by supervisors that visit areas with low connectivity.
The erratic supply of RDT kits affects the ability of facilities to sustain momentum in systemization of test-based treatment for malaria.	MalariaCare provided stock-out data collected during OTSS to the NMCP to enable them to work with relevant partners to ensure regular availability of RDT kits in facilities across regions and districts.

Next steps

As the current cooperative agreement concludes in September 2017, MalariaCare will initiate and complete a phase-out process for all national-, regional-, and district-level program activities in PY5.

- In PY5 MalariaCare will continue implementing its QA strategy to maintain gains made in key case management diagnostic and clinical indicators. Based on lessons learned, the project will continue to strengthen and incorporate key components to maximize outcomes. Through support to KHRC, this includes expansion of the NAMS slide set to include other species to serve as a tool to train microscopists, and build supervisor skills to mentor health workers.
- In PY5, the project will share lessons learned through peer-reviewed publications. Two manuscripts have been developed, and the in-country and HQ teams will work together to coordinate additional publications prior to project close-out.
- MalariaCare will initiate and complete a phase-out process for all national-, regional-, and district-level program activities in PY5, with transition of activities that can be taken on by the government, or other NGOs or bilateral partners.
- Specifically, MalariaCare will work with the GHS at national and regional levels to identify opportunities to transition responsibility for implementation of malaria case management QA activities to the NMCP; ICD; Policy, Planning, Monitoring and Evaluation Division; and other implementing partners.

- Also as part of the phase-out and transition process, MalariaCare will work closely with the NMCP and RHMTs to transition the EDS for continued use during joint clinical and M&E OTSS following project close-out. We will continue to build skills of staff in PY5 to use the tool in the field, transfer data, analyze data, and use it for decision making at all levels.
- Compile all project tools, such as training materials, manuals, guidelines, standard operating procedures, OTSS checklists, and job aids for turnover to the NMCP, CLU, and other implementing partners.

Guinea

Introduction

MalariaCare has been active in Guinea since PY1. It continued operations until late in PY2, when the Ebola virus outbreak required a diversion of the country’s resources for health toward fighting the epidemic. In addition, due to transmission risk by blood exposure, national policy during this period specified use of clinical criteria alone for diagnosis of malaria—which is expected to have resulted in a loss of some diagnostic capacity due to lack of practice. In May and June 2016, MalariaCare worked with the NMCP and the PMI partner StopPalu to bring diagnostic services at the national and regional levels back to former standards, or better, before closing out operations in the country. MalariaCare supported laboratory supervision visits at nine targeted national and regional hospitals across the country.



A master trainer consultant from Université Cheikh Anta Diop (Cheikh Anta Diop University, or UCAD) led a basic MDRT; delivered a validated collection of malaria slides for proficiency testing and provided training in how to manage such a collection; and transferred the materials and training content to the StopPalu project and the NMCP.

Key accomplishments

Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent.

- In order to rebuild diagnostic capacity within Guinea, MalariaCare supported a six-day onsite training to refresh the microscopy skills of key national and regional laboratory microscopists, with support from the NMCP and StopPalu. The program was based on a modified version of the basic MDRT course with added components on instruction and supervision skills. The training included 20 trainees from the National Reference Laboratory at the central level, and regional-level microscopists from regional health management teams and/or from regional teaching hospitals (Kindia, Labe, Boke, Faranah, Mamou, Kankan, and N'Zérékoré). The first four days of training were dedicated to microscopy and RDT skills improvement. Basic microscopy skills were updated—with an emphasis on proper malaria slide production, parasite detection, species identification, and parasite quantification. Participants were trained in the proper use of RDTs and

clinical use of the diagnostic test results. Day five of the training was dedicated to supervision and mentoring skills. The trainees were taught to use a standardized clinical checklist, observe laboratory practices, provide mentoring feedback and develop actionable improvement plans. On day six, participants practiced their skills in teams of two to four during a field visit to local Conakry health facilities.

- Class scores were used to evaluate overall performance and to identify gaps in knowledge. Passing scores for each indicator are consistent with WHO guidelines (Malaria Microscopy Quality Assurance Manual, version 2: 2015). For WHO L1, passing scores for each indicator were: ≥ 90 percent for parasite detection, ≥ 90 percent for species identification, and ≥ 50 percent for density. For WHO L2, passing scores for each indicator were: ≥ 80 percent for parasite detection, ≥ 80 percent for species identification, and ≥ 40 percent for parasite counting. Significant improvements were made in parasite detection, species identification, and parasite counting.

Of all 20 participants, three attained the competency standards for expert microscopists at a WHO L1, one for WHO L2, two for WHO L3, and the remainder achieved WHO L4 (see Table 2 for WHO equivalent score summary). However, when supervisor competency is assessed for only parasite detection, 60 percent of participants obtained L1 equivalent scores, and 25 percent attained L2 equivalency. Species identification and parasite counting have been identified as challenges in Guinea, as in other countries. Species identification is generally not a part of routine practice and is difficult to master during a one-week MDRT course. During this training, the average score for species identification increased from 29 percent at pre-test (median 27 percent; range 0 to 59 percent) to 50 percent at post-test (median 39 percent; range 23 to 91 percent), with 15 percent of participants attaining L1 and 20 percent attaining L2. Parasite counting scores had significantly increased by 50 percentage points, from 13 percent at pre-test (median 0; range 0 to 50 percent) to 63 percent at post-test (median 63 percent; range 0 to 100 percent). Table 15 below provides additional information on pre- and post-test results.

Table 15. Basic malaria diagnostics refresher training (MDRT) microscopy practical pre- and post-test results, Guinea (n=20).

Competency area	Average pre-test score (median [range])	Average post-test score (median [range])	Percentage point change in score
Parasite detection	64% (73% [0%–91%])	89% (91% [64%–100%])	25
Species identification	29% (27% [0%–59%])	50% (39% [23%–100%])	21
Parasite counting	13% (0% [0%–50%])	63% (63% [0%–100%])	50

These participants also underwent two days of OTSS supervisor training. During this training, participants were given an orientation to OTSS objectives, mentoring strategies, the roles and responsibilities of supervisors, and the OTSS checklist. A field test was also conducted to allow supervisors to practice implementing what they had learned and to familiarize themselves with using the checklist in a real-time setting. In a knowledge assessment of the materials covered on mentoring and OTSS, the average score increased by 22 percentage points, from 62 percent (median 60 percent; range 40 to 85 percent) at pre-test to 84 percent at post-test (median 85 percent; range 70 to 90 percent). These participants could be selected to conduct the OTSS at the central level or regional level.

Objective 2: Increased percentage of patients suspected to have malaria or a febrile illness who receive a diagnostic test for malaria.

No activities under this objective in PY4.

Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illness—consistent with the result of the diagnostic test.

No activities under this objective in PY4.

Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.

- Procured 20 sets of standardized malaria slides for use in ongoing training and proficiency testing by the national program. Approximately 300 slides consisting of varying malaria parasite species and densities were prepared by UCAD in Senegal under WHO protocols for slide banking. Species identification of slide bank donors was confirmed by PCR (conducted at UCAD) and parasite densities were validated by six WHO L1 microscopists from the RITM in Manila, the Philippines.

Following delivery of the slide sets, a consultant master trainer from UCAD provided a one-day training on the implementation and long-term care of the slide sets, and their management using a Microsoft Access database. The training was provided to five participants, one from StopPalu and four from the NMCP. The MalariaCare consultant also provided a one-day training on the malaria microscopy diagnostics QA to the same participants. A slide management database (Microsoft Access) and SOPs for slide management were handed over to the NMCP, and a brief tutorial was provided.

Key challenges

Key challenge/lesson learned	Solution
The absence of any MalariaCare staff based in Guinea made arrangements for the training difficult.	MalariaCare contacted the StopPalu project in Conakry and enlisted their support in making local arrangements for the training venue, hotel reservations, coffee break, and lunch for participants. Additionally, the MalariaCare consultant volunteered to carry the supplies needed for training activities, including arranging for the printing of manuals and bench aids in Dakar, Senegal.

Summary of MalariaCare achievement over the life of the project

MalariaCare’s main objective in Guinea has been to work with the NMCP and bilateral project StopPalu to start up and implement a joint clinical and laboratory OTSS scheme at national and regional hospitals nationwide. MalariaCare’s focus is on the laboratory side, and StopPalu’s focus is on managing the clinical side. Due to the Ebola virus outbreak, national resources for health were diverted toward the crisis and stretched the health system beyond its capacity to provide even basic care. As a result, MalariaCare’s activities were placed on hold in late PY2. Activities resumed in the second half of PY4 with the goal of bringing national laboratory capacity back to pre-Ebola epidemic levels.

Activity/training	Outcome
MDRT for 45 national and regional laboratory microscopists.	Created a cadre of national and regional microscopy experts who can be called upon to support OTSS and diagnostics refresher training nationwide.
OTSS supervisor training for 19 national and regional clinical and laboratory experts.	Created a team of national clinical and laboratory supervisors to provide onsite mentoring and training to health facility staff during OTSS.
CCMRT for 11 regional clinicians.	Created a cadre of expert clinicians who are trained on the most up-to-date national case management policy. These experts can now be called upon to act as clinical OTSS supervisors.
Laboratory OTSS at the national hospital and eight regional hospitals expanded to joint visits for Round 2 and Round 3.	Conducted the first three rounds of the national OTSS scheme, providing onsite mentoring
National OTSS scheme.	Created the supervision tool and training materials for a joint clinical and laboratory OTSS scheme, in close collaboration with the NMCP and StopPalu project.
National PT scheme.	Supported the NMCP to implement a PT scheme to develop and maintain high-quality microscopy skills for laboratories nationwide.

NOTE: MDRT=malaria diagnostics refresher training; OTSS=outreach training and supportive supervision; CCMRT=clinical case management refresher training; NMCP=national malaria control program; PT=proficiency testing.

Recommendations

- It is recommended that future OTSS diagnostic supervisors be selected based on their practical microscopy skills, ability to mentor, and their availability to provide ongoing training-of-trainers and conduct OTSS at the central and regional levels for the next few years. Performance during prior MDRT and supervisor training could be reviewed and used as criteria for selection to continue as supervisors and trainers. It is specifically recommended that MDRT post-test scores of WHO L1, L2, or L3 equivalence and supervisor training post-test scores of 75 percent or higher be used as criteria for continuation.
- Joint clinical and laboratory OTSS is best conducted two to four times per year with a combined laboratory and clinical supervisor team. It is recommended that, following OTSS rounds, the NMCP carry out LLWs with the national and regional teams; this would allow them to provide regional-level feedback and recommendations for the improvement of the QA system and short-term action plans to correct systemic issues.

Transition and sustainability

- At the end of the MDRT and slide management training, the MalariaCare consultant formally transferred MalariaCare’s training and supervision resources to StopPalu and the NMCP. The NMCP can now use these materials to continue to provide MDRT and supervision skills training in the country, either directly or

through an implementing partner. Additionally, the NMCP now has the capacity to use the standard training slide sets for proficiency testing for malaria microscopists at the central and regional levels.

- The following documents, materials, equipment, and supplies were provided to NCMP, StopPalu, and the USAID Mission in Guinea:
 - MDRT training curriculum:
 - Agenda
 - Training manual
 - Materials and presentations
 - Scoring guide
 - Sample pre- and post-test
 - Tally counters for use during training
 - OTSS training curriculum:
 - Agenda
 - Training manual
 - Materials and presentations
 - Sample pre- and post-test
 - MalariaCare PowerPoint training slides for QA
 - Reference materials:
 - Bench aids
 - WHO Access Universal aux Tests de Diagnostic du Paludisme
 - WHO Basic Malaria Microscopy
 - WHO-validated slide bank
 - SOP of Access database for slide management
 - Software for Malaria Blood Slide Management (Access database)
 - Slide sheet information (result for the slide contained in the Malaria Slide Bank)
 - Slide barcode reader
 - Laboratory supplies:
 - pH paper
 - Sharps container
 - Giemsa Stock 1 Liter
 - Gloves
 - Microscopes cleaning papers
 - Lancets B/200
 - Pasteur pipets
 - Bin
 - Slides boxes B/100

- Assessment copy
- Air fan
- Electric cords

Kenya

Introduction

PY4 marked the first full implementation year for MalariaCare in Kenya. In this period, the project continued to work closely with the NMCP at the national level and health management teams in eight target counties to improve the quality of malaria diagnostic and case management activities in western Kenya. See Figure 41 below for a map of Kenya highlighting those eight intervention counties – Kisumu, Vihiga, Migori, Homa Bay, Kakamega, Siaya, Busia, and Bungoma.

Figure 41. Map of Kenya Counties



Project implementation was rolled out in three geographic distribution phases: Phase 1 was initiated at the start of PY4 and included Vihiga, Kisumu, and Migori counties. Phase 2 started midyear in Homa Bay and Kakamega counties. Phase 3 started toward the end of PY4 in Busia, Bungoma, and Siaya. Training and implementation of OTSS were done sequentially by phase, with implementation of two rounds of OTSS completed in Phase 1 and one round in Phase 2 counties. Phase 3 counties will conduct their first round of OTSS in early PY5. OTSS supervisors from all counties have completed supervision and technical training, which include advanced malaria diagnostics refresher training (aMDRT), clinical case management training, and OTSS supervision training.

Key accomplishments

Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent.

- To build microscopy skills for OTSS supervisors and facility laboratory staff, MalariaCare facilitated four advanced MDRTs for Phase 2 and Phase 3 counties, resulting in 53 technicians trained. Scores improved across all three competency areas (parasite detection, species identification, and parasite counting) from pre-test to post-test (see Table 2 for WHO equivalent score summary). During the training, two out of 53 participants (3 percent) met the WHO L1 or L2 standard for all three competency areas. For WHO L1, passing scores for each indicator were: ≥ 90 percent for parasite detection, ≥ 90 percent for species identification, and ≥ 50 percent for density. For WHO L2, passing scores for each indicator were: ≥ 80 percent for parasite detection, ≥ 80 percent for species identification, and ≥ 40 percent for parasite counting. Species identification was the biggest barrier, as only two participants met that standard (80 percent or above). When not considering species identification, 16 (21 percent) participants met the L1 or L2 standard for both parasite detection and parasite counting. See Table 16 for a summary of participant scores.



Busia County Director of Health during inaugural meeting with Phase 3 counties.

Table 16. Advanced malaria diagnostics refresher training (MDRT) microscopy practical pre- and post-test results, Kenya (n=53).

Competency area	Pre-test Mean (median [range])	Post-test Mean (median [range])	Average % point change in score
Parasite detection	75% (69% [21%–64%])	84% (84% [60%–100%])	9
Species identification	24% (22% [0%–60%])	45% (45% [21%–80%])	21
Parasite counting	8% (10% [0%–60%])	35% (33% [6%–80%])	27



NMCP Head of Diagnostics for Case Management taking participants through the training

- Performed six basic MDRTs (two per phase) in PY4 to update microscopy and RDT skills of 120 health facility laboratory staff in all eight target counties. Trainees were selected from high-volume health facilities that had no staff who had been trained on microscopy in the last two years and that had poor microscopy performance scores during OTSS.



Basic MDRT participants practicing slide development.

Overall scores improved across all three competency areas (parasite detection, species identification, and parasite counting) from pre-test to post-test (see Table 2 for WHO equivalent score summary). Of the 120 trainees, 71 (59 percent) met the L2 standard for parasite detection, which is the main competency of focus in bMDRTs (Table 17).

Table 17. Basic malaria diagnostics refresher training (MDRT) microscopy practical pre- and post-test results, Kenya (n=120).

Competency area	Pre-test	Post-test	Average % point change in score
	Mean (median [range])	Mean (median [range])	
Parasite detection	64% (67% [29%–94%])	81% (84% [35%–98%])	17
Species identification	21% (20% [0%–70%])	40% (39% [7%–83%])	19
Parasite counting	8% (0% [0%–50%])	38% (38% [0%–93%])	30

Objective 2: All patients suspected to have malaria or a febrile illness receive a diagnostic test for malaria.

- In PY4, the project provided technical assistance to the NMCP to develop and finalize the *National Quality Assurance Guidelines on Parasitological Diagnosis of Malaria*. MalariaCare will implement guideline updates as part of QA activities in PY5.

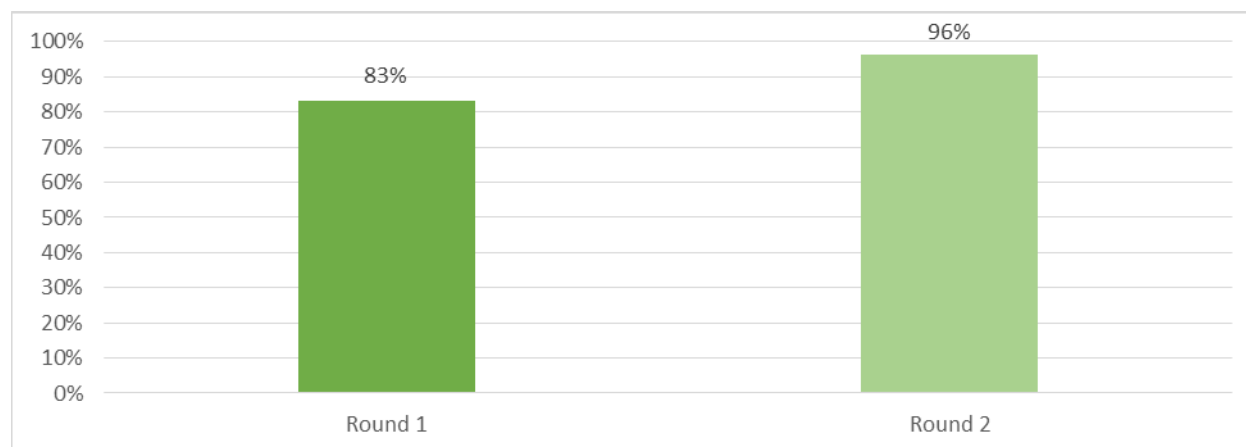
MalariaCare performed mRDT QA training in seven target counties—the exception being Siaya—with the different cadres trained as outlined in Table 18 below. Training for mRDT QA in Siaya, one of the Phase 3 counties, will be conducted in PY5.

Table 18. Health facility staff who completed mRDT QA training.

County		Nurses	Malaria Lab Techs	Clinical Officers	Pharm Technologist	Public Health Officer	Total
Bungoma	Male	8	6	1	1	0	16
	Female	14	5	0	2	0	21
Kisumu	Male	9	13	14	0		36
	Female	30	4	19	0	1	54
Vihiga	Male	7	5	1	0	1	14
	Female	22	5	3	1	2	33
Kakamega	Male	6	0	4	0	0	10
	Female	11	5	0	0	1	17
Busia	Male	16	5	1	0	0	22
	Female	20	2	0	0	0	22
Homa Bay	Male	15	31	17	0	5	68
	Female	25	13	8	0	2	48
Migori	Male	16	7	9	1	0	33
	Female	25	9	6	1	0	41
TOTAL		224	110	83	6	12	435

While it is too early to determine the long term benefits of this training, RDT performance in Phase 1 counties measured during OTSS before and after the RDT training shows great improvement: 83 percent of facilities met the minimum performance target (75 percent compliance with RDT components of checklist) before the training (OTSS Round 1), and 96 percent met the target after training (OTSS Round 2), as shown in Figure 42.

Figure 42. RDT preparation and reading—% of facilities reaching minimum performance target of 75% compliance with all RDT steps.



Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illness—consistent with the result of the diagnostic test.

- In PY4, 54 clinical OTSS supervisors from Phase 2 and Phase 3 counties received clinical refresher training. Across all training in both phases, the scores improved from an average 80 percent pre-test (median 80, range 60 to 100) to an average 87 percent at post-test (median 88, range 67 to 100), with an RDT competency score of 92 percent at the end of training (median 94, range 69 to 100).
- In addition to diagnostic and clinical refresher training, all OTSS supervisors in the target counties received a three-day training on OTSS supervision and mentoring skills, including a focused review on using the EDS tool for data collection and focused mentoring.
- In Kenya, MalariaCare focuses its efforts in the eight counties in Western Kenya. Since starting programming in PY3, MalariaCare has used a phased approach to scaling activities. In PY4, MalariaCare began OTSS implementation in the five Phase 1 and Phase 2 counties (Homa Bay, Kakamega, Kisumu, Migori, and Vihiga). The first round of OTSS, conducted in November 2015, covered 280 (90 percent) of the 311 facilities in the Phase 1 counties (Kisumu, Migori, and Vihiga). The second round of OTSS, conducted in July and August 2016, covered 604 (98 percent) of the total 619 facilities included in both Phase 1 and Phase 2. This represents 884 (9%) of the 9,736 facilities in Kenya.⁸

Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.

- To promote an ongoing integrated QA cycle at reference level, the project supported the formation of health management therapeutics committees (HMTCs) in four county referral hospitals—Vihiga, Migori, Kakamega, and Homa Bay. The HMTC use OTSS data to focus on improving case management processes within their facilities. For example, one facility is now adjusting its hospital formulary to align with the national treatment guidelines, as a result of the HMTC use of OTSS data.

⁸ Ministry of Health Kenya. Kenya Master Health Facility List, Retrieved October 25, 2016 from <http://kmhfl.health.go.ke/#/home>

- The team also facilitated county-level LLWs in the Phase 1 counties. During these meetings, the county teams reviewed OTSS data to identify gaps and developed action plans to address these gaps for improving countywide case management activities (see Figure 43 for the Migori County post-OTSS action plan below).

Figure 43. Migori County Post-OTSS Action Plan, Round 1

FOCUS AREA	CHALLENGES IDENTIFIED	ROOT CAUSE TO BE ADDRESSED	CALL TO ACTION	TIME FRAME	RESPONSIBLE PERSON	ACCOUNTABLE
MICROSCOPY	<ul style="list-style-type: none"> Poor performance and recording of IQA findings on registers. Diversity of quality in preparation to Giemsa stains. 	<ul style="list-style-type: none"> Lack of adherence to SOPs. No SOPs to be adhered to. No universal supply of Giemsa stains, due to funding constraints. Designated points not having Giemsa stains. County not having budget/resource to help in supply of the commodity. 	<ul style="list-style-type: none"> Adhering to SOPs. OJT on SOPs. County to work on the budget to help in supply of the commodity. 	<p>Within 3 months</p> <p>Within 2 months.</p>	<p>SCLMT</p> <p>County lab coordinator</p>	<p>County lab coordinator</p> <p>County lab coordinator</p>
	RDT	<ul style="list-style-type: none"> Poor adherence to RDT SOPs. Various cadres conducting RDTs and yet not trained on RDT performance. 	<ul style="list-style-type: none"> Negative attitude. Lack of vigilance supervision and taking staff to task. Lack of vigilance supervision and taking staff to task. 	<ul style="list-style-type: none"> Improve adherence to SOPs during support supervision. Prioritize testing staff in our training. 	<p>Within 3 months.</p> <p>Within 3 months</p>	<p>SCLMT</p> <p>SCMLT/SCMCC</p>
CLINICAL OBSERVATION		<ul style="list-style-type: none"> Poor assessment of severe disease in the consultation rooms. Lack of job aids, algorithms, and bench aids on malaria case management. 	<ul style="list-style-type: none"> Poor adherence to malaria case management. Irregular support supervision. Lack of OJT. No distribution and dissemination of bench aids and algorithms. 	<ul style="list-style-type: none"> Vigilance on support supervision, adherence to SOPs and OJT. Strengthen the distribution and dissemination of malaria case management job aids. 	<p>Immediately before next dissemination.</p> <p>Immediately.</p>	<p>SCMCC, County OTSS clinical supervisors.</p> <p>County OTSS clinical supervisors/SC MCC</p>
	ADHERENCE	<ul style="list-style-type: none"> Poor adherence to malaria negative results. 	<ul style="list-style-type: none"> No vigilance supervision, follow-up, or feedback. 	<ul style="list-style-type: none"> Intensify the supervision to facility-level staff and make follow-up and feedback. 	<p>Before next dissemination in November.</p>	<p>OTSS supervisors/SC MCC</p>

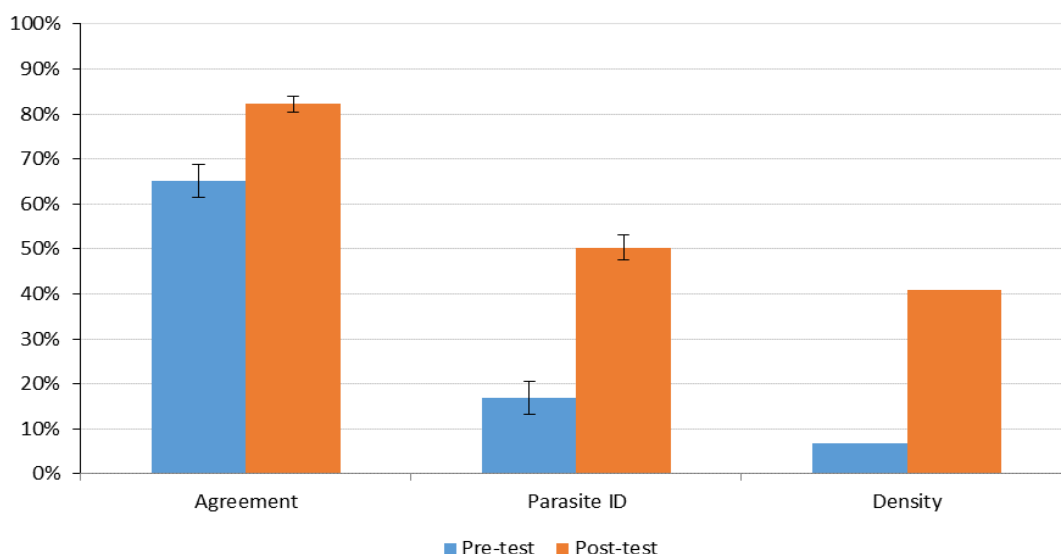
- Strengthening of county malaria reference labs was initiated during PY4. As part of the decentralization of technical responsibility, the eight counties conducted a consultative process to identify county malaria reference laboratories. To support capacity-building in these newly designated laboratories, MalariaCare, in conjunction with the NMCP, conducted an advanced MDRT for laboratory personnel from three new county malaria reference laboratories in Bungoma, Busia, and Siaya. Twenty microscopists from these reference laboratories were trained for five days on microscopic diagnosis, including the ability to distinguish *Pf* from other infective *Plasmodium* species, and the accurate identification of other nonmalaria bloodborne infections.



A MalariaCare laboratory trainer providing guidance to reference laboratory staff

Although overall scores improved across all three competency areas (parasite detection, species identification, and parasite counting) from pre-test to post-test, none of the trainees met WHO L2 standard for all three competency areas (see Table 2 for WHO equivalent score summary). Figure 44 below shows the aggregate performance for all 20 participants. Species identification was the biggest barrier, with only one participant meeting that standard (≥ 80 percent). For the other two competencies, 17 of the 20 participants (85 percent) met the L1 or L2 standard for parasite detection (≥ 80 percent) and 9 trainees (45 percent) met the L1 or L2 standard for parasite counting (≥ 40 percent).

Figure 44. aMDRT microscopy practical pre- and post-test results for county malaria laboratory staff, Kenya (n=20).



The participants who excelled in this training were staff who had extensive experience working in the Department of Vector Borne Disease laboratories and those who participated in malaria microscopy studies. Many of the remaining participants who demonstrated the greatest need for additional training had never had any malaria microscopy refresher training. This demonstrates a significant need for greater capacity-building of county laboratory staff. This level of training is necessary to support local reference-level expertise, and will need to continue regularly to support the goals of the NMCP to build a long-term independent and sustainable laboratory system.

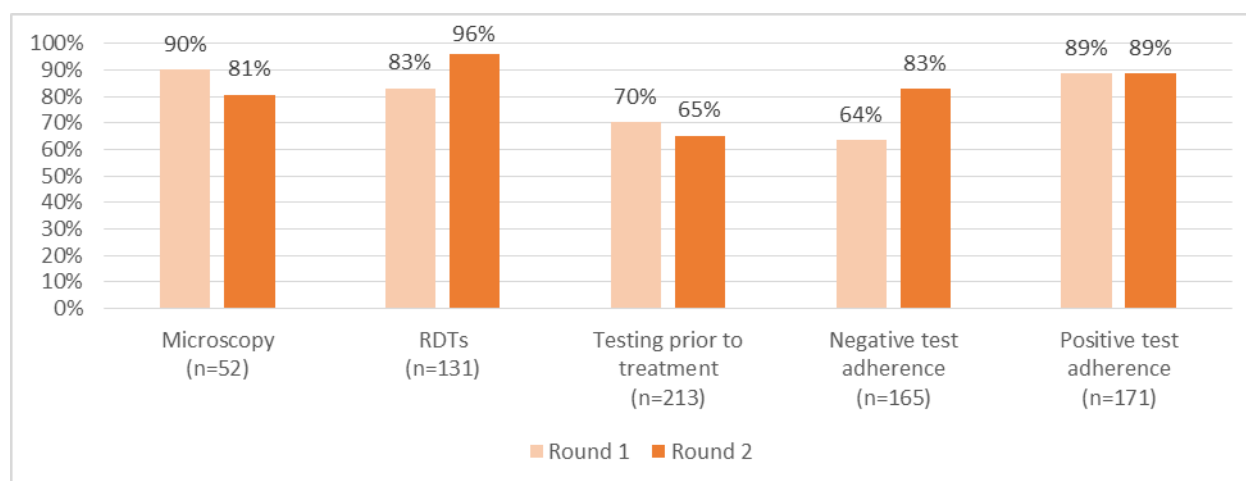
Progress made on key MalariaCare indicators

Trend data

Given the phased approach to the OTSS implementation, trend data are only available for the three Phase 1 counties (Migori, Vihiga, and Kisumu). Of the 280 Phase 1 facilities visited in Round 1, 277 (99 percent) were visited in Round 2. The number of facilities with scores in both rounds varied from 51 facilities for microscopy (32 percent of the 161 Phase 1 facilities that perform microscopy) to 213 facilities for testing prior to treatment (76 percent of facilities). The main limiting factors in data completeness were low levels of checklist completion in Round 1. These low levels were primarily due to the use of the paper-based checklists, stock-outs of commodities and supplies, lack of power, and lack of staffing, as recorded in Round 2. For example, of the 106 facilities without an RDT observation score, 90 (85 percent) were due to RDT stock-outs at the facilities in the first or second round, whereas an additional 11 (10 percent) were due to missing data in the first round.

Figure 45 compares the performance of those facilities from Phase 1 counties, visited in both Round 1 and Round 2. Improvements in the proportion of facilities meeting MalariaCare targets were observed in RDT performance and negative test adherence.

Figure 45. Proportion of Phase 1 health facilities meeting minimum performance target (75%) for technical competencies and overall performance target (90%) for measures of adherence, Round 1 versus Round 2, Kenya, (n=277).



In addition to onsite mentoring conducted during OTSS, improvements in RDT performance may also be due to RDT QA training that MalariaCare conducted between Round 1 and Round 2. Review of action plans developed during the first round indicates that negative test adherence was often identified as a priority to address, which may explain the significant improvement for this indicator. The drop in microscopy performance and testing prior to treatment is worrisome. However, under initial analysis, the trend may not be due to poor performance, but instead due to a lack of necessary supplies during this period. We do expect ongoing improvements with future rounds. In general, it takes three to four rounds to reach an improvement plateau.

Due to complications with the paper checklist database used during Round 1, the clinical case management scores are not comparable between Round 1 and Round 2. However, the minimum standard steps that make up two-thirds of the score have remained consistent between these rounds. Table 19 gives an overview of performance between Round 1 and Round 2 on these steps.

Table 19. Proportion of Phase 1 health facilities meeting the minimum standard steps for clinical case management, Round 1 versus Round 2, Kenya (n=130).

Step	Round 1 (avg)	Round 2 (avg)
Checks for at least one sign of severe malaria (or apparent)	90%	88%
Supervisor agrees with whether a malaria test should be ordered*	96%	98%
Supervisor agrees with final diagnosis and severity assessment	97%	95%
Correct prescription per test result (if available) and diagnosis	91%	95%

*Counted as yes if test is not available.

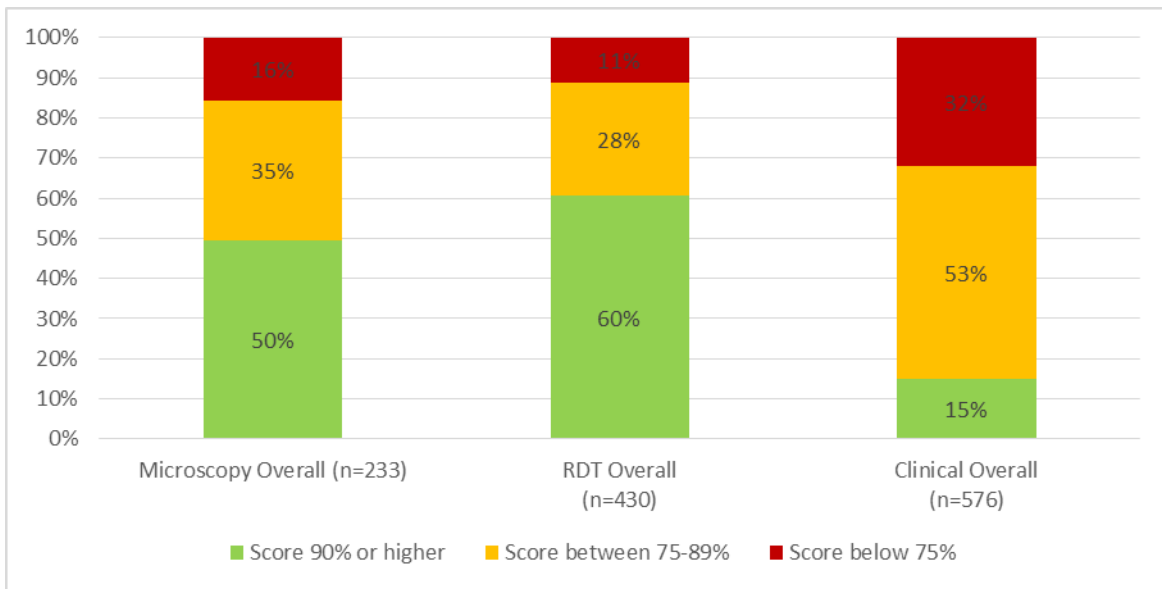
Most recent visit

The following section provides an overview of the current status of technical performance (microscopy, RDTs, clinical performance) and adherence (testing before treatment, adherence to negative test results, adherence to positive test results) indicators, which is based on the most recent OTSS visit.

Performance on key competencies

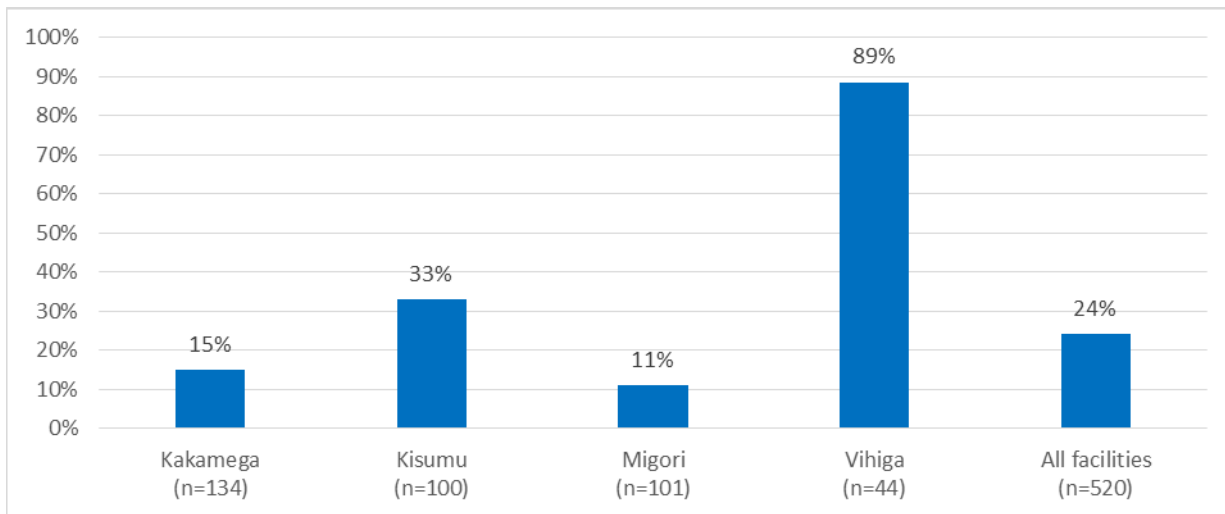
In PY4, 604 facilities were visited in Round 1 and Round 2. Of the 604 facilities visited, 257 reported that they perform microscopy, of which 233 (91 percent) had sufficient information to receive a score. For RDTs, 550 of the 594 facilities visited that perform RDTs (93 percent) had scores available. For clinical case management, 577 (96 percent) had sufficient data to receive a score. Figure 46 summarizes their performance.

Figure 46. Proportion of health facilities meeting minimum (75%) and overall (90%) targets on technical performance indicators during the most recent OTSS visit, Kenya.



In Kenya, RDT performance is generally good, with 89 percent of facilities meeting the minimum target (75 percent or higher). Similar to other countries, the most commonly missed step was waiting the correct amount of time per the manufacturer's instructions, with facilities scoring 78 percent of observations meeting this standard on average per facility. However, counties (with the exception of Vihiga) are facing major stock-outs of RDTs (Figure 47).

Figure 47. Proportion of facilities with no stock-outs of RDTs lasting more than 7 days in the 3 months prior to most recent OTSS visit, by region and all facilities, Kenya.



Microscopy performance is at a similar level of competence, with 84 percent of facilities meeting the minimum performance level target or higher during the most recent visit. The minimum standard step missed most often for microscopy was spreading thick film into 1-2 cm diameter circle and reading print placed under the slide, with 73 percent of observations correctly performing this step. Given the high percentage of facilities yet to meet the overall performance target (90 percent or higher), there is still significant room for improvement.

As in other MalariaCare supported countries, clinical case management scores are the lowest of the three technical performance indicators, with only 68 percent of facilities meeting the minimum target and 15 percent meeting the overall target of 90 percent. While facilities performed well on the minimum standards – the lowest score was 80 percent on checking for signs of severe disease - facilities scored lowest items for conducting a physical exam, with an average score of 45 across the 11 physical exam items. The three items with the lowest average scores were conducting a neck exam (24 percent), checking heart rate (27 percent), and conducting an abdominal exam (30 percent).

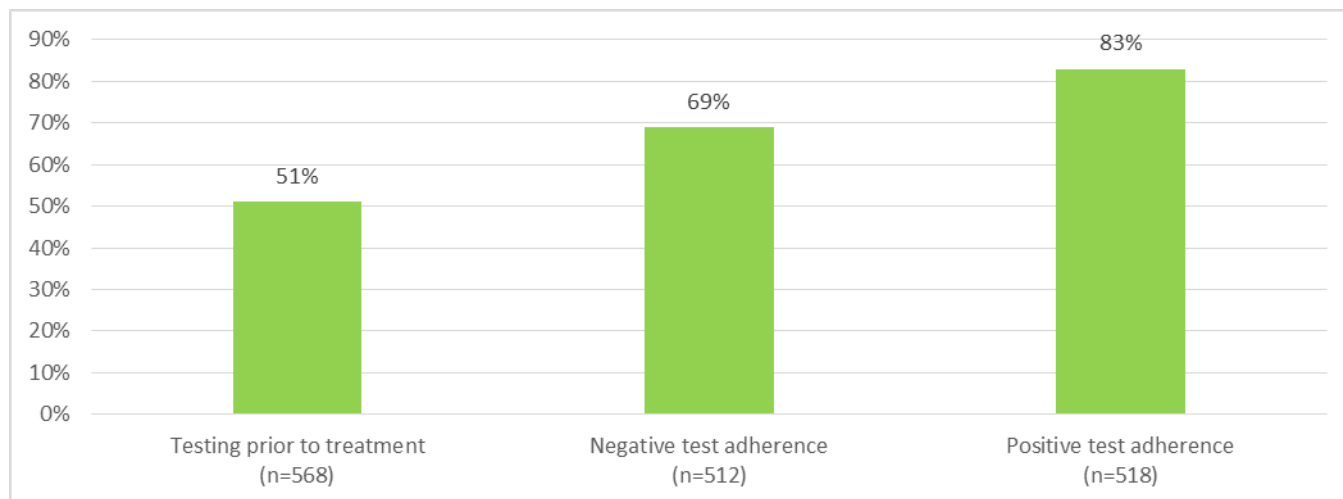
Measures of adherence

To gain a better understanding of testing and treatment behavior outside of clinical observations, OTSS supervisors review a sample of health facility register records to measure adherence to testing before antimalarial treatment, as well as treatment adherence to malaria, both positive and negative test results. Supervisors are trained to utilize the findings of the register review to identify the causes and work with health facility staff to develop solutions for them.

Of the 604 facilities visited in Round 1 and Round 2, 574 (95 percent) and 505 (84 percent) had completed scores for testing prior to treatment and adherence to test results, respectively. The aggregate indicator performance scores are shown below in Figure 48. Only 51 percent of facilities with data met the target of 90 percent of ACT treatments linked to a test result. Likely causes may include poor record keeping or continued use of clinical diagnosis; these will be focus areas of improvement in future rounds of OTSS. As would be expected early in the implementation of the QA program, adherence to negative test results lags behind adherence to positive test results. This signals continued overtreatment of test negative cases, but this is expected to improve with future

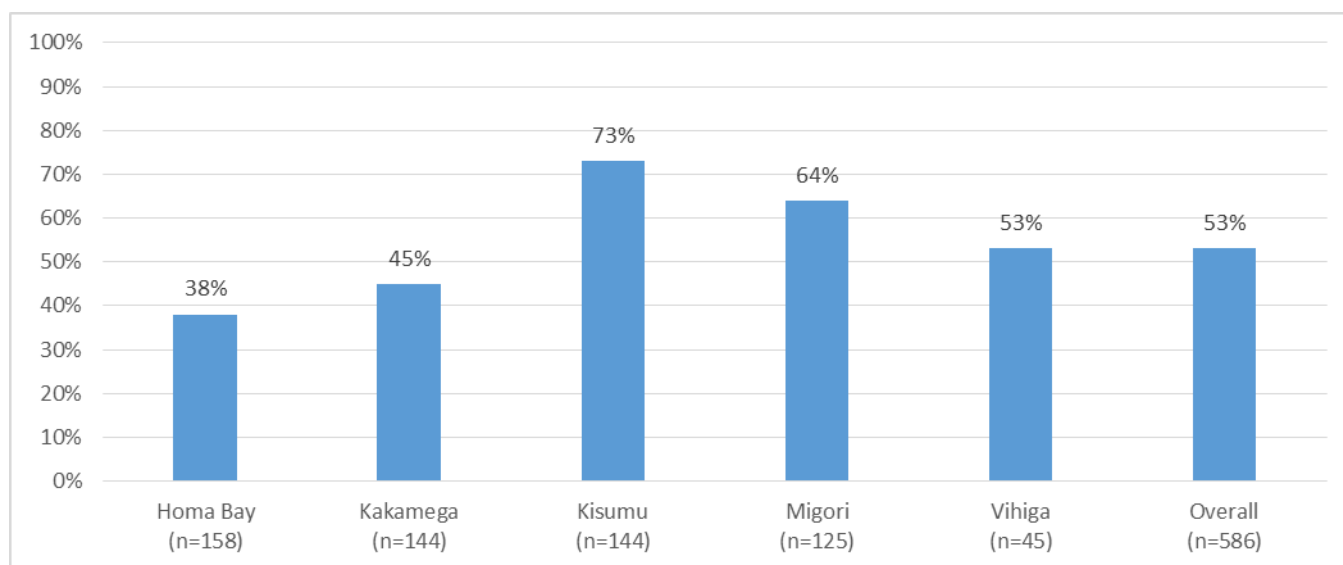
rounds of onsite mentoring. Improvement in negative result adherence is dependent on clinicians' confidence in test results as well as education on how to manage causes of non-malarial fever.

Figure 48. Proportion of health facilities meeting overall performance target (90%) on testing before treating and adherence to test results during the most recent OTSS visit, Kenya (n=660).



In addition, despite relatively high adherence to positive test results, stock-outs of appropriate antimalarials appear to pose a threat to the treatment of malaria. Almost half of facilities with data (53 percent) reported experiencing a significant stock-out of a first- or second-line antimalarial (artemether-lumefantrine or dihydroartemisinin-piperaquine) in the three months prior to the OTSS visit. Figure 49 shows the proportion of facilities in each county that have not suffered from a significant ACT stock-out during the reporting period.

Figure 49. Proportion of facilities with no stock-outs of a first-line ACT lasting more than 7 days in the 3 months prior to most recent OTSS visit, by region and overall, Kenya.



Challenges

Challenge	Solution
Paper checklists were used during the first round of OTSS and had to be entered into a database developed by the Kenya team. Gaps in the database prevented all data entry from being included and caused a delay in analyzing Round 1 data.	The database was updated and the missing data entered. The data has since been analyzed and is included in this report. Going forward, electronic checklists will be used in place of paper checklists, which have improved the efficiency of data entry, analysis, and use.
There was a delay in the roll-out of EDS due to delays in release of the new EDS application. This resulted in the delay of related activities, specifically OTSS supervisor training for Phase 2 supervisors and the second round of OTSS.	The new EDS application (E2) was finalized in June 2016, and used in Round Two of OTSS, which was conducted in July and August 2016 in Phase One and Phase Two counties.
Clinical county/subcounty malaria coordinators approached MalariaCare and asked to be more involved in the OTSS process.	Coordinators have since been invited to LLWs and are also included in post-OTSS follow-ups to the low-performing health facilities as part of PY5 activities.

Next steps

- Work with the NMCP and council health management teams (CHMTs) to strengthen the malaria case management QA program established in PY3 and PY4. The primary goal is to ensure that all patients with suspected malaria are tested using a quality test and receive appropriate clinical management. MalariaCare will continue to facilitate quarterly rounds of onsite health facility supervision in 928 health facilities across the eight focus counties.
- Continue roll-out of the EDS, MalariaCare will work on training national and county staff on analyzing and interpreting data collected through the electronic tool. The project will maximize impact of data collected in OTSS by using it to determine those facilities that fail to meet minimum performance standards, and then providing focused attention through peer-to-peer mentoring and subcounty follow-up visits in between OTSS rounds.
- Build capacity in managing severe malaria and anemia. The team will develop a severe malaria checklist to assess competency and facilitate mentoring of severe malaria. To address a key clinical problem associated with poor malaria outcomes, MalariaCare will add a checklist module focusing on assessment and management of anemia. In addition, job aids for both severe malaria and anemia will be disseminated this year to assist in capacity-building. Lastly, to strengthen overall clinical capacity of the OTSS supervisors, the project will provide refresher training for the weaker performers and also train a new cadre of clinical supervisors needed because of current cadre attrition.
- Continue to build capacity at the county malaria reference laboratories. MalariaCare will conduct additional aMDRTs for laboratory staff. In addition, MalariaCare will support the county malaria reference laboratories (CMRLs) in managing PT panels, using a slide set that will be procured during PY5.

Liberia

Introduction

MalariaCare began activities in Liberia in PY1 (October 2012–September 2013). Activities were suspended in PY2 as a result of the Ebola virus outbreak (the first confirmed case of Ebola virus disease was reported on March 17, 2014). On January 14, 2016, the WHO declared that the emergency had been resolved. During the interim, national policy advised the use of clinical diagnosis of malaria instead of drawing blood where there was inadequate personal protective equipment or training. Following the outbreak, the MOHSW has been in the process of restoring and improving essential and quality-assured health services in governmental and nongovernmental health facilities. As a first step, retraining and competency assessment in malaria diagnostics for national-level staff and county diagnostic officers (CDOs) – a need identified prior to the Ebola outbreak by poor ECAMM and MDRT results in 2014 – were prioritized. In January and February 2016, MalariaCare supported the NMCP in conducting the first refresher training in malaria microscopy post-outbreak for both national level staff CDOs from 13 of 15 counties. As a final transition of activities to the NMCP, 20 reference slide sets were procured from UCAD in Dakar, Senegal. The slide sets will be integral to implementing future NMCP activities supporting malaria microscopy in the country.

Key accomplishments

Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent.

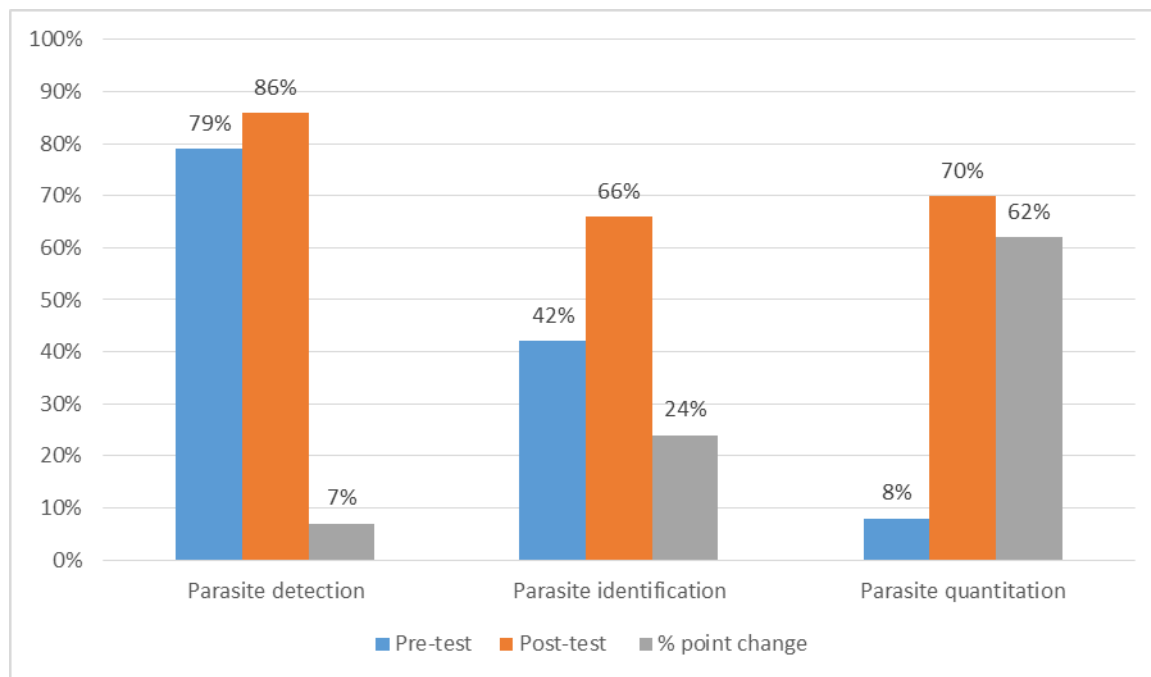
- Supported refresher training and competency assessment in malaria diagnostics for the national-level reference group. The purpose of this training was to refresh diagnostic skills of the national cadre responsible for overseeing decentralized training and supervision activities, and for implementing the national QA plan for malaria diagnostics. The long-term objective for this group is to improve their technical capacity to an equivalent of WHO accreditation L1 or L2 status, assuming that they are offered continuous training and mentorship; the refresher course is a first step in this process. The refresher training and assessment focused on three microscopy competencies: parasite detection, species identification, and parasite quantification.

Parasite identification scores were high in the pre-test with an average of 79 percent (median 82 percent; range 36 to 100 percent), and improved to 86 percent post-test (median 88 percent; range 70 to 100 percent). Although only two of ten (20 percent) participants passed all three components of the competency assessment by attaining WHO L1 (n=1) or L2 (n=1), improvements were made by the group overall, with a third participant falling only two points short of the passing threshold on species identification (see Table 2 for a summary of WHO equivalent scoring). Based on class average scores, the greatest gains between pre- and post-test were observed for parasite quantification, up 63 percentage points from 8 percent at pre-test (median zero; range 0 to 25 percent)



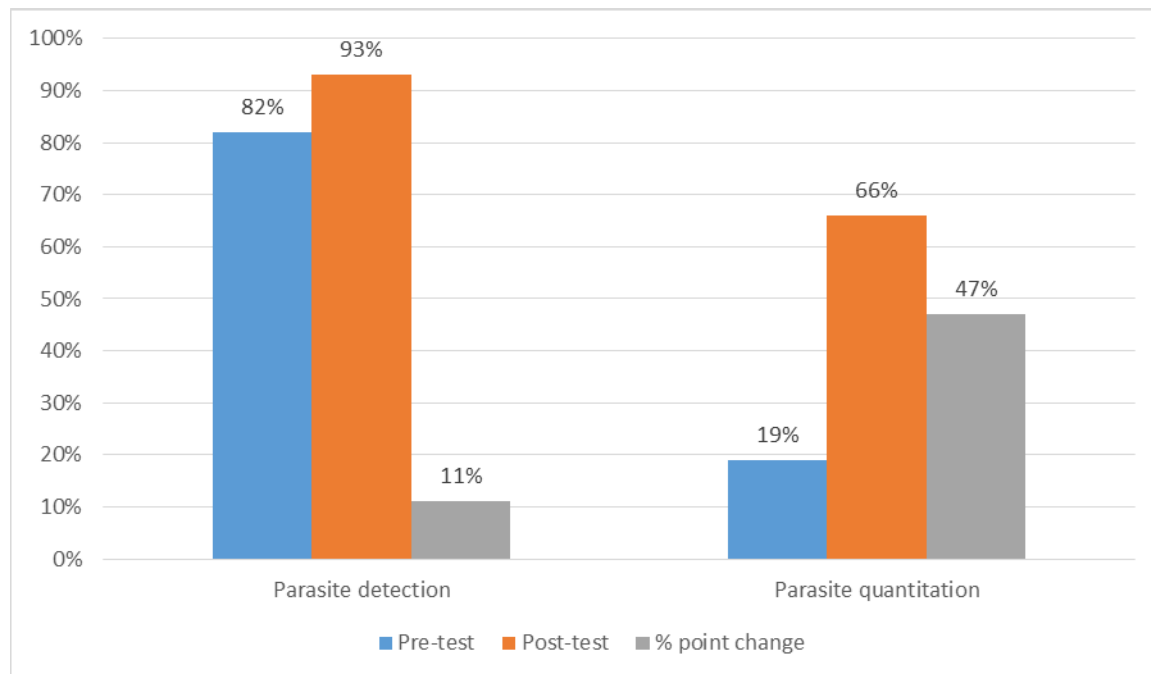
to 70 percent at post-test (median 67 percent; range 50 to 83 percent); and determination of species identification, which increased by 24 percentage points, from 42 percent at pre-test (median to 50 percent; range 0 to 67 percent) to 66 percent at post-test (median 64 percent; range 39 to 94 percent). By the end of the training, all participants (100 percent) performed at the equivalent of WHO L1 for parasite quantitation (> 50 percent). All RDT steps were performed correctly during an observation. See Figure 50 for overall group results over the course of the training.

Figure 50. National reference group average score by test component, Liberia (n=10).



- MalariaCare supported malaria microscopy refresher training and competency assessment for the CDOs. This cadre is responsible for implementing decentralized training and supervision activities within their counties. The course, which was facilitated with the support of the three highest performers from the national-level refresher training, focused on two essential microscopy skills: parasite detection and quantitation. Twelve of thirteen (92.3 percent) participants from 13 counties passed the competency assessment at the equivalent of WHO L1 (n=11) or L2 (n=1). Only one participant will require immediate and additional training in parasite detection to reach minimum standards for malaria microscopy. Overall, CDOs scored higher on parasite detection than their national-level counterparts, likely due to the frequency with which they examine blood smears, with an average post-test score of 93 percent (median 94 percent; range 71 to 100 percent). All participants (100 percent) passed the component for parasite quantitation at WHO L1 equivalent (> 50 percent), with an average score of 66 percent (median 67 percent; range 50 to 83 percent) at post-test. Based on participant performance, 12 counties are technically competent to provide peripheral training and supervision to health facilities in their region. See Figure 51 below for overall group results over the course of the training.

Figure 51. CDO group average score by test component, Liberia (n=13).



Objective 2: Increased percentage of patients suspected to have malaria or a febrile illness who receive a diagnostic test for malaria.

No activities under this objective.

Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illness—consistent with the result of the diagnostic test.

No activities under this objective.

Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.

- Facilitated the procurement of 20 slide sets (n=300 slides) consisting of varying malaria parasite species and densities for the NMCP in May 2016. The slides, which were developed under WHO protocols for slide banking, will be used for routine training of malaria microscopists, competency assessments, and PT. Members of the NMCP underwent a two-day orientation on the operational and management aspects of the slide bank, and a slide management database (Microsoft Access) was handed over to the NMCP and a brief tutorial provided. As part of the transition, SOPs for the database and an implementation manual were provided to the NMCP.

Key challenges/lessons learned

Challenge/lesson learned	Solution
Implementation of activities without ground presence.	Technical and management assistance was provided to the NMCP by a senior malaria diagnostic expert/manager from Ghana for one month.
Lost critical time (due to the Ebola epidemic) that could have been used to improve scores of the national- and county-level participants that failed the MDRT.	Provided technical assistant on the implementation of training and QA activities that will utilize the reference slide sets. These future activities will be carried out by the NMCP and their implementing partners after PY4.

Summary of MalariaCare achievement over the life of the project

Activity/training	Outcome
Updated national laboratory diagnostics guidelines.	Developed a national framework for QA of malaria diagnostics in laboratories nationwide.
Advanced MDRT for ten national referral microscopists.	Refreshed diagnostic skills of the national cadre responsible for overseeing decentralized training and supervision activities and implementing the national malaria diagnostics QA plan.
MDRT for 32 county diagnostics supervisors.	Created a cadre of county-level supervisors with the capacity to implement decentralized training and supervision activities within their counties.
Integrated national health facility supervision checklist.	Supported creation of national integrated checklist to be used by the national malaria, tuberculosis, and HIV control programs during future integrated QA visits.
PT sets and slide bank management SOPs.	Ensured the NMCP has the capacity to conduct training and monitoring activities for malaria microscopy.

NOTE: QA=quality assurance; MDRT=malaria diagnostic refresher training; PT=proficiency testing; SOP=standard operating procedure; NMCP=National Malaria Control Program.

Recommendations

To ensure continued progress in strengthening the national- and county-level core groups to carry out training and QA activities for malaria microscopy, the following immediate and long-term recommendations may be considered.

- At the national level:
 - Develop a three-month training plan using the newly acquired PT slides. This training could be led by the two advanced MDRT participants who received passing scores, to strengthen the performance of the national core group.

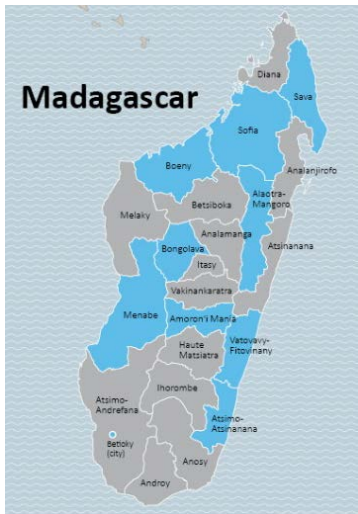
- Consider replacing or reassigning duties for members of the core group who are unable to meet WHO L2 minimum standards for parasite detection and quantitation.
- Consider sponsoring the two participants that passed the MDRT to the WHO ECAMM in Nairobi, Kenya. Course dates can be found at <http://training.amref.org/index.php/laboratory-courses/who-afroamref-external-competency-assessment-of-malaria-microscopists> (this page is updated regularly).
- At the county level:
 - It is recommended that the CDOs from Grand Cape Mount (the only county that failed the competency assessment) received follow-up training, as well as the CDOs from Margibi and Maryland counties (were not present during the training).
- Long term, MalariaCare recommends that the NMCP:
 - Provide continuous (quarterly) training opportunities and monitoring (using PT panels) opportunities to those supervisors supporting malaria microscopy in health facilities.
 - Consider utilizing distance-based learning courses for malaria microscopy as a way to conduct low-cost MDRT-like trainings more frequently.
 - Consider developing a national competency assessment for malaria microscopy course (using the newly acquired slide sets). See course description and details at: <http://www.who.int/malaria/publications/atoz/9789241549394/en/>

Transition and sustainability

- Three participants who scored at least or close to WHO L1 or L2 during the national-level training co-facilitated the CDO training. By doing so, the overall course management, including teaching, daily preparations, and grading, was transitioned to the NMCP. Additionally, MalariaCare procured 20 slide sets to support malaria microscopy training and monitoring activities. To support the NMCP's implementation of malaria microscopy QA activities, a PT slide management database, SOPs, and implementation manual were handed over to the NMCP.
- As part of restoring laboratory services for malaria in Liberia (post-Ebola outbreak), the MOHSW is planning to reinstate the OTSS program using recently trained and competency-assessed CDO from the counties. Based on recent discussions with the MOHSW, they will use the integrated checklist for tuberculosis (TB) and HIV to collect critical information on all three diagnostic areas. Additionally, the NMCP plans to recertify a number of former WHO L1 and L2 microscopists that make up their national-level core group.

Madagascar

Introduction



In Madagascar, MalariaCare worked in close collaboration with the National Malaria Control Program (Département de Lutte contre le Paludisme, or DLP) to build its capacity to roll out a national malaria case management and supervision program with Global Fund funding. During PY4, MalariaCare supported the expert microscopists from the DLP core team to attend ECAMM at UCAD in Dakar, Senegal. This training helped the DLP to create expert WHO-level capacity at the national level. Following training for OTSS supervisors and the first round of OTSS in Antananarivo, MalariaCare conducted the second round of joint laboratory/clinical OTSS to build the capacity of the national core team of supervisors.

Key accomplishments in PY4

Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent.

- To develop high-quality microscopy skills within the national core team of OTSS supervisors, MalariaCare supported a follow-up training on malaria microscopy. A set of 60 malaria slides were procured from the existing slide archive at the Madagascar Institute Pasteur (Institut Pasteur Madagascar, or IPM) to serve as PT panels for identification of *Plasmodium* species and determination of parasite density. The OTSS supervisors provided their results on parasite detection, density, and species identification to IPM staff who cross-referenced those results in order to provide feedback on correct characterization of the slides. The supervisors and technicians involved in this activity kept the IPM PT panels to continue practicing reading the slides.

Table 20 below displays the results of the PT panel exercise.

Table 20. Results for the malaria proficiency testing (PT) panel exercise done for the core national team of outreach training and supportive supervision (OTSS) supervisors in Madagascar, MalariaCare 2016.

	Number of slides	Parasite detection	Species identification	<i>Plasmodium falciparum</i> counting*
Supervisor #1	10	100%	80%	33%
Supervisor #2	10	100%	90%	40%
Supervisor #3	10	100%	100%	25%
Supervisor #4	10	90%	60%	0%
Supervisor #5	10	100%	80%	0%
Supervisor #6	10	100%	80%	25%

* *Plasmodium falciparum* quantitation scores were graded against ± 25 percent of the true count provided by Institut Pasteur Madagascar (IPM).

Parasite detection scores were high, with a mean score of 98 percent and a median of 100 percent. Species identification scores were generally strong with a mean score of 82 percent and median of 80 percent. Parasite quantification scores were weaker, with a mean score of 21 percent and a median of 25 percent. Based on these results, the project recommends that supervisors continue to practice reading the malaria slides provided to them in the PT panels with guidance and feedback from IPM, especially as relates to parasite quantitation. The project recommends that the DLP and IPM continue to support refresher microscopy training overall to support further improvement and maintenance of microscopy skills in the country.



12 ECAMM participants from Madagascar, DRC, Mali and Senegal. Dakar, June 2016.

Credit: Daouda Ndiaye

In order to establish expert-level capacity at the national level, MalariaCare provided financial and logistical support for three participants to attend ECAMM, held at UCAD in Dakar, Senegal. The objectives of ECAMM are: 1) to help develop a national core group of expert microscopists in participating countries who are accredited to internationally recognized standards for malaria microscopy; and 2) to provide formal certification of the competency of these microscopists. Among the three expert microscopists who participated in the ECAMM in Dakar, two received WHO L1 accreditation; one was accredited as a WHO L2.

Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illness-consistent with the result of the diagnostic test.

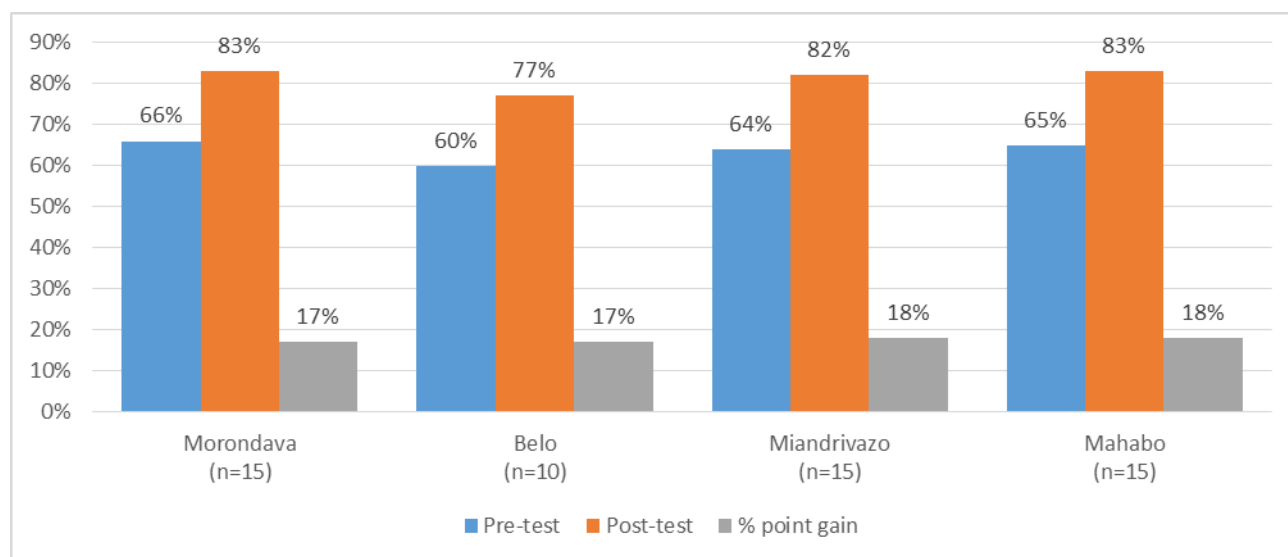
- In coordination with the DLP, MalariaCare supported two clinical case management refresher training courses for 55 district-level clinicians in the target districts of Morondava, Belo, Miandrivazo, and Mahabo. Of the participants, 39 were nurses and 16 physicians. The training materials were aligned with the guidelines of the MOH and DLP to improve case management capacity for malaria and other febrile illnesses. The curriculum focused on the new national policy of a three-day ACT regimen as first-line treatment for uncomplicated malaria, injectable artesunate treatment for severe malaria, and RDT administration.



Practical exercises on use of rapid diagnostic tests (RDTs). Miandrivazo, December 2015. Photo credit: MCDI

Analysis of pre- and post-test scores showed notable improvements, particularly in participants' understanding of correct diagnosis and management of complicated and severe malaria. Additionally, the participants received feedback on pre-test performance to help address areas that required strengthening. Learning tools, such as CDs, reference guidelines, participant workbooks, job aids, and bench aids for using injectable artesunate were printed and were given to the participants at the end of the workshop. Please refer to Figure 52 below for more detail on pre- and post-test scores.

Figure 52. Average pre- and post-test scores for clinical case management refresher training, December 2015, Madagascar.



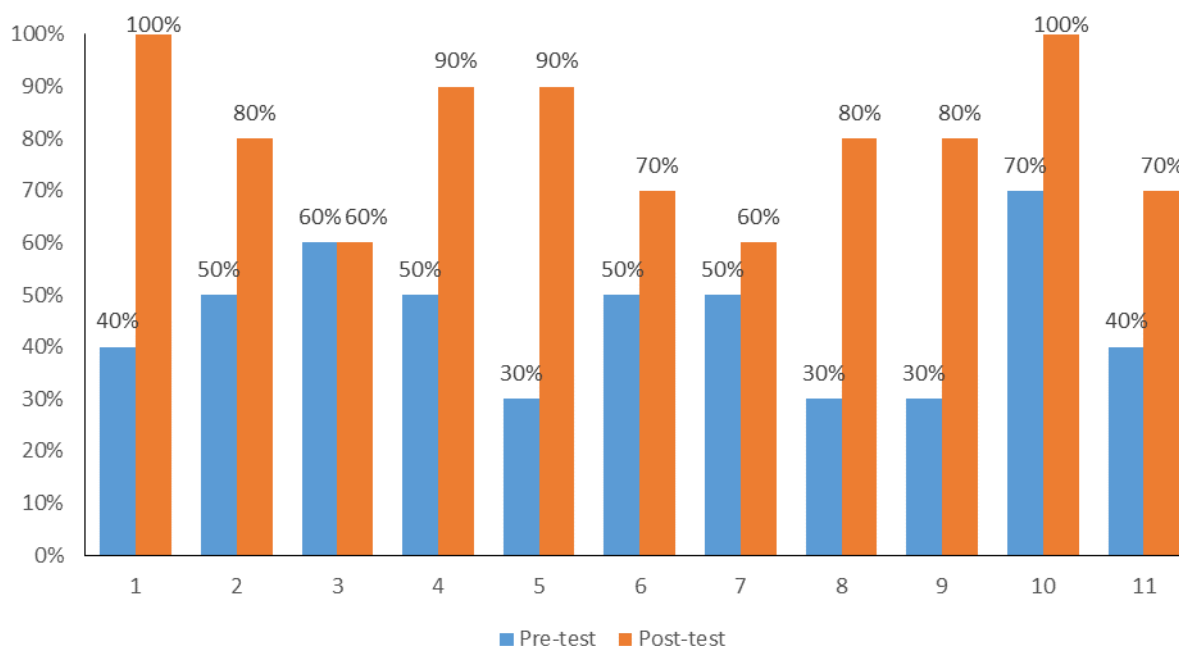
- In preparation for OTSS, MalariaCare supported a three-day theoretical and practical training on OTSS methodology and the use of the MalariaCare supervision tool. Nine participants from the DLP who act as OTSS supervisors in Antananarivo were trained. Classroom training sessions were delivered at the DLP, and practical training took place at health facilities in and around Antananarivo.
- In collaboration with the DLP, MalariaCare conducted the second round of joint laboratory and clinical OTSS at the same 24 health facilities as during the first round of OTSS in Antananarivo. The objective of the activity was to strengthen the skills of the central supervisory team, preparing them to train, mentor, and supervise regional and district supervisory teams in anticipation of a nationwide roll-out of OTSS.

Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.

- Provided technical assistance to the DLP to lay the foundation for development of a NAMS. In coordination with the DLP, the project conducted a five-day NAMS training to orient participants to the essential competencies needed to develop a national slide bank. Twelve laboratory technicians and clinicians from IPM and the DLP who are directly involved in the development of the Madagascar NAMS were trained.

Significant improvements were made in the theory evaluation from pre- to post-test. At pre-test, the average score was 45 percent (median 50 percent; range 30 to 70 percent). At post-test, the average score improved to 80 percent (median 80 percent; range 60 to 100 percent). The average score improved from pre- to post-test by 35 percentage points. Please see Figure 53 for more detail on pre- and post-test scores.

Figure 53. Pre- and post-test scores, MalariaCare Madagascar national archive of malaria slides (NAMS) training, Madagascar.



During the training, seven slide sets were prepared in accordance with WHO procedures for thick and thin blood film preparation, staining, mounting, and storage (see Table 21 below). These slides can be used by the DLP to support microscopy training, prepare microscopists for national and WHO-level accreditation, and develop PT panels that can be used for skills testing and ongoing training during onsite supervision visits at the regional and district level.

Table 21. Slide sets prepared during MalariaCare Madagascar national archive of malaria slides (NAMS) training, Madagascar.

	Donor	Parasite density (p/μL)	Total slides
Negative slides	1	N/A	100
<i>Plasmodium falciparum</i>	2	458,133	14
<i>Plasmodium falciparum</i>	3*	228,000	63
<i>Plasmodium falciparum</i>	3	114,000	84
<i>Plasmodium falciparum</i>	3	76,000	48
<i>Plasmodium falciparum</i>	3	45,000	30
<i>Plasmodium falciparum</i>	3	22,000	45

*From this donor, several dilutions were performed to make different parasite density.

- Supported a one-day training on malaria diagnostic QA that followed the WHO plan for malaria QA as detailed in the WHO *Malaria Microscopy Quality Assurance Manual*. The training targeted six participants from the DLP, who are involved in the development of the national malaria diagnostics QA framework. The

training focused on providing an overview of NAMS development and function; on the structure, function, and implementation of a national QA system; on internal quality control standards and protocols; and on the development of a national competency assessment scheme. As an outcome of the training, the DLP plans to finalize the malaria diagnostic QA manual. The DLP has already implemented several QA activities, including printing and distributing bench aids and standards of practice to health facilities; conducting OTSS in both public and private health facilities; onsite proficiency testing; supporting health facilities to implement internal QA measures; and distributing reagents and supplies to health facilities.

- Supported a two-day LLW following the end of each round of OTSS to present and discuss OTSS data and results from the 24 health facilities visited each round. At these workshops, supervisors met to share experiences, discuss the quality of data collected, identify systemic problems, and develop action plans to address them prior to the next round of OTSS. Supervisors presented the results from their district at the workshop, and then participants broke into groups to identify solutions for problems identified and to develop action plans to improve the implementation of OTSS for the next round.
- MalariaCare printed and distributed case management algorithms to CCMRT participants, and printed malaria diagnostics bench aids for distribution to Antananarivo health facilities during OTSS visits.

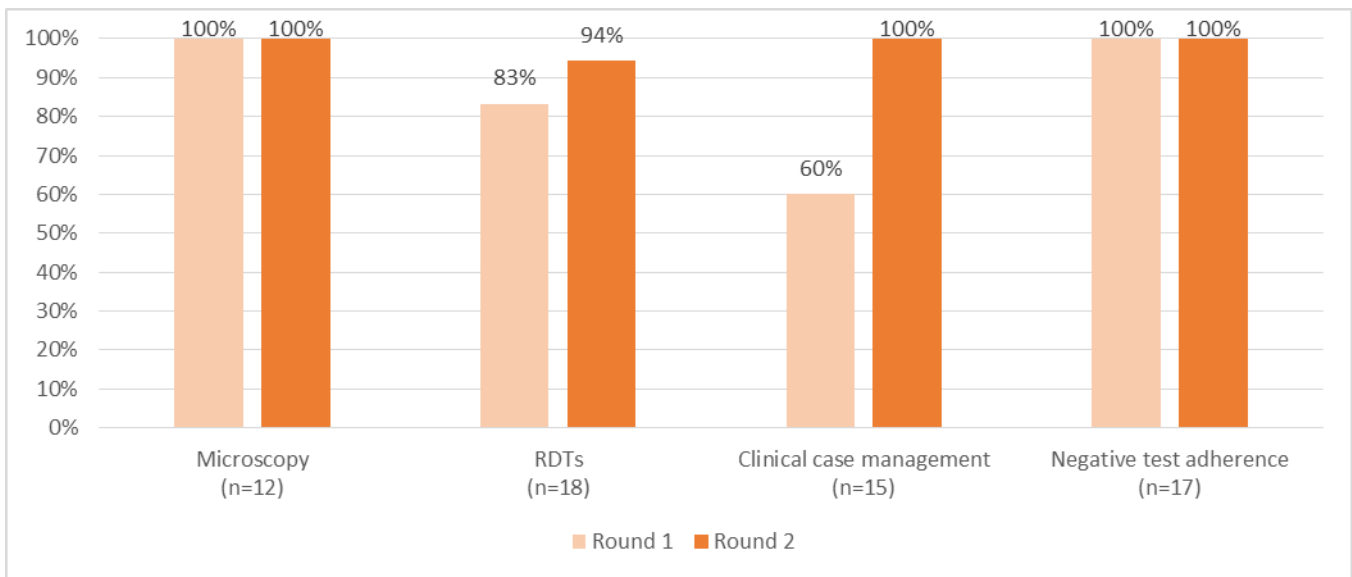
Progress made on key MalariaCare indicators

Trend data

Figure 54 summarizes trends on key MalariaCare health facility performance indicators for facilities with scores available in both rounds conducted in PY4. Of the 24 facilities visited (22 of which perform microscopy), the proportion of facilities with available scores ranged from 55 percent (for microscopy) to 82 percent (for RDTs). At these facilities, insufficient data for adherence measures was available – specifically ACTs prescribed or positive test results, so performance on testing prior to treatment was not calculated for the vast majority.

Among facilities with trend data, all were found to meet already the minimum performance target of 75 percent during the first round. However, average microscopy scores improved from 89 percent to 93 percent, indicating that progress was made among some facilities toward meeting the secondary target of 90 percent. The proportion of facilities meeting targets for negative test adherence remained unchanged with a perfect score (that is, no ACTs prescribed for negative test results) both in Round 1 and Round 2. This may in part be due to malaria being relatively rare in the OTSS facilities at this phase of the program, as for practical training purposes these were all located in Antananarivo. On the other hand, impressive improvements were found in conducting RDTs and febrile case management: the proportion of facilities meeting minimum performance targets increased by 11 percentage points for the former, and by 40 percentage points for the latter.

Figure 54. Proportion of health facilities meeting minimum performance target (75%) on competencies, and overall target on negative test adherence (90%), Round 1 versus Round 2, Madagascar.

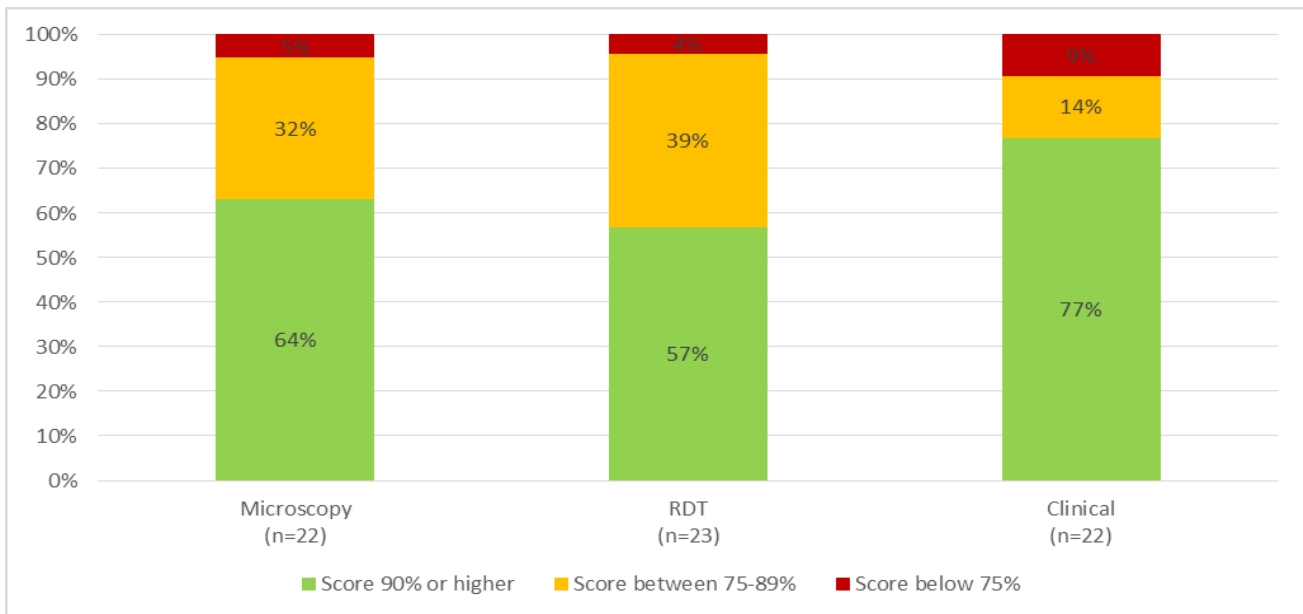


Most recent visit

Performance on key competencies

Figure 55 summarizes health facility performance for malaria microscopy, RDT use, and clinical competencies for all facilities with available data during the most recent OTSS visit in PY4.

Figure 55. Proportion of health facilities meeting minimum (75%) and overall (90%) targets on microscopy, RDT, and clinical competencies during the most recent OTSS visit, Madagascar.



Note: Due to rounding, percentages presented here may not sum to 100%; and the proportion of facilities meeting the minimum performance target is most accurately calculated as 100% minus the number reported to not meet the minimum performance target (i.e. scored below 75%).

Among facilities that performed microscopy, 95 percent met the minimum performance target for microscopy (score of 75 percent or higher) and 64 percent met the overall performance target (score of 90 percent or higher). Similar to other countries, slide preparation appears to require more improvement than slide staining or reading; however, in all observations, supervisors agreed with health facility staff on parasite detection.

Of the 24 facilities reporting to conduct RDTs, 23 (96 percent) had sufficient checklist data to calculate an RDT competency score. Overall, 96 percent of facilities met the minimum performance target, and 57 percent of facilities met the overall target. The most commonly missed steps were labeling the cassette (average facility performance 61 percent) and collecting an adequate amount of blood (average facility performance 74 percent) which is critical for obtaining accurate test results.

Of the 24 facilities visited for OTSS in PY4, 22 (92 percent) had sufficient data entered in the checklist to receive a clinical performance score. Of these facilities, 20 (91 percent) met the minimum performance target and 77 percent of facilities met the overall target of 90 percent. These results indicate that by the end of PY4, the majority of clinicians observed conducted comprehensive physical exams and general histories, in addition to conducting the key steps during clinical case management (such as test ordering and prescribing in accordance with the test result) correctly.

Challenges

Challenge	Solution
DLP staff has competing priorities, making it difficult to coordinate MalariaCare activities such as training and supervision (OTSS).	MalariaCare made a concerted effort to coordinate its training activities with other activities requiring the participation of DLP staff.
Lack of sufficient microscopes for training at the regional level.	Advise the DLP to use funding from other sources to purchase microscopes and basic materials and supplies for the capacity-building of laboratory technicians on diagnostic quality of malaria.

Summary of MalariaCare achievement over the life of the project

MalariaCare has worked in Madagascar to build onto the country’s malaria case management QA program to ensure that a strong foundation of core laboratory technicians and clinicians are equipped to provide effective and impactful supervisory visits. The project leaves behind a well-trained core team that can continue to implement malaria QA measures nationally.

Activity/training	Outcome
MDRT training-of-trainers for 18 central and regional microscopists, which was then cascaded to 100 central and regional laboratory experts.	Created a national cadre of expert trainers who can prepare district-level laboratory technicians to act as laboratory OTSS supervisors. The cascade training created a cadre of laboratory experts who can be called upon to act as OTSS laboratory supervisors to implement the national QA scheme.
National PT scheme.	Supported the DLP to implement a PT scheme to develop and maintain high-quality microscopy skills within the national core team of laboratory OTSS supervisors through regular slide-reading assessments and training.
ECAMM for three national WHO-accredited expert microscopists.	Supported the development of a cadre of expert microscopists who are accredited to internationally recognized standards for malaria microscopy.
CCMRT for 120 central, regional, and district-level clinical experts.	Created a cadre of expert clinicians who are trained on the most up-to-date national case management policy, including treatment, severe malaria, and RDT guidelines. These experts can now be called upon to act as clinical OTSS supervisors.
OTSS supervisor training-of-trainers for 43 national- and provincial-level microscopy and clinical experts, who now act as national trainers. This has been cascaded to 82 district-level supervisors.	Created a team of national trainers to provide OTSS supervisor training to clinical and laboratory experts nationwide. Trained supervisors are now capable of providing onsite mentoring and training to health facility staff during OTSS.
Joint OTSS visits—2 rounds to 24 health facilities in Antananarivo.	Provided real-world practical experience to the DLP to conduct OTSS in order to prepare the DLP to oversee implementation of the OTSS scheme nationwide.
Training on the development and implementation of a national malaria case management quality assurance framework for six DLP staff.	Oriented the DLP to WHO guidance on creating a national QA system, including NAMS development and function; the structure, function, and implementation of a national QA system; internal quality control standards and protocols; and development of a national competency assessment scheme.
NAMS development training for 12 laboratory technicians and clinicians from the Institut Pasteur de Madagascar and the DLP who are directly involved in the development of the Madagascar NAMS.	Prepared national-level laboratory technicians with the competencies to develop proficiency testing slides, to be included in the national slide bank.

NOTE: MDRT=malaria diagnostics refresher training; OTSS=outreach training and supportive supervision; PT=proficiency testing; ECAMM=external competency assessment for malaria microscopy; WHO=World Health Organization; CCMRT= clinical case management refresher training; DLP=national malaria control program; IPM=Institut Pasteur de Madagascar.

Lessons learned

- When working at the peripheral level, interventions should focus on RDT QA and linkages with community case management, whereas microscopy performance, outpatient treatment performance, and inpatient care are the key interventions at the reference level. At the reference level, interventions should include strong focus on parasite quantification skills in order to improve severe malaria outcomes.
- When preparing invitations to workshops, consideration should be given to the skill set of the participants to ensure that one training targets individuals of similar cadre and competence level. At the clinical case management training, participants were made up of physicians, nurses, and health technicians. Trainers had to make a special effort to deliver course content in a way that was understandable to all trainees, sometimes leading to challenges to complete the training.

Recommendations

- It is recommended that the DLP move toward further development and implementation of its integrated diagnostics and clinical malaria case management QA system. In the future, it is recommended that supervisors are selected according to criteria dependent on level:
 - At the reference level, laboratory supervisors would be selected from staff with considerable bench microscopy experience, and pass proficiency tests prior to being sent into the field to ensure they can perform proficiency testing with facility laboratory staff. Clinical supervisors are best selected based on their knowledge and mentoring capacity in both outpatient and inpatient management.
 - At the peripheral level, the DLP would select supervisors that are well-versed in performing and interpreting RDTs and understand their application to treatment, in addition to knowledge and mentoring capacity in outpatient and inpatient management.
 - To build and maintain key microscopy skills, it is recommended that the DLP continue to implement MDRT for laboratory supervisors, and clinical case management refresher training for clinical supervisors. Supervisor training for both cadres would be provided regularly to ensure supervisors are equipped with mentorship and onsite training skills.
- Joint clinical and laboratory OTSS is best conducted two to four times per year with a combined laboratory and clinical supervisor team. It is recommended that following OTSS rounds, the DLP carry out LLWs with the national and regional teams, allowing them to provide health facility-level feedback and recommendations for the improvement of the QA system and short-term action plans to correct systemic issues in Madagascar. Additionally, linking community health workers to peripheral health facilities for implementation of a lower-level QA system is recommended.
- Investment in training and PT slide sets, either a NAMS or PT panels, for use in external quality assurance (EQA) is also recommended. The DLP could continue to develop a national archive that includes all *Plasmodium* species. These slides can be used by the DLP to support microscopy training, prepare microscopists for national and WHO-level accreditation, and develop PT panels that can be used for skills testing and ongoing training during onsite supervision visits at the regional and district levels.

Transition and sustainability

- Following completion of activities planned for PY4, MalariaCare organized and carried out a one-day close-out meeting. All activity participants, implementing partners and the USAID Mission in Madagascar staff were invited. The results of all activities conducted by MalariaCare in PY4 were presented and recommendations for the DLP made, as outlined above. It was specifically suggested that the DLP continue to: 1) conduct two to four regular rounds of OTSS annually; 2) complete development of and manage a malaria slide bank for EQA use; and 3) integrate intermittent preventative treatment (IPTp) for pregnant women into the clinical case management training curriculum, with support from the Maternal and Child Survival Program (MCSP). To sustain the DLP's implementation of a QA system nationwide, MalariaCare has provided the following tools to the DLP:
 - MDRT training materials and malaria microscopy bench aids.
 - NAMS development training materials.
 - Malaria slides for PT slide sets.
 - Joint clinical/laboratory OTSS checklist and OTSS data.
 - Sample agenda and handouts for LLWs.

Malawi

Since October 2012, the start of MalariaCare's first PY, the project has continued working closely with the NMCP and other partners to build capacity in malaria case management at all levels of the health system in Malawi. In PY4, MalariaCare supported targeted diagnostic refresher training for low-performing laboratory supervisors, conducted two rounds of joint OTSS in all 29 districts and two rounds of clinical only OTSS in the 14 focus districts using the EDS, and launched several new clinical case management activities and partnerships. The project remains committed to working with the MOH and NMCP to help transition successful approaches for enhancing the quality of malaria case management in Malawi.



Key accomplishments

- MalariaCare is working with the NMCP to improve the capacity for malaria microscopy in referral hospitals and for a core group of national level experts, as NMCP policy recommends the use of RDTs at all other facilities. To achieve this goal MalariaCare conducted MDRTs for laboratory supervisors and assistants in PY4, and supported two laboratory supervisors to attend a WHO ECAMM course.
- An advanced MDRT for 19 laboratory supervisors was conducted in PY4, and pre- and post-tests were administered to assess both knowledge and the practical skills of participants. Practical skills included parasite detection, species identification, and parasite counting, scores of which are shown in Table 22

below. All 19 participants were OTSS supervisors and were ascribed competency levels based on their parasite detection and parasite counting scores (see Table 2 for WHO equivalent score summary). Key findings of the MDRT, similar to other MalariaCare countries, is that while parasite detection is generally high, parasite speciation and counting scores are lower due to the lack of other species regularly seen. While habitual reliance on the subjective ‘plus’ system for counting often reflects in lower overall scores for parasite counting, MalariaCare is investigating the cause of the drop in scores at post-test for this indicator and will modify programming as needed to address the challenge. Seven of the 19 participants (36.8 percent) achieved 80 percent or higher on parasite detection, and 40 percent or higher on parasite counting (i.e., attaining at least WHO L2 equivalency for these two competency areas). The seven laboratory supervisors that achieved L2 were those who had attended the prior training in PY3. However, six other participants who had attended the PY3 training did not achieve L2 or higher proficiency in this refresher training. One of the reasons to account for this may be that Malawi's national policy of RDT use in most facilities limits laboratory staff's exposure to slide reading more so than in other MalariaCare countries. To provide ongoing support to laboratory supervisors and improve their performance, MalariaCare will, during upcoming OTSS, pair low-performing with high-performing supervisors (including from national level). In case supervisors continue to show consistently low performance, MalariaCare may suggest that NMCP consider replacing them with better-qualified technicians to support MalariaCare activities.

Table 22. MalariaCare Malawi advanced malaria diagnostics refresher training (MDRT) practical skills testing (n=19), Malawi.

Competency area	Average pre-test score (median [range])	Average post-test score (median [range])	% point change in score
Parasite detection	84% (87% [47%–100%])	85% (86% [74%–98%])	1%
Species identification	44% (40% [10%–70%])	58% (57% [32%–71%])	14%
Parasite counting	50% (50% [0%–100%])	34% (33% [13%–60%])	-16 %

- Conducted two MDRTs for a total of 40 laboratory assistants working in OTSS-supported facilities. To assess learning, theory pre- and post-tests were administered. The mean score was 43 percent at pre-test, which increased to 80 percent at post-test. For practical skills (parasite detection, species identification, and parasite counting), scores are shown in Table 23 below and are again consistent with higher performance in detection with lower, albeit improving, performance on species identification and counting.

Table 23. MalariaCare Malawi basic malaria diagnostics refresher training (MDRT) practical skills testing (n=40), Malawi.

Competency area	Average pre-test score (median [range])	Average post-test score (median [range])	% point change in score
Parasite detection	65% (65% [27%–91%])	86% (88% [64%–100%])	21%
Species identification	18% (14% [0%–57%])	40% (39% [18%–64%])	22%
Parasite counting	4% (0% [0%–50%])	15% (17% [0%–42%])	11%

- Supported two NMCP OTSS supervisors to participate in the WHO ECAMM course in Nairobi during October 2016. To enhance the probability that the candidates would reach at least L2 proficiency, they participated in a pre-ECA training in September 2016. Both participants passed ECAMM at WHO L1 or L2, with certification valid until 2019.

Objective 2: Increased percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test for malaria.

- Trained 38 district-level supervisors (19 diagnostic and 19 clinical supervisors) to support lower-level health facilities on RDT testing procedures, use of test results, clinical case management, and providing on-site mentoring at facility level. This training combined activities 2.1 and 3.2 of the work plan. Following the training, these supervisors were deployed to assist with OTSS Round 13. See Table 24 below for a summary of pre- and post-test scores for the district supervisor training.

Table 24. District-level supervisor training pre- and post-test scores, Malawi.

	Average pre-test score (median [range])	Average post-test score (median [range])	% point change in score
Case management clinical supervisors (n=19)	66% (65% [46%–86%])	79% (78% [68%–95%])	13
Rapid diagnostic test (RDT) quality assurance (n=38)	81% (80% [55%–95%])	90% (91% [71%–98%])	9

- Launched iCCM support in four districts. Following confirmation of national policy change and clarification of implementation modalities, MalariaCare’s revised scope for iCCM support was approved late in PY4 (August 2016). By the end of PY4, MalariaCare oriented 35 district health management team staff to the project’s iCCM activities, adapted the quality improvement data collection tool, and began orienting health surveillance assistants to project activities. Remaining iCCM support is planned for PY5.



Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses—consistent with the result of the diagnostic test.

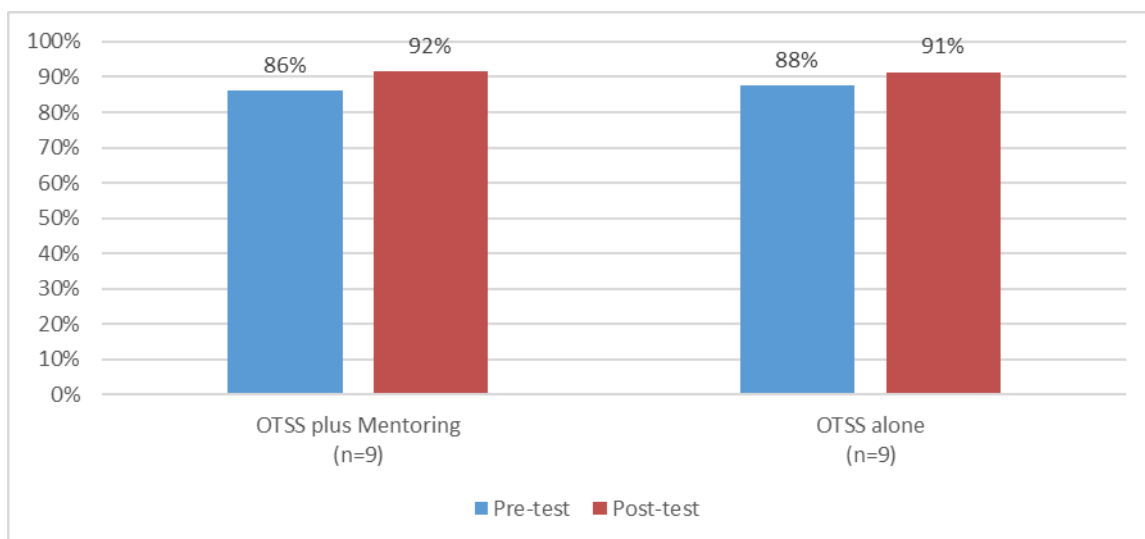
- Utilizing the core group of ten severe malaria mentors (clinicians) trained early in PY4, MalariaCare continued to work closely with the NMCP, the Queen Elizabeth Central Hospital, and Malaria Alert Center to support the trained mentors to conduct two rounds of clinical mentoring. Mentorship can be distinguished from clinical supervision and clinical education, as the aim of

“The mentorship was good in such a way that I have learnt a lot about malaria case management, be it history taking, physical examination, investigations done up to treatment. The process should be ongoing; it should not be a one-off event” – Mentee

mentoring is to go beyond ensuring the proper execution of tasks and the exchange of clinical knowledge.⁹ Intensive mentoring is used to specifically target areas of clinical weakness, both for in-patient and out-patient care, and improve performance using problem-solving approaches and experiences that have worked in similar settings.

- The first round, conducted in 15 facilities, was a piloting round designed to orient the mentors to the process. To assess any added benefit of mentoring after this orientation round, 34 lower-performing facilities were chosen and 17 randomized to receive mentoring, while the remaining 17 received OTSS alone (Figure 56). In July 2016, the 17 selected facilities received a one- to two-day mentoring visit. During the visits, a total of 60 health providers were mentored, or an average of 3 to 4 providers per health facility. A pre-test was administered to 48 of the 60 mentees (80 percent) and a post-test was administered to 31 mentees (52 percent). Due to schedule conflicts, the remaining 17 were not available for post-test. Of the 31 with scores at both pre- and post-test, the mean pre-test score was 64 percent and the mean post-test score was 90 percent. This indicates a gain of 26 percentage points in knowledge and skills in malaria case management. To assess added benefit of intensive mentoring over OTSS visits alone, seven health facility indicators of case management performance were measured in both control and intervention facilities during an OTSS round after the intervention that included: 1) RDT performance; 2) clinical management; 3) testing prior to treatment; 4) adherence to negative test results; 5) adherence to positive test results; 6) diagnosis; and 7) management of severe malaria. At baseline (OTSS in March–April 2016), the average score across all seven key indicators in both arms was 74 percent. By the next OTSS visit held in August–September 2016, only half of the 34 facilities (9 in the mentoring group and 8 in the OTSS alone) had complete data for all seven key indicators. Among those facilities with data, the average score for facilities that received mentoring was 85 percent, whereas it was 83 percent for facilities that received OTSS alone.

Figure 56. Average facility performance, before and after intensive mentoring, Malawi



Following a regression analysis, there was a significant effect of OTSS alone as seen in the control arm (RR=1.10, 95 percent CI: 1.05–1.15) facilities. Comparing the change in the mentoring group to the OTSS

⁹ Rose M, Best D, Higgs, J, eds. *Transforming Practice Through Clinical Education, Professional Supervision and Mentoring*. London: Elsevier Limited; 2005.

only group, there was no significant effect of the intensive mentoring intervention (RRR=1.02, 95 percent CI: 0.94–1.10).

In addition to the OTSS data, mentors also submitted a qualitative mentoring report, which tracked a set of issues from the first to the second visit. Among some of the improvements reported by mentors, four facilities had improved assessment of outpatients, four had improved inpatient management, two improved use of RDTs, and one had established an emergency triage and treatment system. Specific improvements included increased patient history taking and conducting of physical examinations, improvements in appropriate antibiotic and antimalarial dosing, waiting the appropriate amount of time before reading RDT results and designating support staff to carry out triage. At the second visit, mentors also reported several persistent challenges with seven facilities that had not set up a triage system, three facilities where staff were not conducting patient assessments in the OPD, and three with poor monitoring of inpatients with severe malaria. New issues were also identified during the second visit including influx of new, untrained staff and stockouts of RDTs or ACTs.

Improvements seen in individual performance during the mentoring pre- and post-test after the first round of mentoring and improvements captured in the mentoring reports did not translate into overall facility performance at the following OTSS visit. This may be due to the mentoring visits focusing on areas outside of the OTSS checklist (such as triage) waning knowledge and skills among mentored providers over time, the mentoring intervention not reaching a critical mass of staff to affect overall facility performance, or a combination of these occurrences. MalariaCare has already conducted a second round of mentoring, and we will be able to assess any additional effect of this mentoring on both individual and facility performance during the next round of OTSS. Given that other studies on mentorship have shown that the frequency of mentorship visits is an important factor when assessing the effects of mentorship on health outcomes, health worker performance, and quality of care, the team anticipates that more rounds of mentoring may be required to properly assess the potential impact of this effort.¹⁰

- Following the launch of pre-service training to orient new health providers to Malawi’s updated malaria case management guidelines early in PY4, MalariaCare worked closely with the NMCP to provide follow-up support to 20 clinical tutors at the Ekwendeni College of Health Sciences. Additional follow-up was conducted with seven other universities and medical colleges in August 2016. A summary of key revisions that were made by all eight pre-service training institutions is outlined in the table below (Table 25).

Table 25. Key revisions to pre-service training curricula, course outlines, and logbooks.

Key revisions to pre-service training curricula, course outlines, and logbooks.
<ul style="list-style-type: none">• Updated malaria epidemiological content in training curricula.• Adjusted depth of course content in line with academic year and specialization.• Added triaging of severe malaria to training curricula and course outlines.• Revised competence checklists to include correct administration of injectable artesunate and proper monitoring of patients with severe malaria.

¹⁰ Bailey C, Blake C, Schriver M. et al. A systematic review of supportive supervision as a strategy to improve primary healthcare services in Sub-Saharan Africa. *International Journal of Gynecology & Obstetrics*. 2016;132(1):117–125. Accessed from Elsevier on February 29, 2016.

- Supported NMCP to convene two national malaria case management working group meetings with stakeholders. The first meeting was held in April 2016, the second in September 2016. In total, 46 participants attended, including representatives from PMI, NMCP, the Ministry of Health’s Integrated Management of Childhood Illness (IMCI) unit, the Support for Service Delivery Integration (SSDI) project and other implementing partners.
- Conducted two rounds of joint OTSS (Round 13 and Round 14) to 269 higher-level facilities (across all 29 districts), and two clinical OTSS rounds to 130 lower-level health facilities without laboratories (across the 14 MalariaCare-focus districts: Blantyre, Chiradzulu, Dedza, Likoma, Mchinji, Mwanza, Mzimba North, Mzimba South, Rumphu, Neno, Nkhata Bay, Ntcheu, Ntchisi, and Thyolo.). Two of the focus districts, Likoma and Mwanza, have a small number of facilities, all of which were visited during the joint OTSS, so no additional facilities were visited during joint OTSS. During the visits, supervisor teams used district profiles to provide facility staff with feedback on performance gaps (which were identified during OTSS Round 12), as well as recommendations to address these gaps and improve performance. The following section outlines key OTSS results.

Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.

- Following training of ten laboratory technicians on the collection of blood samples from donors and mass slide production for NAMS, MalariaCare began conducting QA visits to NAMS sites in August 2016. After slides are produced from blood samples, an L1 microscopist reviews them. If they pass this quality control process, additional slides are produced from this same sample and used for the NAMS. As of September 2016, 26 donor samples have been collected from Nkhotakota (35 percent), 9 (35 percent) passed quality control, and 17 (65 percent) need to be re-stained. The latter will then need to go through quality control again before a decision is made whether they can be used. Technicians from Nkhotakota were also provided refresher training on mass slide development during the visit. Unfortunately, none of the 14 donor samples collected from Mchinji passed MalariaCare’s quality control assessment due to poor staining and variability of densities (blood was not properly mixed and parasites settled, causing an uneven distribution of parasites) at the time of the visit. However, four donor samples and 1,000 slides were collected during MalariaCare’s QA visit to Mchinji. Moving forward, the Community Health Service Unit (CHSU) NAMS team will stain and characterize blood films prepared by the Mchinji team at their laboratory in Lilongwe. Quality assurance visits by the CHSU NAMS team will continue over the next two months or until slide collection is complete. Additionally, the CHSU NAMS team intends to collect samples from nearby Bwaila Hospital to expedite collection and slide development. Molecular and microscopic validation is planned for PY5.
- To facilitate use of data for decision-making, MalariaCare supported EDS data-user training at national and district



Lessons learned workshop participants from Mwanza developing action plan to address gaps during next OTSS round. **Photo credit: McPherson Gondwe**

levels. During the national training, 16 high-level NMCP/MOH officials, including M&E staff, were oriented to the EDS platform and MalariaCare’s global scoring system for health facility competencies. A series of district-level training sessions followed a similar approach, and 86 decision-makers were trained (16 national staff trained previously in EDS, 57 district supervisors, and 13 trainers). Trainees learned how to retrieve, analyze, and produce graphics of actual data from OTSS within the EDS database.

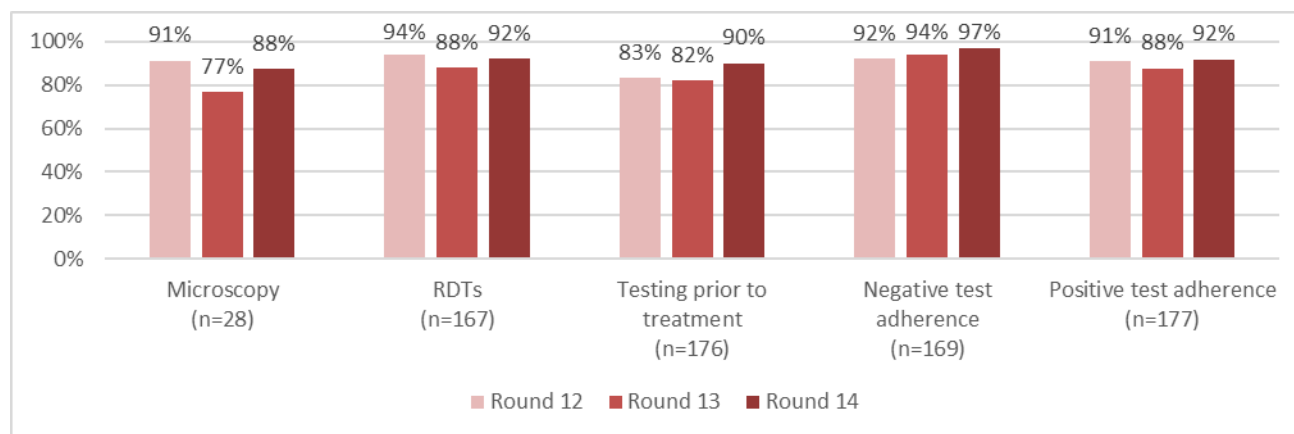
- Conducted two LLWs (Blantyre and Mzuzu) to share results from OTSS Round 12 and Round 13, identify gaps (in each district and overall), and develop action plans to address issues prior to the next OTSS round. In addition to high-level government stakeholders, 163 health workers participated. All districts submitted action plans to NMCP and MalariaCare. MalariaCare will support OTSS supervisors to follow up on these action plans during the next round of OTSS.

Progress made on key MalariaCare indicators

Trend data

During the previous Improving Malaria Diagnostics (IMaD) project, seven rounds of joint OTSS were conducted. To date, MalariaCare has carried out an additional seven rounds of joint OTSS and two rounds of clinical OTSS. Due to improvements in the checklist questions and different facilities visited for each round, performance trends for the majority of facilities currently participating in joint OTSS are only available since Round 12, which was conducted in September of 2015. The trend results in Figure 57 appear to demonstrate the impact of successive visits among those facilities with scores in the latest three rounds. Of the 280 facilities included in joint OTSS visits since September 2015, 228 facilities (or 81 percent) were visited during Round 12 through Round 14. Figure 57 below compares the performance of these facilities with available scores between rounds. The number of facilities with scores in all three rounds varied from 28 facilities (for microscopy, or 26 percent of the 109 microscopy-performing facilities that were visited in all rounds) to 177 facilities (for positive test adherence, or 63 percent of facilities visited in all rounds).

Figure 57. Proportion of joint OTSS health facilities meeting minimum performance target (75%) on competencies, and overall target on register measures (90%), Round 12, Round 13, and Round 14 OTSS, Malawi.



Among these facilities, the majority met MalariaCare’s minimum performance targets across all three rounds. While improvements are seen in three of the five indicators from Round 14 (compared with Round 12), several scores decreased between Round 12 and Round 13. The exception is performance on negative test adherence,

which increased across all three rounds. One reason for this may be that in Round 12, district supervisors were assigned to visit facilities in their own district. Discussions with supervisors determined that they sometimes felt uncomfortable giving feedback to close colleagues on their performance. In later rounds, district supervisors were sent to other districts.

Due to improvements made to the clinical checklist at the beginning of PY4, it is not possible to compare overall clinical scores between the three rounds. However, Table 26 below shows the trends for the three minimum standard steps that have remained consistent throughout all three rounds. Improvement was seen on the checking for at least one sign of severe malaria, with a 37 percentage point increase between Round 12 and Round 14. Performance on the other two indicators remained above 90 percent during all three rounds.

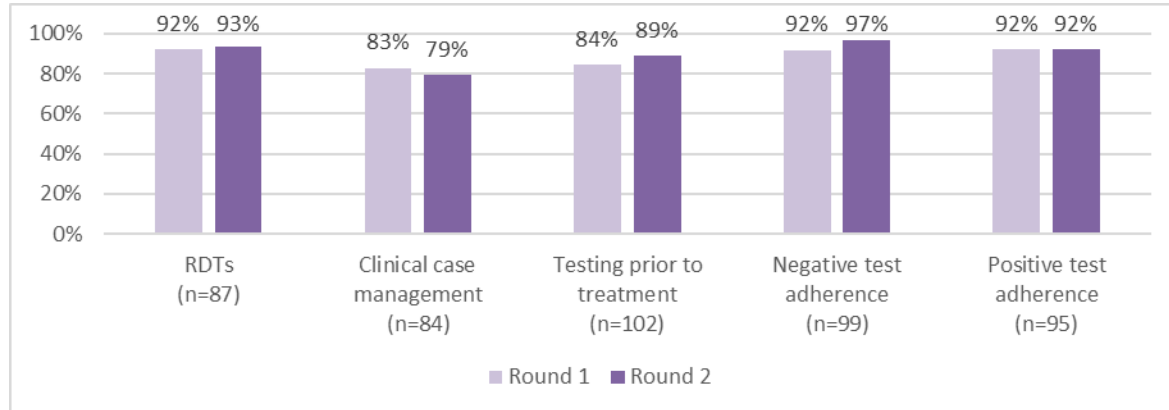
Table 26. Average health facility performance on minimum standard steps for clinical case management between Round 12, Round 13, and Round 14 OTSS, Malawi (n=157 of 228 facilities visited)

Step	Round 12	Round 13	Round 14
Checks for at least one sign of severe malaria (or apparent)	48%	67%	85%
Supervisor agrees with whether a malaria test should be ordered*	95%	97%	97%
Correct prescription per test result (if available) & diagnosis	93%	94%	91%

*Counted as yes if test is not available

In PY4, clinical OTSS was initiated and two rounds were completed. Of the 168 facilities expected to be visited, 130 (77 percent) were visited in Round 1, and 121 (93 percent) were visited again in Round 2. Figure 58 shows the proportion of health facilities meeting the minimum performance target (75%) on competencies and the overall target (90%) on register measures during sequential rounds of clinical OTSS. The number of facilities with sufficient data to produce scores in both rounds ranged from 84 facilities for clinical case management (69 percent) to 102 facilities for testing prior to treatment (84 percent). The proportion of clinical OTSS facilities meeting the minimum performance target improved slightly between Round 1 and Round 2 for all indicators, with the exception of clinical case management, which went down 4 percent. Clinical improvement and performance overall in MalariaCare countries has lagged compared to diagnostic competencies. This is not unexpected as RDT and microscopy performance are a set of defined, repetitive steps while clinical competency is more complex with varying clinical presentations requiring both objective and subjective decision making on the part of the provider. There was more of an improvement in regards to testing prior to treatment and negative test adherence, with a 5 percentage point increase in facilities meeting the standard for both of these indicators.

Figure 58. Proportion of clinical OTSS health facilities meeting the minimum performance target (75%) on competencies, and overall target on register measures (90%), Round 1 versus Round 2 OTSS, Malawi.



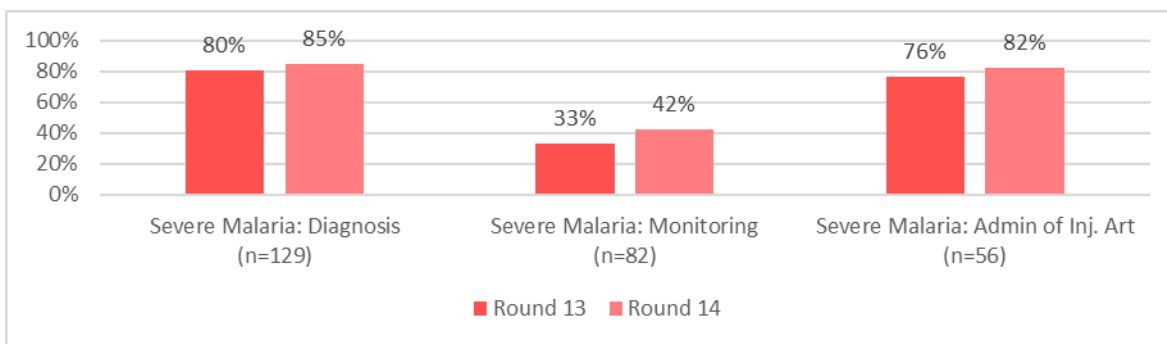
Severe malaria

In PY4, the NMCP, in collaboration with partners including MalariaCare, developed a national severe malaria checklist that MalariaCare used during OTSS visits. This checklist, which focuses on diagnosis and monitoring of severe malaria as well as the procedure for administering injectable artesunate, was incorporated into Round 13 and Round 14 for joint OTSS and both the first and second clinical OTSS rounds. For these checklists, there is no minimum performance target; therefore, average scores on each section are reported.

Of the 247 facilities included in joint OTSS that were visited in both Round 13 and Round 14, the number of facilities with scores in both rounds varied from 56 facilities (for administration of injectable artesunate, or 23 percent of facilities) to 129 (for diagnosis of severe malaria, or 52 percent of facilities). This is lower than for other indicators, as not all facilities offer each of these severe malaria services. MalariaCare is working with the NMCP to better determine for which facilities the severe malaria tool is most appropriate.

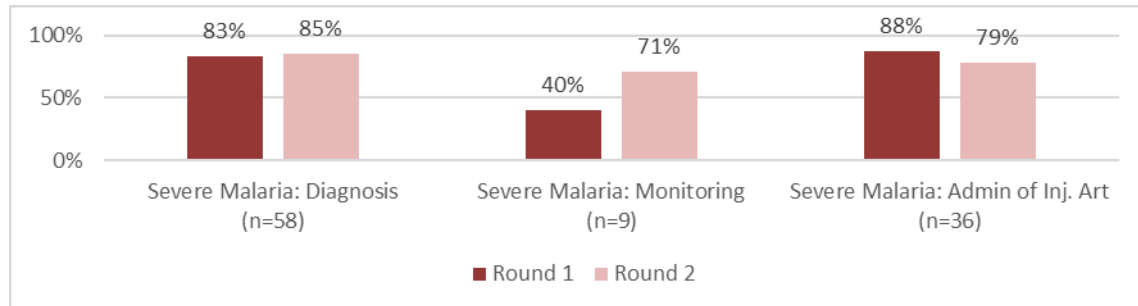
Facilities scored higher in diagnosis of severe malaria, with an average score of 85 percent in Round 14 (a 5 percentage point increase from Round 13) and administration of injectable artesunate (Figure 59). This indicates that knowledge of administration of injectable artesunate and processes for diagnosis of severe malaria are quite high and improving over time. However, facilities performed poorly on monitoring of severe malaria, with an average score of 42 percent in Round 14. In general, supervisors identified staffing shortages in patient wards and recording of results as two major barriers to routine monitoring of inpatients.

Figure 59. Average score of joint OTSS health facilities on severe malaria competencies, Round 13 versus Round 14, Malawi.



Among the 121 facilities that were visited during both rounds of clinical OTSS, the number of facilities with sufficient data to produce scores varied from 9 facilities for administration of injectable artesunate (7 percent of facilities) to 129 for diagnosis of severe malaria (48 percent of facilities) (Figure 60). Similar to the joint OTSS rounds, facilities performed best on severe malaria diagnosis, with an average score of 85 percent in Round 2 (a 2 percentage point increase from Round 1). For monitoring of severe malaria, facilities received an average score of 40 percent for Round 1. This average score increased by 31 percentage points between Round 1 and Round 2; however, it represents a small proportion of the total facilities (n=9) and should, therefore, be interpreted with caution.

Figure 60. Average score of clinical OTSS health facilities on severe malaria competencies, Round 1 versus Round 2, Malawi.



The following section provides an overview of the current status of technical performance (microscopy, RDTs, clinical performance) and adherence (testing before treatment, adherence to negative test results, adherence to positive test results) indicators, based on each facility’s most recent visit in the past year.

Most recent visit

Performance on key competencies

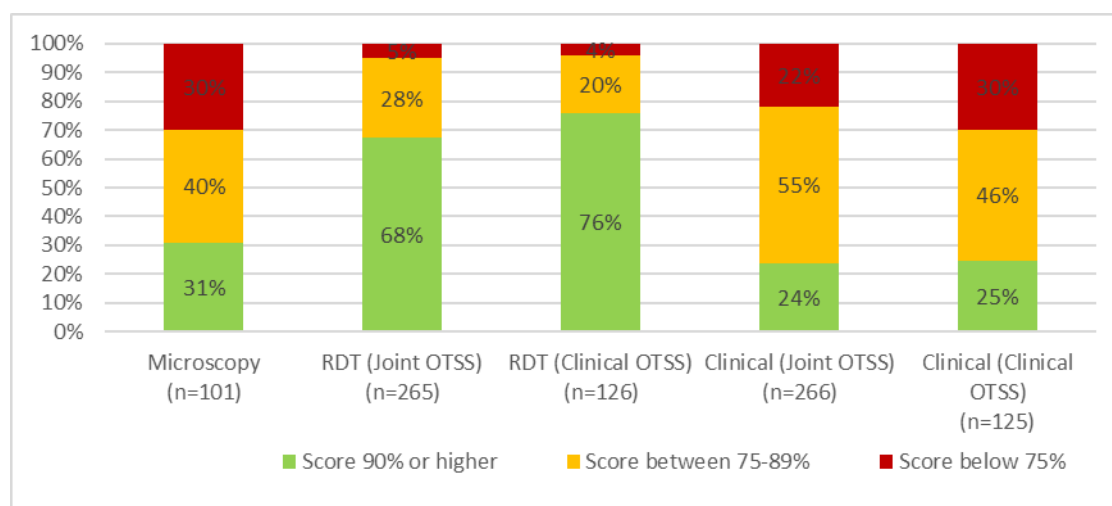
During PY4, 269 facilities were visited in Round 13 through Round 14 in 29 districts during joint OTSS, and 130 facilities were visited during Round 1 and Round 2 in the 14 focus-districts during clinical-only OTSS, which is conducted at lower level facilities. In total, this represents approximately 38 percent of all health facilities in Malawi. During both clinical and joint OTSS, 3 observations of clinical care are conducted and mentoring performed based on areas of need. Facilities with joint OTSS are larger facilities, typically with laboratories, and

have had more rounds of OTSS than those receiving clinical OTSS rounds only, which typically occur at lower level facilities.

Of the 269 facilities visited during joint OTSS, 265 (99 percent) had sufficient data to calculate RDT performance scores and 266 (99 percent) had sufficient data to calculate clinical case management scores at their most recent visit (Figure 61). Of the 109 facilities that performed microscopy included in joint OTSS, 92 (83 percent) had sufficient data to receive a microscopy score at their most recent visit.

Of the 130 facilities visited during clinical OTSS, 126 (97 percent) had sufficient data to calculate RDT performance scores and 125 (99 percent) had sufficient data to calculate clinical case management scores at their most recent visit.

Figure 61. Proportion of health facilities meeting minimum (75%) and overall (90%) targets on technical performance indicators during most recent joint OTSS and clinical OTSS to facilities without laboratories, Malawi.



Note: Due to rounding, percentages presented here may not sum to 100%; and the proportion of facilities meeting the minimum performance target is most accurately calculated as 100% minus the number reported as not meeting the minimum performance target (i.e. scored below 75%).

RDT performance is at a high level of competence, with 96 percent of facilities included in joint OTSS and facilities included in clinical OTSS meeting the minimum target (75 percent compliance). Similar to other countries, health workers most often miss the standard of waiting the correct amount of time for the test result, with only 82 percent and 86 percent of observations meeting this standard on average per facility during joint OTSS and clinical OTSS, respectively.

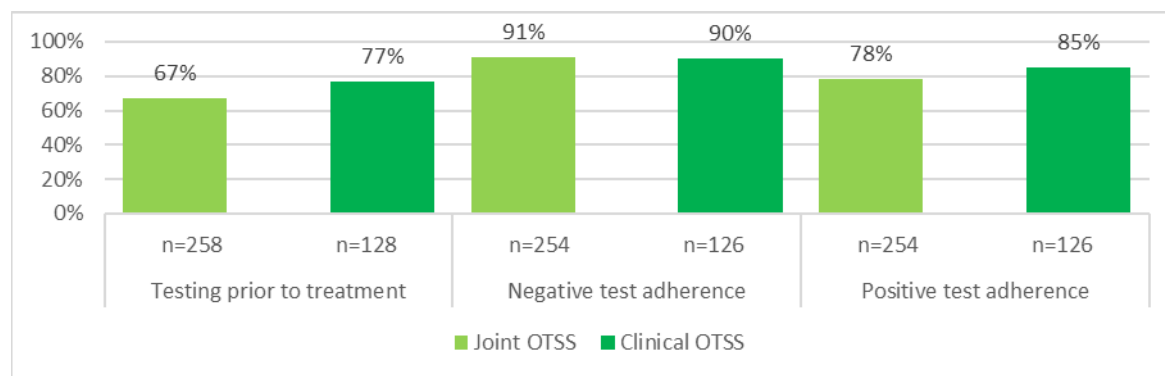
Competence is lower for both microscopy and clinical case management. For microscopy, which is only assessed during joint OTSS visits, 71 percent of facilities met the standard. Of the three major categories of steps (slide preparation, staining, and reading), slide preparation and slide staining appear to be the areas with the greatest room for improvement; less than 70 percent of facilities correctly completed the minimum standard steps for slide preparation and slide staining using field stain. Only one lab staff used the Giemsa stain and so performance with this stain could not be fully assessed.

For clinical case management, 79 percent of facilities included in joint OTSS, and 71 percent of facilities included in clinical OTSS, typically lower level facilities with fewer OTSS visits, met the minimum standard. Although there has been improvement as shown in the trend analysis, MalariaCare will continue to strengthen the mentoring capacity of clinical supervisors to target and improve deficient areas. Providers are generally making the correct decision to order a test, diagnosing uncomplicated malaria, and treating appropriately, but checking for signs of severe disease remains the most challenging minimum standard step. For facilities involved in joint OTSS and clinical OTSS, 83 and 81 percent of facilities respectively met this standard. Other common deficiencies as seen in other MalariaCare countries include performing a comprehensive history and physical exam that target causes of fever.

Measures of adherence

To gain a better understanding of testing and treatment behavior outside of clinical observations, supervisors review a sample of health facility register records during OTSS to estimate testing before provision of antimalarial treatment, as well as treatment adherence to malaria test results. For facilities included in joint OTSS, 258 of the 269 (96 percent) and for facilities included in clinical OTSS, 128 out of 130 (98 percent) had sufficient information on ACT records to estimate testing prior to treatment. For both negative and positive test adherence, 254 of the 269 facilities included in joint OTSS (94 percent) and 126 of the 130 facilities included in clinical OTSS (97 percent) had sufficient data to produce scores. Results for these indicators are displayed in Figure 62 below.

Figure 62. Proportion of health facilities meeting overall performance target (90%) for testing before treatment and adherence to test results during most recent OTSS visit, Malawi

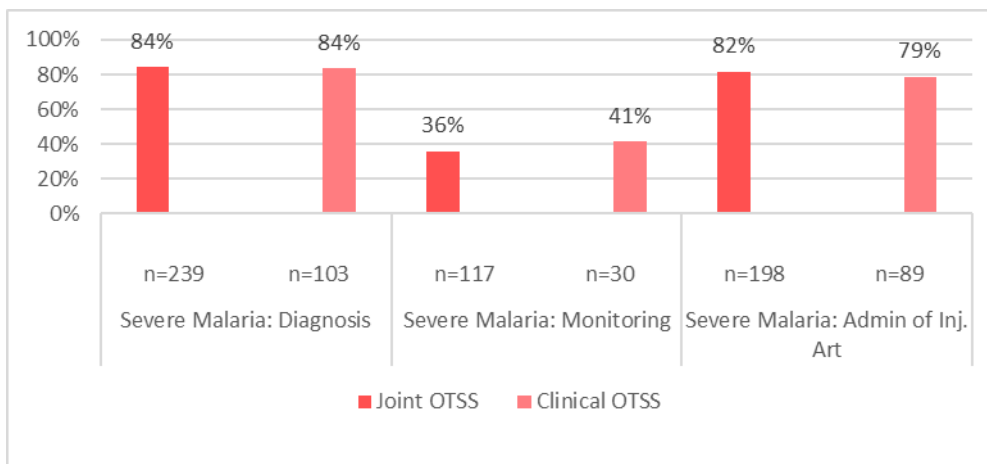


In 67 percent of facilities with data included in joint OTSS and 77 percent of facilities with data included in clinical OTSS, supervisors found a corresponding test result for 90 percent or more of the ACT records sampled. The majority of facilities are meeting the 90 percent target for negative test adherence (negative test results with no corresponding ACT prescription): 91 percent of facilities included in joint OTSS and 90 percent of facilities included in clinical OTSS met the target. A lower proportion of facilities included in joint OTSS met the target for positive test adherence than for negative test adherence: 78 percent of facilities included in joint OTSS and 85 percent of facilities included in clinical OTSS met the target for adherence to positive test results. Lower performance in the facilities receiving joint OTSS may be due to the fact that these are larger facilities with potentially multiple clinical and lab registers, which makes the process of linking registers more difficult.

Severe malaria

Figure 63 summarizes health facility performance on the three severe malaria indicators for the most recent visit at both those facilities receiving joint OTSS and those receiving clinical OTSS. Of the 269 facilities included in joint OTSS, the number of facilities with a score for each severe malaria indicator varied from 117 facilities for patient monitoring (43 percent of facilities) to 239 for diagnosis of severe malaria (89 percent of facilities). For the 130 facilities included in clinical OTSS, the number of facilities with a score for each severe malaria indicator varied from 30 facilities for patient monitoring (23 percent of facilities) to 103 for diagnosis of severe malaria (79 percent of facilities). For RDTs, 239 (99 percent) facilities receiving joint OTSS and 103 (97 percent) facilities receiving clinical OTSS had scores available; for clinical case management, 266 (99 percent) facilities receiving joint OTSS and 125 (96 percent) facilities receiving clinical OTSS had sufficient data to receive a score.

Figure 63. Average score of facilities on severe malaria indicators during most recent OTSS visit, Malawi.



Facilities performed best on severe malaria diagnosis, with both facilities included in joint OTSS and those included in clinical OTSS receiving an average score of 84 percent. The majority of facilities performed poorly on severe malaria monitoring, with facilities included in joint OTSS receiving an average score of 36 percent and facilities included in clinical OTSS receiving an average score of 41 percent. As stated in the trend analysis, knowledge of administration of injectable artesunate and processes for diagnosis of severe malaria are quite high, whereas monitoring of severe malaria inpatients is low due to lack of staff and poor recording.

Challenges

Challenge	Solution
Delayed implementation of iCCM activities due to finalization of a national roll-out plan for iCCM.	MalariaCare continued working closely with PMI, the MOH, and implementing partners, as the national roll-out plan for iCCM activities was finalized. MalariaCare's support for iCCM implementation started late in PY4. The team will continue to provide support for iCCM in PY5.
Stock-outs of malaria commodities negatively affected providers' ability to provide health service in line with national guidelines.	While procurement of commodities is outside of MalariaCare's mandate, the team will continue to flag these issues with NMCP, PMI, and partners during stakeholder meetings.

Next steps

- As MalariaCare enters its final year, transition of key project approaches and sustainability considerations will be the primary focus of project activities. Key efforts will include further building the capacity of core (diagnostic and clinical) trainers, expanding the role of local training institutions in clinical mentoring and pre-service training, enhancing use of project data for decision-making, expanding support for management of severe malaria, sharing lessons learned, and working closely with the NMCP and implementing partners (e.g., the new PMI bilateral project and Global Fund–supported efforts) on smooth transition of activities.
- During OTSS, MalariaCare will continue to strengthen implementation of QA case management, with a particular focus on lower-performing facilities. OTSS health facility performance data—available through EDS in all 29 districts—will be increasingly used to target interventions and identify health system gaps.
- To enhance microscopy skills at lower-level facilities, MalariaCare will provide MDRT for remaining laboratory assistants (not trained in PY4).
- Following the preparatory iCCM activities conducted late in PY4, MalariaCare will support the NMCP through implementation of planned community-level iCCM activities in Thyolo, Blantyre, Mwanza, and Neno to institute a system of QA iCCM.
- To enhance clinical capacity, MalariaCare will continue to collaborate with the NMCP, Malaria Alert Center (MAC), and Queen Elizabeth Central Hospital to assess whether routine OTSS efforts can be effectively enhanced through intensive clinical mentoring. This effort will focus especially on patient monitoring, which has shown weakness and may be contributing to severe malaria case fatality rates. At district level, the mentors will be supported to continuously review OTSS performance data from health facilities and to conduct targeted mentorship of providers in low-performing facilities. An evaluation of performance data following a next round of intensive mentoring will determine whether this complementary step in the project’s QA approach justifies continuation.
- To ensure that updated national case management guidelines are well integrated into pre-service training curricula, MalariaCare will also continue to collaborate with eight major health training institutions (five medical universities and three other health training institutions) and SSDI to assist the NMCP with ensuring that pre-service training institutions are able to successfully incorporate national malaria content into their training curricula.
- MalariaCare will work closely with NMCP and District Medical Offices to transition the EDS approach to NMCP and other implementing partners.

Mali

Introduction



In Mali, MalariaCare works in partnership with the National Institute of Public Health Research (Institut National de Recherche en Santé Publique, or INRSP) and the PNLP to build and strengthen the capacity of laboratory technicians and clinicians in supervision and mentorship. Through outreach training and supportive supervision, these trained supervisors strengthen competence of providers in diagnosis and treatment of malaria according to the revised national guidelines. In PY4, MalariaCare focused its work on the regions of Segou and Mopti. However, through technical assistance to other malaria intervention partners, the project continued to support case management QA activities in the three northern regions of Timbuktu, Gao, and Kidal as well as the four previous MalariaCare target

regions (Bamako, Sikasso, Koulikoro, and Kayes). In doing so, MalariaCare has created synergies with the Global Fund (through PSI), High Impact Health Service (Service de Santé a Grand Impacte, or SSGI), and PSI private-sector interventions by standardizing case management training and supervision nationwide. Supervisors of these networks were trained in the use of the case management QA tool and provided with tools to perform the same QA supervision and mentorship to these clinics as in the public facilities.

Key accomplishments

Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent.

- In collaboration with the INRSP, the project organized a five-day basic MDRT on microscopy and RDT skills for 20 lab technicians from the two target regions of Mopti and Segou. Significant improvements were observed between pre- and post-test scores relating to disease pathogenesis, laboratory knowledge, and QA. The average score for the knowledge test increased from 36 percent at pre-test (median 40 percent; range 13 percent to 60 percent) to 72 percent at post-test (median 80 percent; range 18 percent to 95 percent)—an increase of 36 percentage points.
- Of all 20 participants, none attained the minimum competency standards for expert microscopist at WHO L2 for all three competency areas (parasite detection: 80 percent; species identification: 80 percent; parasite counting: 40 percent) (see Table 2 for WHO equivalent score summary). However, when supervisor competency is assessed for only parasite detection, 40 percent of participants obtained L1 equivalent scores, and 20 percent attained L2 equivalency. Species identification and



Malaria diagnostics refresher training (MDRT) participants practice reading malaria slides.
Photo credit: MalariaCare Mali

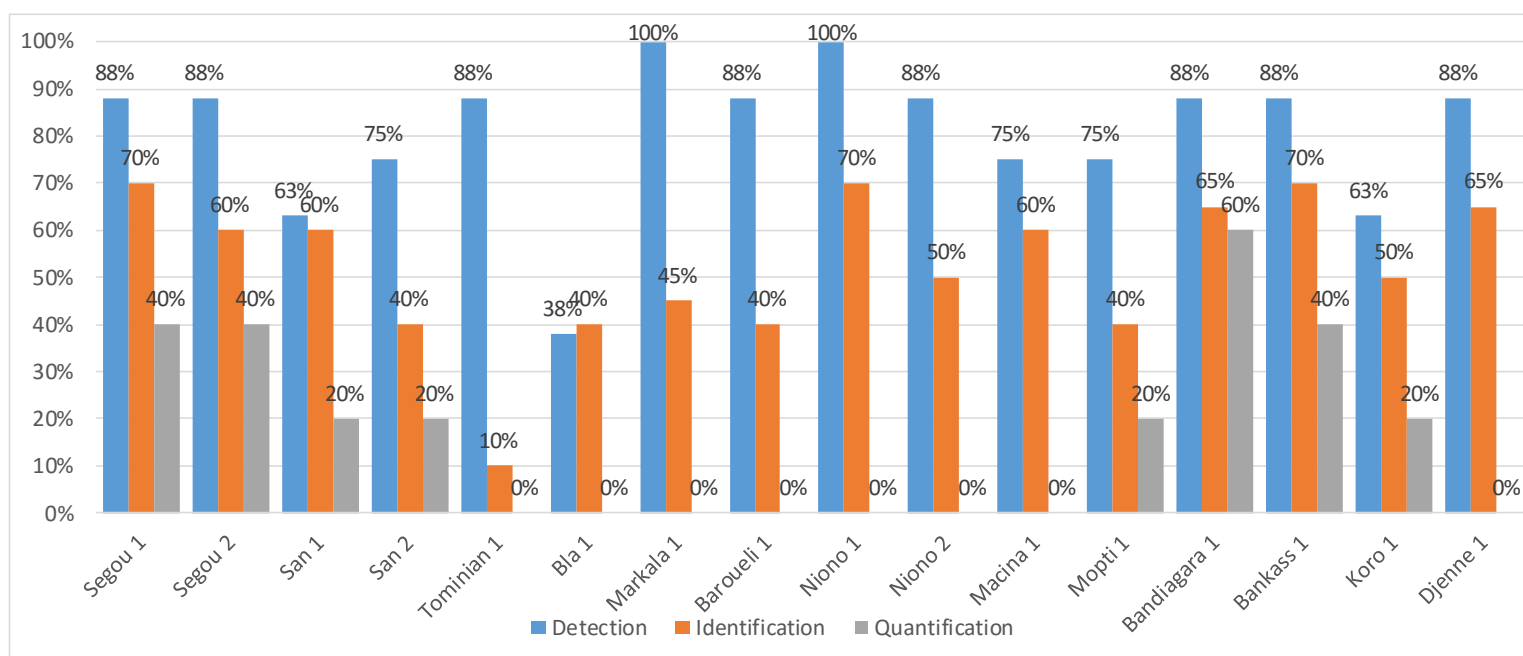
parasite counting have been identified as challenges in Mali, as in other countries. Species identification is generally not a part of routine practice and is difficult to master during a one-week MDRT training. During this training, the mean score for species identification rose from 39 percent at pre-test to 47 percent at post-test. Parasite counting scores remained low over the course of the training, increasing by only three percentage points, from 17 percent at pre-test to 20 percent at post-test. Table 27 below provides additional information on pre- and post-test results.

Table 27. Basic malaria diagnostics refresher training (MDRT) microscopy practical pre- and post-test results, Mali (n=20).

Competency area	Average pre-test score (median [range])	Average post-test score (median [range])	% point change in score
Parasite detection	76% (77% [54%–92%])	86% (89% [57%–100%])	10
Species identification	39% (40% [12%–73%])	47% (48% [33%–66%])	8
Parasite counting	17% (20% [0%–60%])	20% (22% [0%–44%])	3

- During the first round of OTSS visits following this training, laboratory technicians at the 16 reference facilities underwent proficiency testing. During the first round of these post-MDRT follow-up assessment visits, the performance of the MDRT participants was good for parasite detection, with 63 percent of participants scoring 80 percent or higher with a median score of 88 percent. Unsurprisingly, based on performance at the MDRT, participants generally showed difficulty in their ability to conduct quantification and species identification, with average scores at 52 percent and 16 percent, respectively (see Figure 64 below for individual performance). Average performance of the microscopists fell slightly from the average results at the MDRT post-test: parasite detection fell from 86 percent to 81 percent, parasite identification rose from 47 percent to 52 percent, and quantification fell from 20 percent to 16 percent. The laboratory staff assessed indicated a desire for continued OTSS visits focusing on slide reading. PT results for the second round of OTSS, which will conclude in early PY5, will be shared in the PY5 semi-annual report.

Figure 64. MDRT participant follow-up assessment performance, OTSS Round 1, Mali (n=16).



- Conducted an advanced MDRT and pre-ECAMM follow-up training for four microscopists selected to attend the ECAMM. Held over three days, this course sought to reinforce the microscopy skills and competencies in malaria microscopy immediately prior to participating in the ECAMM. While the competencies of these microscopists were already fairly high, particularly in parasite detection (average pre-test score was 92 percent), significant improvement was made in parasite counting, with an increase in average score by 27 percentage points, from 33 to 60 percent, and an increase in average score for species identification from 67 to 74 percent (see Table 2 for WHO equivalent score summary). Table 28 below provides additional information on pre- and post-test results.

Table 28. Advanced malaria diagnostics refresher training (MDRT) microscopy practical pre- and post-test results, Mali (n=4).

Competency area	Average pre-test score (median [range])	Average post-test score (median [range])	% point change in score
Parasite detection	92% (92% [85%–100%])	98% (100% [93%–100%])	6
Species identification	67% (65% [65%–73%])	74% (77% [58%–85%])	7
Parasite counting*	33% (40% [20%–40%])	60% (60% [40%–80%])	27

*NOTE: one participant’s score for parasite counting was not considered due to a faulty microscope during the pre-test.

- Following the advanced MDRT pre-ECAMM course, the four microscopists traveled to Dakar, Senegal, to undergo ECAMM. Two participants received WHO L1 accreditation, one received L2 accreditation, and the fourth achieved L3 competency.

Objective 2: Increased percentage of patients suspected to have malaria or a febrile illness who receive a diagnostic test for malaria.

- Conducted OTSS supervisor training for 32 clinical and laboratory district supervisors from Mopti and Segou regions. Over the course of three days, these new supervisors were introduced to the objectives and strategies for conducting an OTSS visit; planning and preparing for an OTSS visit; the MalariaCare OTSS checklist; and group exercises to train supervisors on conducting observations, providing feedback and mentorship to facility staff, and developing action plans. There was a notable increase in performance on the theory pre- and post-test by 33 percentage points, from an average score of 41 percent at pre-test (median score 40 percent; range 20 to 73 percent) to 74 percent at post-test (median score 75 percent; range 45 percent to 95 percent).
- Completed the project's first two rounds of OTSS (Round 1 and Round 2) in Segou, and OTSS Round 1 in Mopti. In PY4, OTSS visits were conducted in a total of 144 health facilities, including 16 reference facilities and 128 community health centers. This represents approximately 7 percent of all health facilities in Mali.¹¹ The following section highlights key findings on performance and other information for OTSS health facilities visited in PY4.

Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illness—consistent with the result of the diagnostic test.

- Prior to transitioning implementation of activities to SSGI, MalariaCare conducted the first round of OTSS (Round 1) in Bamako, Koulikoro, Kayes, and Sikasso regions (a carry-over activity from PY3). OTSS visits were conducted in 136 health facilities, including 34 reference facilities and 102 community health centers. Following this round of OTSS, SSGI took over implementation of malaria QA activities in these regions with technical assistance from MalariaCare, including OTSS Round 2 in late PY4.
- In collaboration with the PNL, MalariaCare organized a clinical case management refresher training to build the capacity of clinicians to improve the knowledge of and adherence to the national clinical case management guidelines. Thirty-eight clinicians from all 16 districts in Mopti and Segou regions attended the training, which focused on clinical management of severe and uncomplicated malaria. Significant improvements and generally good performance were observed between pre- and post-test scores. The average score increased by 11 percentage points, from 82 percent at pre-test (median score 85 percent; range 40 to 100 percent) to 93 percent at post-test (median score 100 percent; range 50 to 100 percent). Sixteen of the clinicians trained will be selected as clinical supervisors who will join their laboratory counterparts in the joint clinical and laboratory OTSS later in the project year.

Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.

- Conducted the first LLWs in Mopti and Segou regions. At these workshops, PNL representatives, key regional representatives, and regional- and district-level supervisors gathered to share experiences and data from the first round of OTSS in these regions. At the LLW, results on key OTSS indicators were presented and discussed, and participants received an orientation to methodologies for calculating the key indicators. Additionally, on-the-job training and mentoring practices were reviewed, and participants were trained on developing action plans to improve on identified weaknesses using specific, measureable, attainable, realistic

¹¹ US President's Malaria Initiative. Mali Malaria Operational Plan FY2016

and timely (SMART) goals. Following this review, districts broke into teams to develop those action plans. Following discussion of the data and action plans, the group began planning for peer-to-peer mentoring visits to poor-performing facilities following the next round of OTSS.

- During visits in facilities with laboratories, supervisors also worked to strengthen external/internal quality assurance systems for malaria diagnosis by implementing an EQA slide reading program by evaluating laboratory technicians during OTSS visits. Supervisors carried ten well-characterized malaria slides during OTSS visits, which were then read by laboratory staff under the watch of the supervisor. Additional mentoring and guidance was provided to laboratory technicians based on their performance reading the ten slides.
- Procured 11 Olympus CX training microscopes and a microscope camera and projection equipment, which were turned over to the INRSP and distributed to training facilities around the country to support improved microscopy training and QA activities in Mali.
- Conducted EDS end-user training for clinical and laboratory OTSS supervisors in Mopti and Segou to conduct OTSS visits using the tablet-based EDS, which was rolled out during Round 2 of OTSS. Over the course of three days, these supervisors were trained on utilizing the tablets to conduct supervision visits in their districts. General introductions to the tablets and EDS were followed by role-playing and practicing completing the electronic checklist during observations, developing action plans based on weaknesses identified, and conducting a field visit to nearby health facilities to conduct a trial EDS-based OTSS visit. In general, participant understanding of using the system was high by the end of the training, and participants reported confidence in their ability to conduct supervision using EDS.
- Provided technical assistance to Global Fund partner PSI to support a four-day MDRT for laboratory technicians from the northern regions of Kidal, Gao, and Timbuktu. The training was facilitated in collaboration with the PNL and INRSP and included 11 laboratory technicians. This training is the first in a series of cascading training sessions aimed at enabling participants to acquire and develop essential knowledge and competency in malaria diagnosis, and to be capable of subsequently passing on acquired knowledge and skills to other technicians in the northern regions through successive training, mentoring, and supervision in the Global Fund focus regions. Table 29 below details pre- and post-test score information for these participants. The results show that technicians from these regions started up with low skills in all areas of microscopy, but achieved significant gains in the post-test scores. In spite of these gains, the technicians will need further support to reach WHO levels in each area. MalariaCare will continue to work with PSI to support follow-up with the trained technicians to ensure upkeep of acquired skills.

Table 29. Participant performance in parasite detection, identification, density, and diagnostic microscopy theory; MalariaCare malaria diagnostics refresher training in northern regions, Mali (n=11).

Competency area	Average pre-test score (median [range])	Average post-test score (median [range])	% point change in average score
Parasite detection	59% (54% [46%–77%])	92% (93% [79%–100%])	33
Species identification	46% (47% [22%–64%])	72% (72% [61%–78%])	26
Parasite counting	0% (0% [0%–0%])	20% (20% [0%–40%])	20
Theory evaluation	35% (35% [25%–51%])	70% (73% [55%–85%])	35

- Provided technical assistance to PSI and SSGI to conduct supervisor training for OTSS supervisors in their target regions. MalariaCare provided training materials to PSI to train 35 clinical and laboratory supervisors in Gao, Kidal, and Timbuktu. Additionally, MalariaCare provided the same technical assistance to SSGI to train 41 participants responsible for conducting OTSS visits in the SSGI focus regions of Kayes, Koulikoro, and Sikasso, and in Bamako district. Overall, participants scores increased by 16 percentage points, from an average of 53 percent at pre-test (median score 53 percent; range 13 to 85 percent) to an average of 69 percent at post-test (median score 70 percent; range 25 to 93 percent). Participants reported that the approach was unique in its focus using supervision visits as an opportunity to provide mentorship to providers in their districts.

MalariaCare is also providing technical assistance to SSGI during OTSS Round 2 visits in the same regions.

- Provided technical assistance to SSGI to conduct a two-day training in RDT QA for district-level supervisors from Kayes region. This training aimed to improve RDT competency and confidence in RDT results to improve provider adherence to test results. District supervisors from Sikasso, Bamako, and Koulikoro will also benefit from this training in PY5.
- Given that a sizeable proportion of the population with malaria initially seeks help from the private sector (including pharmacies and patent drug dealers), which accounts for about 44 percent of service provision¹² in Mali, MalariaCare expanded its support to the private sector in the first half of PY4.

As a first step, MalariaCare supported a clinical supervisor training for 15 midwife supervisors who supervise private community-level health facilities in Bamako. During the training, these supervisors were introduced to the clinical OTSS tool and methodologies and were trained on key supervision and mentoring skills.

The five highest-performing midwives were selected to act as supervisors in a pilot round of OTSS, which was conducted concurrently with joint clinical/laboratory OTSS visits in late PY4. Results from this OTSS pilot will be shared with the PNL and PMI to provide a summary report of issues facing the provision of high-quality malaria case management in the private sector.

¹² *Rapport de Mise à Jour de la Carte Sanitaire 2011 CPS/MS.*; 2012. Available at http://www.clustersantemali.net/docs/Carte_sanitaire_2011.pdf.

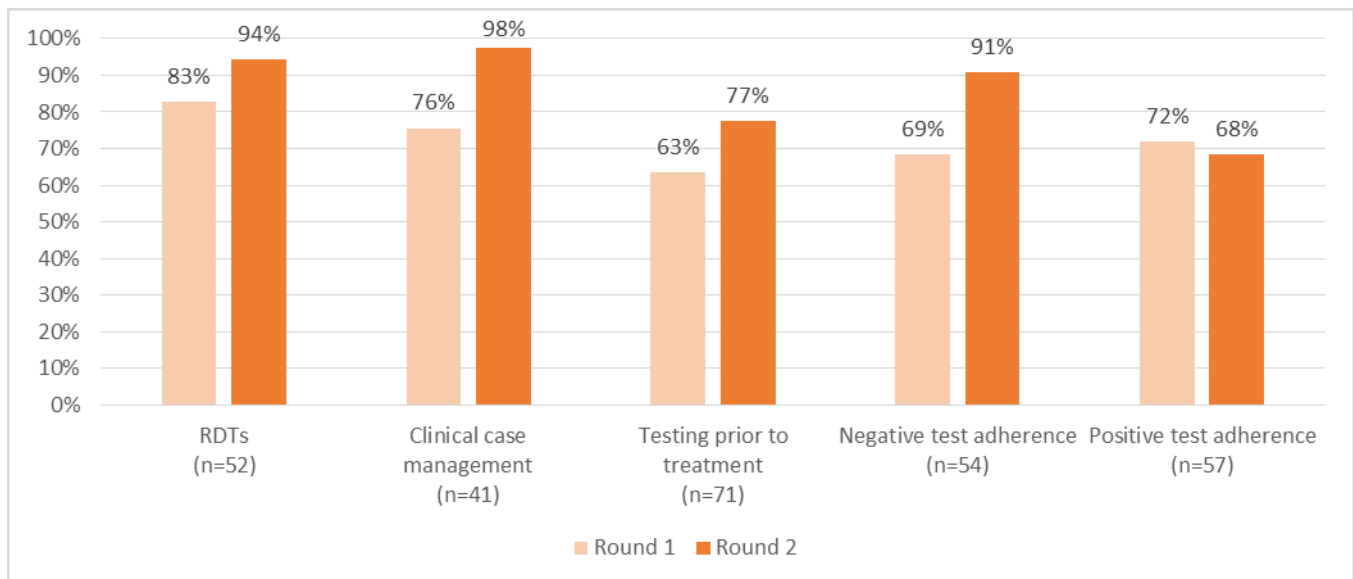
Progress made on key MalariaCare indicators

Trend data

Starting in PY4, at the request of the USAID Mission in Bamako, MalariaCare switched its geographic coverage to cover two regions: Mopti, where one round of OTSS was completed by the end of PY4, and Segou, where two OTSS rounds were completed. Of the 72 facilities MalariaCare planned to visit in Segou, all were visited for both rounds. During the first round, which was completed using paper-based checklists, many supervisors appeared to overlook one or two checklist questions for microscopy, thus no scores were calculated for the majority of facilities visited. For the other indicators, the number of facilities with scores for both rounds varied from 41 (or 57 percent of facilities visited twice) for clinical case management, to 71 (or 99 percent) for testing prior to treatment. Notably, with the introduction of EDS in Round 2, the proportion of available scores increased to 95 percent, from 74 percent in Round 1. MalariaCare attributes this improvement in data quality to the use of EDS (which includes data completeness prompts) as well as improvements in the understanding of the checklist amongst supervisors. Thus, with additional OTSS rounds using EDS, MalariaCare should be able to track improvements in performance among a larger group of facilities moving forward.

Figure 65 summarizes the proportion of facilities in Segou meeting minimum performance targets for RDT and clinical case management competencies (i.e., a facility score of 75 percent or greater) and overall targets for testing prior to treatment and adherence to test results (score of 90 percent or greater). Improvements were seen for all categories, particularly negative test adherence: In Round 1, 69 percent of facilities met the target, while 91 percent of the same facilities did so in Round 2. However, adherence to positive test results declined slightly.

Figure 65. Proportion of health facilities in Segou meeting minimum performance target (75%) on competencies, and overall target on register measures (90%), Round 1 versus Round 2, Mali.

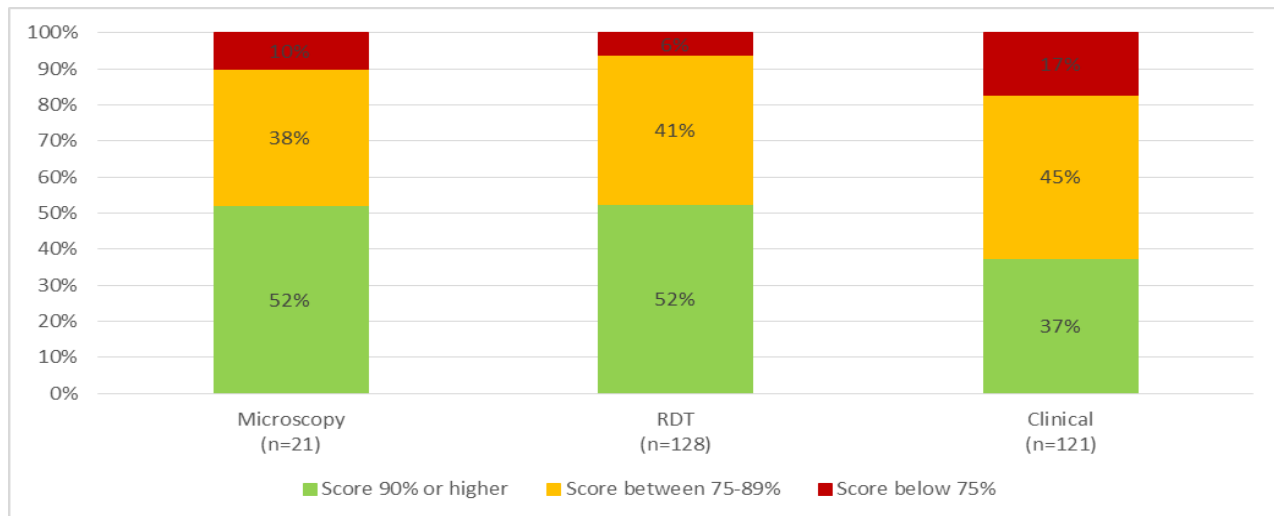


Most recent visit

Performance on key competencies

The following section summarizes the most recent performance results available for all health facilities visited in PY4. A total of 144 facilities were visited at least once. Figure 66 summarizes health facility performance for malaria microscopy, RDT, and clinical competencies during the most recent OTSS visit in PY4.

Figure 66. Proportion of health facilities meeting minimum (75%) and overall (90%) targets on microscopy, RDT, and clinical competencies during the most recent OTSS visit, Mali.



Note: Due to rounding, percentages presented here may not sum to 100%; and the proportion of facilities meeting the minimum performance target is most accurately calculated as 100% minus the number reported as not meeting the minimum performance target (i.e. scored below 75%).

As previously mentioned, microscopy scores could not be calculated for most health facilities in Round 1 because supervisors did not sufficiently document performance on each step. However, due to the improvements in checklist completion seen with the introduction of EDS, scores presented in Figure 66 are primarily from that EDS supported round (which was conducted in Ségou region). Among facilities with available data, 90 percent met the minimum performance target for microscopy (score of 75 percent or higher) and 85 percent met the overall performance target (score of 90 percent or higher). Similar to other countries, slide preparation appears to require more improvement than slide staining or reading. However, compared to other MalariaCare countries, the proportion of facilities where supervisors agreed with staff on parasite detection for every observation was relatively low: 81 percent of facilities did so.

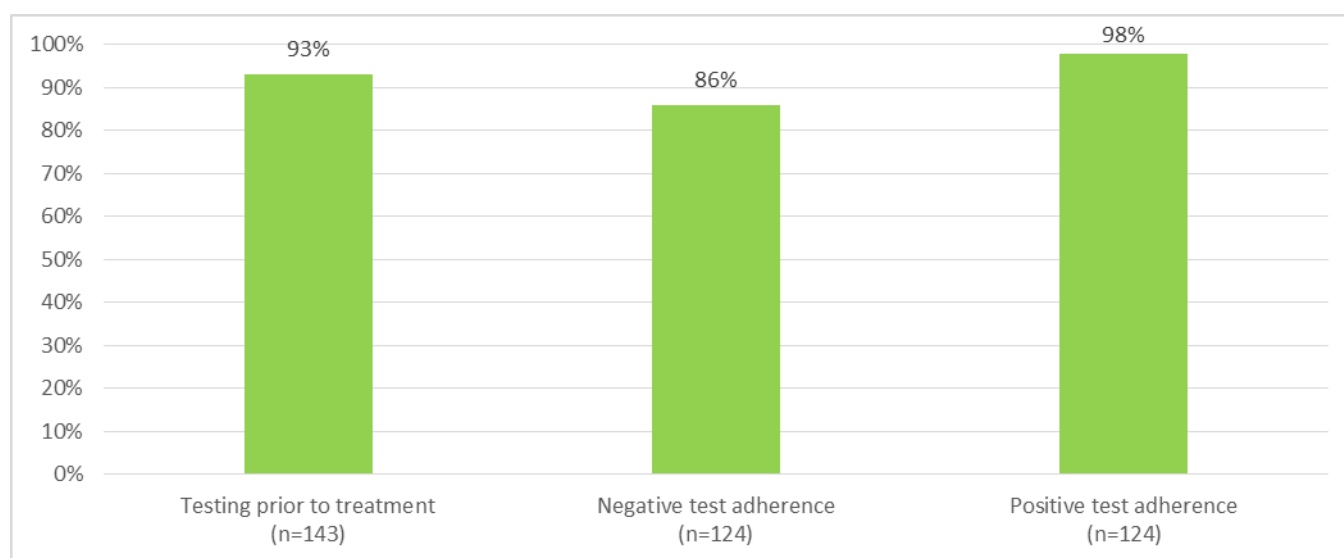
Of the 142 facilities reporting conducting RDTs, 128 (or 89 percent) had sufficient checklist data to calculate an RDT competency score. Of these facilities, 94 percent met the minimum performance target, and 52 percent of facilities met the overall target. Although only 30 percent of Mopti facilities met the overall target of 90 percent, these facilities were only visited once in PY4, whereas Segou facilities received two rounds of OTSS. Because performance between the two regions was similar for the initial visit, MalariaCare anticipates improvement in RDT performance in Mopti once Round 2 for the region concludes in early PY5.

Of the 144 facilities visited for OTSS in PY4, 121 (84 percent) had sufficient data entered in the checklist to receive a clinical performance score. Similar to other countries, clinical performance scores are generally lower than those of diagnostics: only 37 percent of facilities met the overall target of 90 percent. Overall performance (target of 90 percent of steps performed), as in most MalariaCare countries, was lower due to incompleteness in performance of a comprehensive history and physical examination pertinent to febrile illness, and inadequate communication with patients about their illness and previous case.

Measures of Adherence

To gain a better understanding of testing and treatment behavior outside of clinical observations, OTSS supervisors review a sample of health facility register records to estimate testing before antimalarial treatment, as well as treatment adherence to malaria test results. One hundred and forty-three of the 144 facilities visited in PY4 collected sufficient information on ACT records to estimate testing prior to treatment, and 124 of 144 facilities (86 percent) had sufficient data to measure and compare adherence to positive and negative test results. Results for these indicators are displayed in Figure 67.

Figure 67. Proportion of health facilities meeting overall performance target (90%) on testing before treating and adherence to test results during the most recent OTSS visit, Mali.

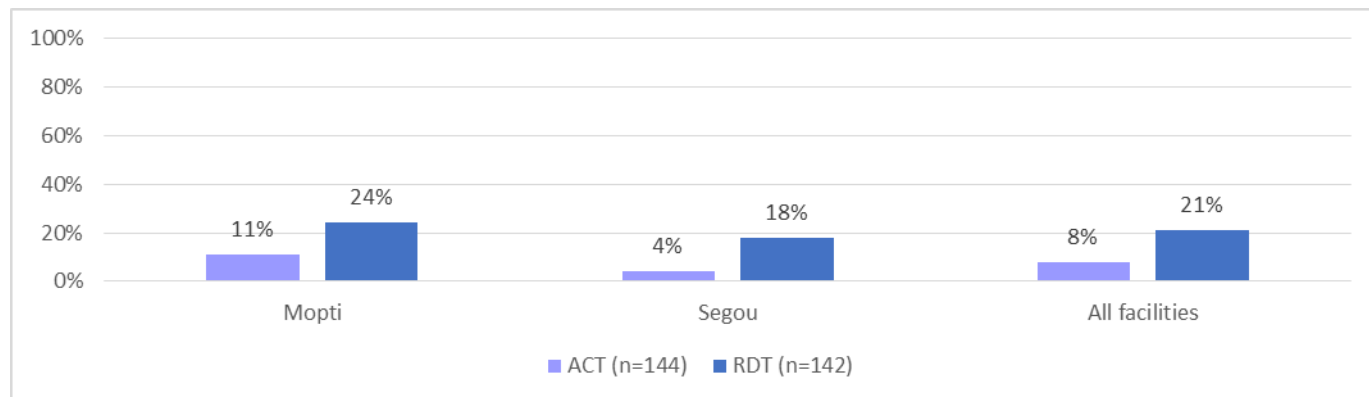


Overall, the proportion of facilities meeting performance targets on these measures is high. Ninety-three percent of facilities had test results for 90 percent or more of ACT records sampled. As with other countries, targets for adherence to negative test results were less often met than adherence targets to positive test results (86 percent compared with 98 percent). This trend was also found during the clinical observations, where prescribing contrary to the test result was done more frequently for negative tests than for positive tests. While OTSS mentoring efforts should be focused on building trust in negative test results, effort should also be made to understand why any patients who test positive for malaria fail to receive appropriate treatment

The OTSS checklist, in addition to a register review section, also asks whether there was a stock-out of ACTs and RDTs lasting more than seven days in the three months prior to the OTSS visit. In Mali, OTSS facilities appear to have a bigger problem with RDT stock-outs than ACT stock-outs: 8 percent reported a significant stock-out of all

first-line ACTs, compared with 21 percent for RDTs (see Figure 68). Stock-outs of RDTs in particular may pose a threat to universal testing prior to prescribing antimalarials, especially in facilities where competent microscopy is not available.

Figure 68. Proportion of health facilities reporting ACT and RDT stock-outs lasting more than 7 days in the 3 months prior to the most recent OTSS visit, Mali.



Challenges

Challenge

Delay between supervisor training and the launch of OTSS in Sikasso, Kayes, Koulikoro, and Bamako regions due to an outbreak of polio and the subsequent vaccination activities.

Solution

Before supervisors started OTSS visits, MalariaCare held an orientation meeting to refresh the skills they had learned during supervisor training. Moving forward, the project team will plan to implement supervisor training and OTSS within a two-month period.

Delays in the roll-out of EDS led to delay in scheduling OTSS during the year and related activities.

Moved forward with a paper-based round in Mopti and Segou in order to maintain the implementation timeline. EDS roll-out followed in the second round of OTSS. Activities like peer-to-peer mentoring, district review meetings, and data user training will carry over into PY5 to allow for use of EDS data.

Difficulties coordinating jointly planned activities with other implanting partners.

MalariaCare has continued to work with other partners by holding coordination meetings to discuss and plan PY5 activities that will require MalariaCare support.

Two identified MalariaCare supervisors (one clinical and one laboratory supervisor) who were previously trained through MalariaCare's MDRT and clinical case management training were not available for supervisor training.

When a supervisor is not able to attend supervisor training, MalariaCare provides a short "crash course" and orientation to the supervisor, either directly before or during the supervisor's first OTSS visit.

Next steps

- Continue to support the PNLP to institutionalize joint clinical and laboratory OTSS within the national system to build the competence of providers in effective early diagnosis and treatment of malaria according to the revised national guidelines. To this end, the project will continue to support standardized case management quality assurance interventions nationwide—such as training, supportive supervision, and lessons learned workshops—through implementation in MalariaCare focus regions and technical assistance to the Global Fund and SSGI interventions.
- Collaborate with Measure Evaluation to ascertain interoperability between the OTSS electronic data collection and the DHIS2 platform. Harmonizing HMIS routine data collection through DHIS2 with OTSS data would strengthen national data management systems and encourage data use for decision-making at multiple levels. MalariaCare will also continue discussions with the PLNP, the Global Fund, and SSGI regarding use of the EDS for malaria supervision across all regions, and the transition of the EDS to the national program in PY5.

Mozambique

Introduction

In PY4, MalariaCare continued to strengthen central- and provincial-level managerial, diagnostic, and clinical case management capacity to plan and coordinate implementation of QA interventions at all levels. MalariaCare worked with the Programa Nacional de Controlo da Malária (PNCP/NMCP) to focus on high-priority areas of capacity-building at the national and provincial levels: early and adequate diagnosis of malaria using both microscopy and RDTs; appropriate treatment, referral, and clinical management of complications of severe malaria; and developing responsive M&E systems capable of providing real-time data on quality of care for use at all levels of decision-making. MalariaCare continued current interventions under way in the two high-burden provinces, Zambezia and Nampula, and expanded its work to two other high-burden provinces, Cabo Delgado and Tete. See Figure 69 for a map of Mozambique provinces with the four intervention provinces highlighted.



Figure 69. Map of Mozambique

MalariaCare’s QA strategy is anchored around provincial- and peripheral-level supervision and mentoring of health facilities. During MalariaCare PY3, the first year of implementation in Mozambique, the capacity of district-level supervisors was not sufficient to independently conduct OTSS. However, through technical training, MalariaCare built the capacity of these supervisors enabling them to conduct OTSS to lower level facilities in PY4.

MalariaCare trained a pool of clinical and laboratory supervisors in the two new provinces in both malaria case management and mentoring skills, and has further strengthened the capacity of the supervisors in Nampula and Zambezia. Two rounds of OTSS were implemented in each province with all data being collected via the DHIS2 Android-based electronic checklist (EDS). Supervisors recruited and trained during PY3 were trained on the EDS in a stand-alone EDS training, and all new supervisors were trained on the electronic system during the joint clinical and laboratory supervisor training of trainers (TOT).

To support operations in both Cabo Delgado and Tete, the project hired a provincial coordinator for each province. Both coordinators are based in the Direccção Provincial de Saúde/Provincial Health Directorate (DPS) office in their respective provinces to provide direct technical assistance to these offices. To support central operations, a finance officer and program assistant were hired. MalariaCare has established an office in Maputo where the program coordinator, finance officer, and program assistant are based.

Key accomplishments

Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent.

- In collaboration with the NMCP and the Instituto Nacional de Saude/National Institute of Health (INS), MalariaCare facilitated two four-day basic MDRT sessions for 37 district-level laboratory staff. One training was held in Tete for 12 district-level laboratory staff. The second was held in Nampula, training a total of 25 laboratory staff—11 from Cabo Delgado, 8 from Nampula, and 6 from Zambezia. Pre- and post-tests were used to assess microscopy skills, including parasite identification, species identification, and parasite density. Of the 37 trained over both sessions, 25 participants with the highest competency scores were selected to continue on to the advanced MDRT and serve as laboratory supervisors.
- The following table (Table 30) shows average scores at pre- and post-test for the basic MDRT in all four provinces (see Table 2 for WHO equivalent score summary). On average, average participant scores increased from 76 percent (median 79 percent; range 0 to 100 percent) to 86 percent (median 86 percent; range 61 to 100 percent) for parasite detection, and 15 percent (median 0 percent; range 0 to 100 percent) to 36 percent (median 38 percent; range 0 to 88 percent) for parasite counting. However, none of the participants met the WHO L1 or L2 standards across all three competency areas (parasite detection, species identification, and parasite counting). These results show the need for additional training, especially in species identification, where participants started with a low score and did not improve (average 28 percent to 29 percent; median 19 to 31 percent). Species identification was the main barrier to meeting WHO L1 or L2 standards (80 percent or greater); none of the participants reached proficiency in this area. For parasite detection, 28 participants (76 percent) met the WHO L1 or L2 standards (score of 80 percent or greater). For parasite counting, 18 participants (49 percent) met the WHO L1 or L2 standards (score of 40 percent or greater).

Table 30. Basic MDRT—Average scores for microscopy competency areas, Mozambique (n=37).

Competency area	Average pre-test score (median [range])	Average post-test score (median [range])	% point change in score
Parasite detection	76% (79% [0%–100%])	86% (86% [61%–100%])	10
Species identification	28% (19% [0%–86%])	29% (31% [9%–50%])	1
Parasite counting	15% (0% [0%–100%])	36% (38% [0%–88%])	21
Theory evaluation	26% (28% [5%–48%])	57% (55% [24%–100%])	31

- To further build on the skills of the best technicians emerging from the bMDRT, MalariaCare facilitated two five-day advanced MDRT sessions for 25 laboratory OTSS supervisors. One training was held in Tete, training 7 supervisors. The second was held in Nampula, training a total of 18 laboratory staff—7 from Cabo Delgado, 5 from Nampula, and 6 from Zambezia. Pre- and post-tests were used to assess diagnostic theory and microscopy skills, such as parasite detection, species identification, and parasite density. The theory test results increased by 35 percentage points (from 25 percent to 60 percent) from pre- to post-test; however, just five participants scored above 80 percent. For microscopy skills, indicators barely improved, with averages hardly showing any significant gains.

The following graph (Table 31) shows scores for the advanced MDRT training in all four provinces. At post-test, participant scores marginally increased in parasite detection (mean 83 percent; range 68 to 98 percent), showed a moderate increase for species identification (mean 41 percent; median 42 percent; range 19 to 65 percent), and did not improve in parasite counting (mean 37 percent; median 36 percent; range 10 to 71 percent). None of the participants met the WHO L1 or L2 standards across all three areas (parasite detection, species identification, and parasite counting). Even with advanced MDRT, species identification remained the main barrier to meeting WHO L1 or L2 standards (80 percent or greater); no participant met L1 or L2 standards in this area. This points to a need for continued interventions in focused training, preferably on-the-job such as conducted during OTSS. When not considering the species identification score, ten participants (40 percent) met L1 or L2 standards for both parasite detection (score of 80 percent or greater) and parasite counting (score of 40 percent or greater).

Table 31. Advanced MDRT—Average scores for microscopy competency areas, Mozambique (n=25).

Competency area	Average pre-test score (median [range])	Average post-test score (median [range])	% point change in score
Parasite detection	82% (86% [55%–100%])	83% (85% [68%–98%])	1
Species identification	32% (38% [10%–80%])	41% (42% [19%–65%])	9
Parasite counting	37% (50% [0%–75%])	37% (36% [10%–71%])	0
Theory evaluation	25% (23% [-10%–60%])	60% (58% [18%–100%])	35

- Supported the NMCP in conducting two rounds of diagnostic proficiency panels testing across laboratories in the four provinces. Panels of eight slides are sent out to select laboratories where the staff worked as a team to report results on parasite detection, species identification, and parasite counting for each slide in the set. Each set included two Pf, two Pm, one Po, two multiple species, and one negative slide. Once compiled, the laboratory sent results to the central level who reviewed and scored these. The first round of panel testing was conducted in January 2016, the second in June 2016. A total of 70 facilities (67 during Round 1 and 68 during Round 2) were sent a panel of eight slides across the two rounds. A total of 65 facilities were sent panels in both rounds. Of these, 30 laboratories sent in results for both rounds. Each slide could receive a maximum score of 12.5, for a total of 100 points possible across the eight slides. Results were reported on each indicator - parasite detection, species identification, and parasite counting, with each correct answer counting toward 4.17 points of the total 12.5 possible per slide.

The overall target score was 50 percent, which is the NMCP target for proficiency panel scores. Of the 30 laboratories with results from both rounds, 7/30 (23 percent) received a total score above 50 percent for the first round, which increased to 14/30 (47 percent) in the second round. The average increase in scores across the 30 laboratories was five percentage points, with an average first round score of 40 percent (median 40 percent; range 13 percent to 72 percent), and an average second round score of 45 percent (median 47 percent; range 9 percent to 81 percent). The overall target score was 50 percent, which is the NMCP target for proficiency panel scores.

Objective 2: Increased percentage of patients suspected to have malaria or a febrile illness who receive a diagnostic test for malaria.

- Conducted RDT onsite refresher training for health care workers during OTSS visits, training a total of 700 health care workers (176 from Nampula, 92 from Zambezia, 171 from Cabo Delgado, and 261 from Tete) on the appropriate performance of RDTs and reading of results.

Training was conducted as part of the feedback session at the close of the OTSS visit. These sessions included all clinical and laboratory staff members to the greatest extent possible without sacrificing service availability in the facility. Supervisors first demonstrated use of the RDTs, then required participants to demonstrate correct use. Weak areas in RDT performance identified among staff at each facility were discussed and addressed during this time.

Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illness—consistent with the result of the diagnostic test.

- In collaboration with the NMCP, MalariaCare trained 36 supervisors in clinical case management—9 from Zambezia, 10 from Tete, 11 from Cabo Delgado, and 6 from Nampula. One training was held in Nampula and included participants from Nampula, Cabo Delgado, and Zambezia. A second training was held in Tete, which included the 10 Tete supervisors as well as an additional 33 participants from Tete health facilities (22 nurses and 11 medical assistants) who were not supervisors, per the request of the Tete PHA which supported them. Across the two training sessions, mean participants' scores increased from 63 percent at pre-test (median 65 percent; range 25 percent to 85 percent) to 74 percent at post-test (median 75 percent; range 40 percent to 100 percent).

- Continued supporting the malaria case management committees established in four facilities last year, and created committees in an additional seven facilities in PY5, for a total of 11 committees established. These multidisciplinary committees meet monthly at the facility level, specifically the reference health facilities, to review case management data and discuss malaria case management trends (new malaria cases, severe malaria deaths, provider adherence to diagnostic results, case management practices, adherence to guidelines, and any data management issues). MalariaCare attended inaugural meetings and provided assistance to develop the terms of reference for each committee. The committees are intended to provide a forum for developing practical interventions to improve malaria case management in selected health facilities.
- Trained 52 provincial- and district-level clinical and laboratory supervisors during the combined clinical and laboratory TOT in Nampula, Cabo Delgado, and Tete. The training included a day focused on mentoring and supervision skills, a day introducing and reviewing the electronic checklist, and a third day of practical application at local health facilities. In addition, several modules focused on important topics that are critical to effective case management across both clinical and laboratory staff, including identification and basic management of severe malaria and diagnosis using malaria microscopy test results (specifically, parasite density and species identification).

Conducted three rounds of provincial OTSS, targeting district-level reference facilities, and one round of peripheral OTSS in peripheral-level health facilities. For peripheral OTSS only one round was done as the country team was not confident in the ability of the newly trained district-level supervisors to effectively complete OTSS at the lower level facilities without additional support. It was then decided to have the district-level supervisor accompany the provincial supervisor during the next round of OTSS, which delayed the peripheral OTSS implementation. Delays in the roll-out of the revised EDS (E2) also affected peripheral OTSS implementation. Across all rounds, 161 health facilities were visited in 57 districts. A total of 44 facilities were visited in Cabo Delgado, 56 in Nampula, 42 in Tete, and 19 facilities in Zambezia. Fewer facilities were visited by MalariaCare in Zambezia in comparison to the other three provinces, as the PMI-funded MCSP managed QA activities for lower-level facilities in that province.

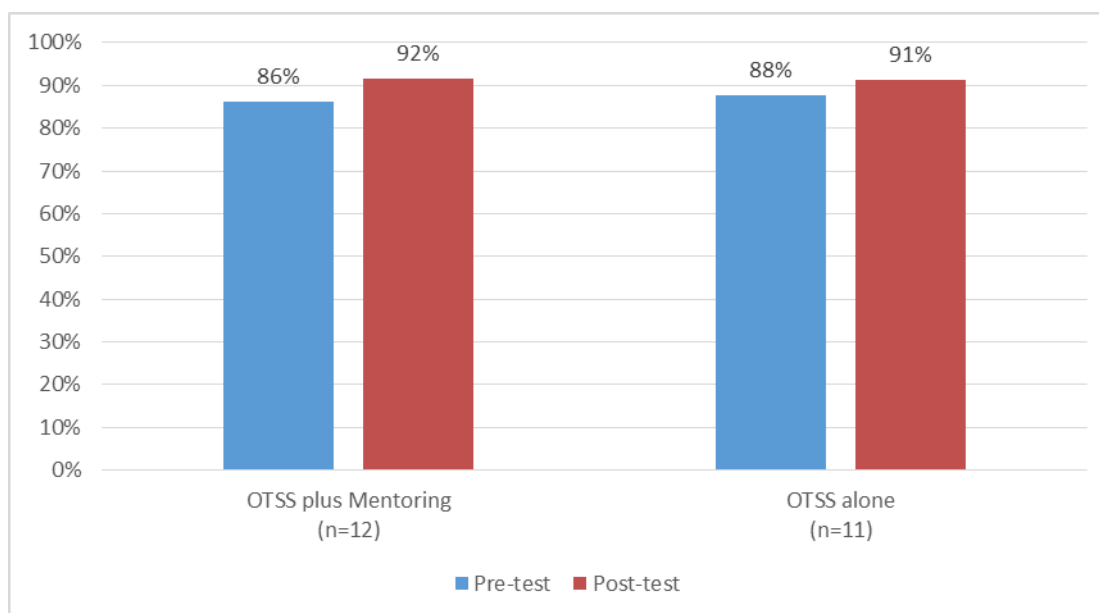
- Conducted an intensive mentoring pilot in all four provinces. This is a complementary activity conducted in between OTSS rounds, targeting 16 health facilities designated as low-performing based on findings from the preceding round of OTSS. In PY4, MalariaCare selected 16 OTSS supervisors, and two clinical and two lab supervisors from each province, to participate as mentors in the pilot. These supervisors were selected based on their demonstrated mentoring skills during OTSS. MalariaCare facilitated a two-day training in each province to further build the supervisors' mentoring skills and orient them to the intensive mentoring process.

Based on findings from the first round of OTSS in PY4 (Round 4), 32 health facilities, 8 per province, were selected for the pilot. These facilities had the lowest average scores on adherence measures, RDT performance, and clinical performance. Because microscopy performance was so high in all facilities, this was not considered as a criterion for selection. From the 32 facilities, 16 (4 per province) were randomly selected to receive the mentoring intervention. Mentors then spent five days in these facilities between OTSS Round 5 and Round 6. The remaining 16 facilities received OTSS alone. Although 4 facilities were selected in Zambezia, 3 were actually visited, as the fourth intervention facility could not participate due to an unrelated onsite evaluation when intensive mentoring was implemented.

A total of 139 clinical and laboratory providers were mentored across the 15 intervention facilities. Each mentee completed a pre-test on the first day of the mentoring visit, and a post-test on the last day. Pre- and post-tests were designed specifically for clinical or laboratory staff. Across the providers mentored, the average percentage point increase in scores from pre- to post-test was 4.6 percent. Observations of individual mentees revealed the following common challenges for laboratory staff: difficulty in identifying parasites at different stages of the lifecycle, difficulty in counting parasites, lack of quality control of stains, and using the log book to correctly record all results. For clinical staff these challenges included: not knowing when to use RDTs to test patients, poor physical examination, difficulty in correctly interpreting parasite density, and difficulty calculating dosage for severe malaria treatment. To address these issues, mentors provided one-on-one mentoring, conducted mini-lectures with multiple staff, demonstrated correct procedures, and shared their overall findings with the facility leadership. By the end of the week, mentors reported satisfactory improvement for most health facility staff in the areas identified and they recommended specific exercises for additional practice following the visit, such as more senior staff at the facility providing additional in-service training or oversight in identified areas.

To assess whether the intervention had an impact on overall facility performance, average OTSS scores on five key indicators—1) RDT performance, 2) clinical management, 3) testing prior to treatment, 4) negative test adherence, and 5) positive test adherence—from the first and last round of OTSS were analyzed and then compared against facilities that received OTSS alone for any significant performance improvement in the mentoring facilities (Figure 70). At baseline (November 2015–January 2016), the average score across all five key indicators for those facilities receiving mentoring was 86 percent; for those who received only OTSS, the average score was 88 percent. During the final OTSS visit held in August–September 2016, 12 of the 15 facilities (80 percent) in the intervention arm and 11 out of the 15 facilities (73 percent) in the control arm had complete data for all five indicators across both rounds of OTSS. Among the facilities with data, the average scores for facilities that received mentoring was 92 percent; it was 91 percent for facilities that received OTSS alone.

Figure 70. Average facility performance, before and after intensive mentoring, Mozambique.



Following a regression analysis, there was a statistically significant increase in the overall facility performance score in the facilities that received mentoring (RR=1.06, 95 percent CI: 1.01–1.11), as well as in the facilities that received OTSS alone (RR=1.05, 95 percent CI: 1.00–1.10). To determine the additional impact of mentoring, we compared the change in the mentoring group to the OTSS-only group from the first to the last OTSS visit in PY4. In this analysis, there was no significant effect of the intensive mentoring intervention (RRR=1.01, 95 percent CI: 0.94–1.07).

While only half of facilities had complete data for all five indicators and could be included in this analysis, additional analyses for each of the six individual facility performance indicators revealed that there was no significant effect of either OTSS plus mentoring or OTSS alone on any of the individual indicators. In PY5, MalariaCare will be conducting additional intensive mentoring in the same intervention facilities after the first round of OTSS to see if any significant effect emerges. After a second round of mentoring, mentors will also be able to follow-up on the issues identified and mentored on during the visit to assess if there has been any progress in these specific areas.

Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.

- Conducted a provincial-level LLW in each of the four provinces after the second round of OTSS in PY4. Each LLW included representatives from the national, provincial, and district level, among whom were OTSS supervisors, malaria focal points, and provincial health management. During these workshops, participants reviewed and analyzed OTSS data—identifying gaps in performance and designing action plans to address these gaps.
- Conducted an EDS end-user training for Nampula supervisors recruited and trained in PY3. A total of 20 participants attended the training. The training included an introduction to the electronic tablet, a TOT session

to prepare participants to facilitate similar training to lower levels, and a practical session using the tablets in local health facilities. All supervisors recruited in PY4 were trained on EDS as part of the TOT described under Objective 3. Supervisors used the electronic checklist to collect data from all facilities visited during OTSS this year. The roll-out of the electronic checklist has improved the completeness of reporting OTSS data. This is true for the clinical management and register review checklists in particular, as data completeness went from 72 percent to 97 percent and 67 percent to 93 percent between Round 3 and Round 6, respectively.

- Conducted an EDS data-user training for ten national-level representatives and MalariaCare staff. This three-day training workshop demonstrated how to use the EDS DHIS2 data-user interface to read and interpret data collected during OTSS, as well as how to use data outputs for decision-making.

Progress made on key MalariaCare indicators

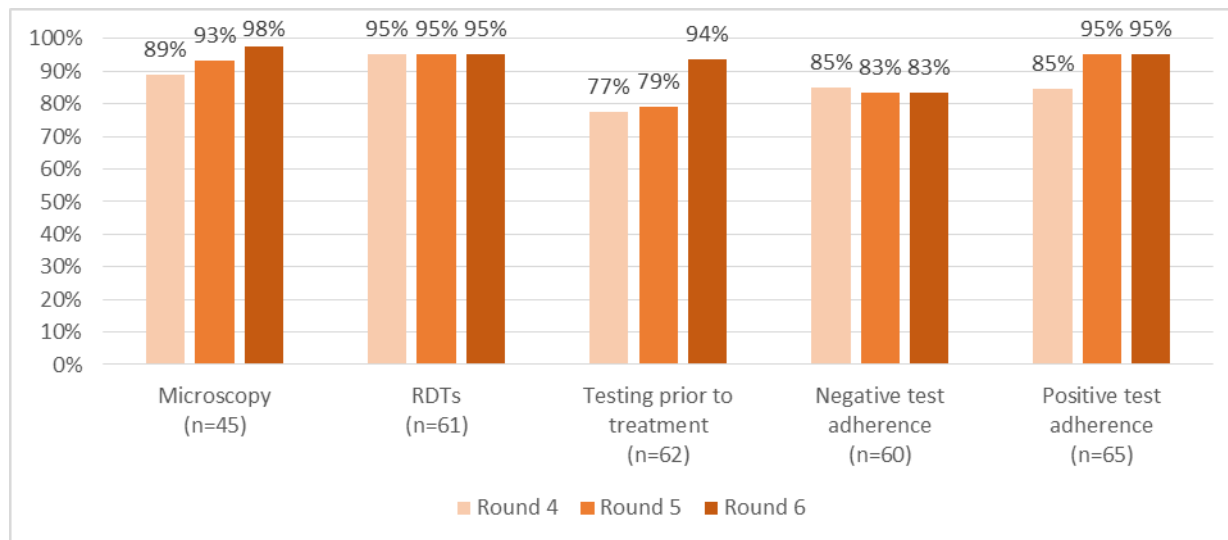
Trend data

Since the start of OTSS in Mozambique during PY3, MalariaCare has carried out six rounds of provincial OTSS and one round of peripheral OTSS. Provincial OTSS is conducted by provincial-level OTSS supervisors in the reference health facility and in at least one peripheral facility in each intervention district. Peripheral OTSS was first initiated in July of PY4 and is conducted by district-level OTSS supervisors only in lower-level facilities that do not offer malaria microscopy services. In PY4, 93 facilities were visited during provincial OTSS, and 68 lower-level facilities were visited during peripheral OTSS. These facilities represent approximately 6 percent of all health facilities in Mozambique, or 24 percent of the facilities in the four provinces where MalariaCare works.¹³

Due to poor-quality data during the initial rounds of OTSS when paper-based checklists were used, performance trends for the majority of facilities currently participating in provincial OTSS are only available for PY4. Trend results in Figure 71 provide an indication of the impact of successive OTSS visits among facilities with three OTSS visits in PY4. Of the 93 provincial OTSS facilities visited in PY4, 73 facilities (or 78 percent) were visited in all three rounds. Figure 71 compares the performance of these facilities with available scores across rounds. The number of facilities with scores in all rounds varies by indicator, from 45 facilities for microscopy (68 percent of microscopy-performing facilities that were visited in all three rounds) to 65 facilities for positive test adherence (89 percent of facilities visited in all three rounds).

¹³ Instituto Nacional de Estatística. Anuário Estatístico 2015, Retrieved November 3, 2016 from <http://www.ine.gov.mz/estatisticas/publicacoes/anuario/nacionais/anuario-estatistico-2015/view>

Figure 71. Proportion of provincial OTSS health facilities meeting minimum performance target (75%) on competencies, and overall target on register measures (90%), Round 4 versus Round 5 versus Round 6, Mozambique.



Among these facilities, the majority of health facilities met MalariaCare’s minimum performance targets in the first OTSS round of PY4, and remained compliant. This may partially explain the low levels of improvement in the following round for proportion of facilities meeting targets for microscopy, RDTs, adherence to negative test results, and adherence to positive test results. However, there was improvement in scores for microscopy (from 89 percent to 98 percent), testing prior to treatment (from 77 percent to 94 percent), and adherence to positive test results (from 85 percent to 95 percent) over the three rounds.

Due to improvements made to the clinical checklist, clinical scores from Round 6 are not comparable to earlier rounds. However, Table 32 reports trends for those minimum standard steps that were assessed using either version of the checklists. The proportion of facilities meeting the clinical competency steps declined between Round 4 and Round 6, even though there was some improvement in Round 5. Similar to other countries, the lowest performance was seen in checking for at least one sign of severe malaria. At the most recent round, the steps performed correctly most often were correct diagnosis and severity assessment, and correct prescription per test result and diagnosis. However, performance on these steps declined over time. This appears due to a lack of clinical training across all front-line health workers as well as turnover of staff in health facilities which results in different staff receiving mentoring each round. Given the decline in clinical indicators, MalariaCare recommends that the NMCP and partners provide generalized clinical case management training to facilities, particularly those with new staff.

Table 32. Average health facility performance on minimum standard steps for clinical case management during the most recent OTSS visit, Mozambique (n=62 of 73 facilities visited 3 times).

Step	Round 4	Round 5	Round 6
Checks for at least one sign of severe malaria (or apparent)	78%	81%	76%
Supervisor agrees with whether a malaria test should be ordered*	85%	89%	82%
Supervisor agrees with final diagnosis and severity assessment	98%	95%	91%
Correct prescription per test result (if available) & diagnosis	94%	92%	89%

*Counted as yes if test is not available

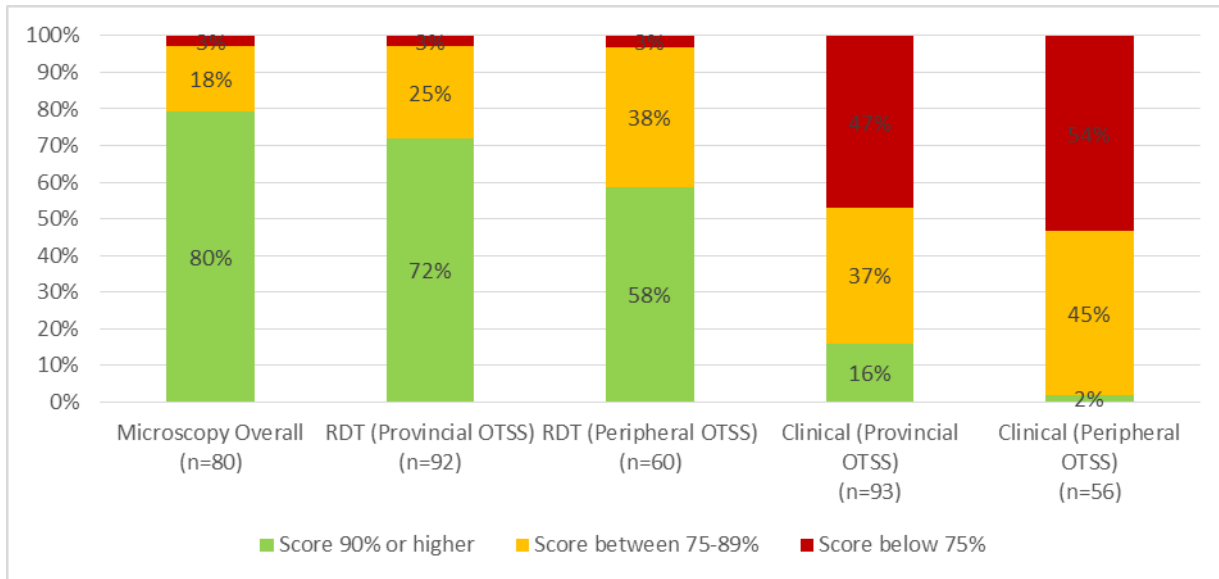
Most recent visit

The following section provides an overview of the current status of technical performance (microscopy, RDTs, clinical performance) and adherence (testing before treatment, adherence to negative test results, adherence to positive test results) indicators at the most recent visit for each facility.

Performance on key competencies

In PY4, 93 provincial OTSS facilities and 68 peripheral facilities were visited at least once. Of the 93 provincial OTSS facilities, 83 facilities performed microscopy, and 80 of these facilities had sufficient data to receive a score (peripheral OTSS did not include microscopy observations). For RDTs, 92 provincial facilities (99 percent) and 60 peripheral facilities (88 percent) had scores available; for clinical case management, 93 provincial OTSS (100 percent) and 56 peripheral OTSS (82 percent) facilities had sufficient data to receive a score. Figure 72 summarizes their performance.

Figure 72. Proportion of health facilities meeting minimum (75%) and overall (90%) targets on technical performance indicators during the most recent OTSS visit, provincial and peripheral, Mozambique.



For the provincial OTSS facilities in Mozambique, microscopy competency continues to be high (97 percent of facilities met the minimum target of 75 percent or higher), despite challenges in supervisors’ and lab staff’ performance in the aMDRTs and bMDRTs. However, the aMDRT and bMDRT performance outputs focus only on the reading of slides, whereas the OTSS microscopy competency reflects preparation, staining, and reading competency, which does dilute the effect of any issues with reading. Additionally, it should be of note that slides read during MDRTs are specifically made for training purposes and may include more difficult slides as compared to samples read as part of daily cases reviewed in the laboratory. During the most recent OTSS visit for the provincial OTSS facilities, slide preparation was identified as the weakest area of the three. Specifically, performance was low among those observations where a finger prick was done, with just 61 percent of the

facilities, on average, correctly pricking the finger, wiping off the first drop of blood, and placing the drop on the slide without touching the finger.

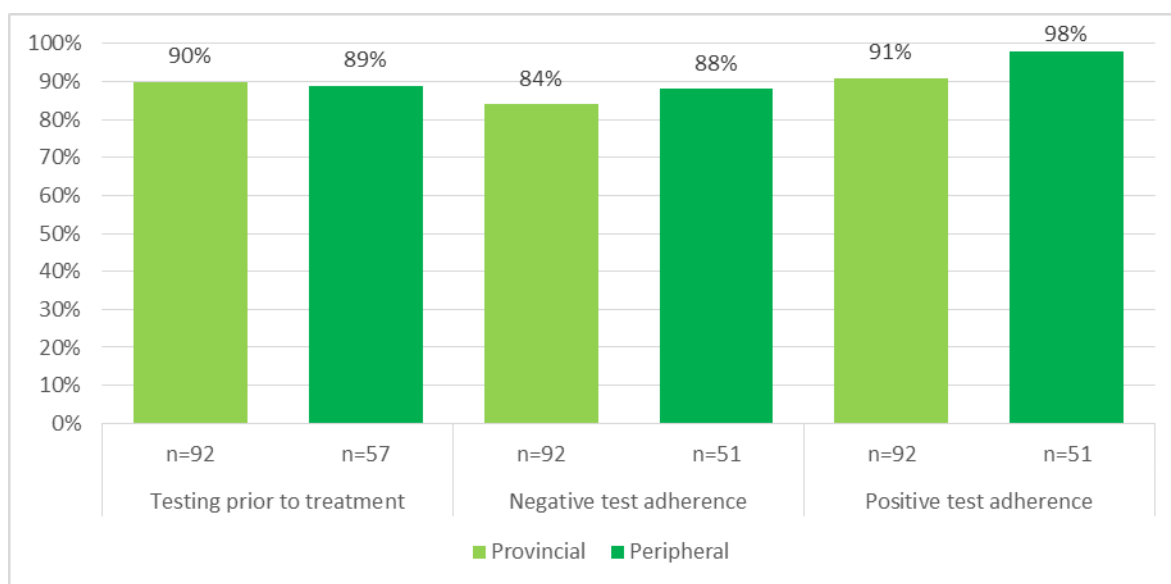
For RDTs, the proportion of provincial and peripheral OTSS facilities meeting the minimum performance target of at least 75 percent was high, with 93 percent of facilities meeting the minimum performance target in both groups. Providers generally performed all minimum standard steps correctly, with the exception of collecting an adequate amount of blood (average of 85 percent of observations for both provincial and peripheral OTSS facilities). Other weak areas for both include checking the expiry date of the RDT device (75 and 71 percent, respectively) and labelling the cassette (77 percent for both).

Similar to other MalariaCare supported countries, clinical case management scores are low for both OTSS groups, with 53 percent and 47 percent of facilities meeting the minimum performance target or higher during the most recent visit, respectively. This may be due to lack of training on clinical case management guidelines, as well as continuous staff turnover in health facilities. Among provincial OTSS facilities, the most commonly missed minimum standard step was checking for at least one sign of severe malaria: on average, seventy-eight (78) percent of observations performed this step correctly during the most recent visit. For peripheral OTSS facilities, although performance was high for minimum standard steps (on average, at least 85 percent of observations performed these correctly), conducting a comprehensive physical exam remains an issue. Steps that were performed the least frequently were conducting a lung exam (13 percent), conducting a neck exam (18 percent) and checking heart rate (20 percent).

Measures of adherence

To gain a better understanding of testing and treatment behavior outside of clinical observations, OTSS supervisors review a sample of health facility register records to estimate testing before antimalarial treatment, as well as treatment adherence to malaria test results. Of the 93 provincial OTSS facilities visited in PY4, 92 collected sufficient information on ACT records to estimate testing prior to treatment, and 50 out of 68 peripheral facilities did so. For negative and positive test adherence, 92 of the 93 provincial OTSS facilities and 51 out of 68 peripheral OTSS facilities had sufficient data to receive a score. Results for these indicators are displayed in Figure 73.

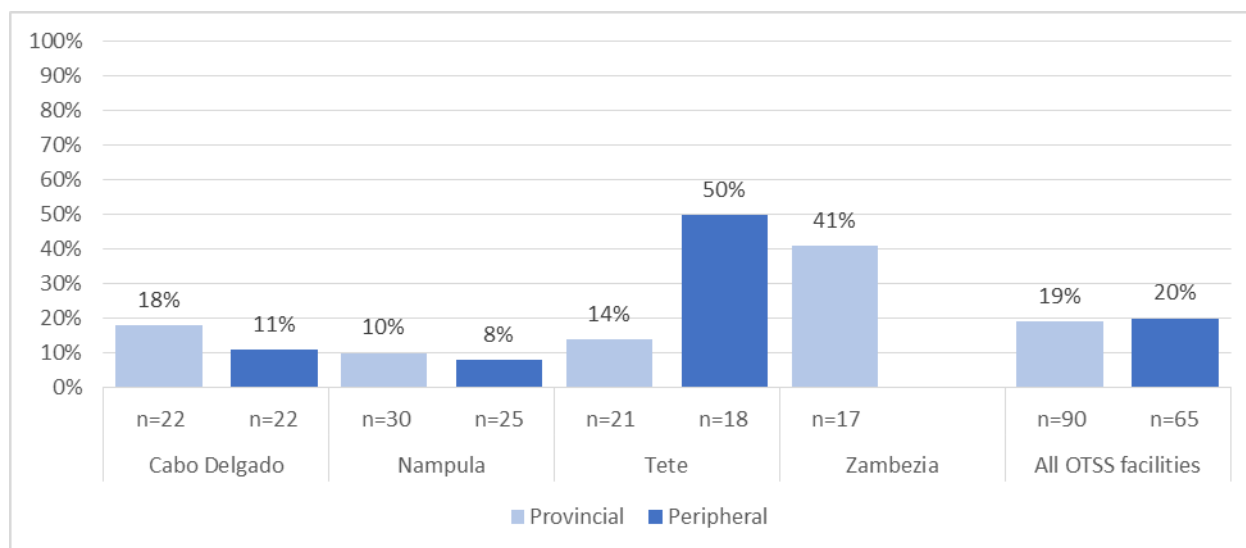
Figure 73. Proportion of health facilities meeting overall performance target (90%) on testing before treating and adherence to test results during the most recent OTSS visit, Mozambique.



In 90 percent of provincial OTSS facilities and 89 percent of peripheral OTSS facilities with data, supervisors found a corresponding test result for 90 percent or more of the ACT records sampled. The majority of facilities are meeting the 90 percent target for positive test adherence (positive test results with a corresponding ACT prescription): 91 percent of provincial OTSS facilities and 98 percent of peripheral OTSS facilities met the target. Similar to other countries, a smaller proportion of facilities met the target for negative test adherence: 84 percent of provincial and 88 percent of peripheral OTSS health facilities.

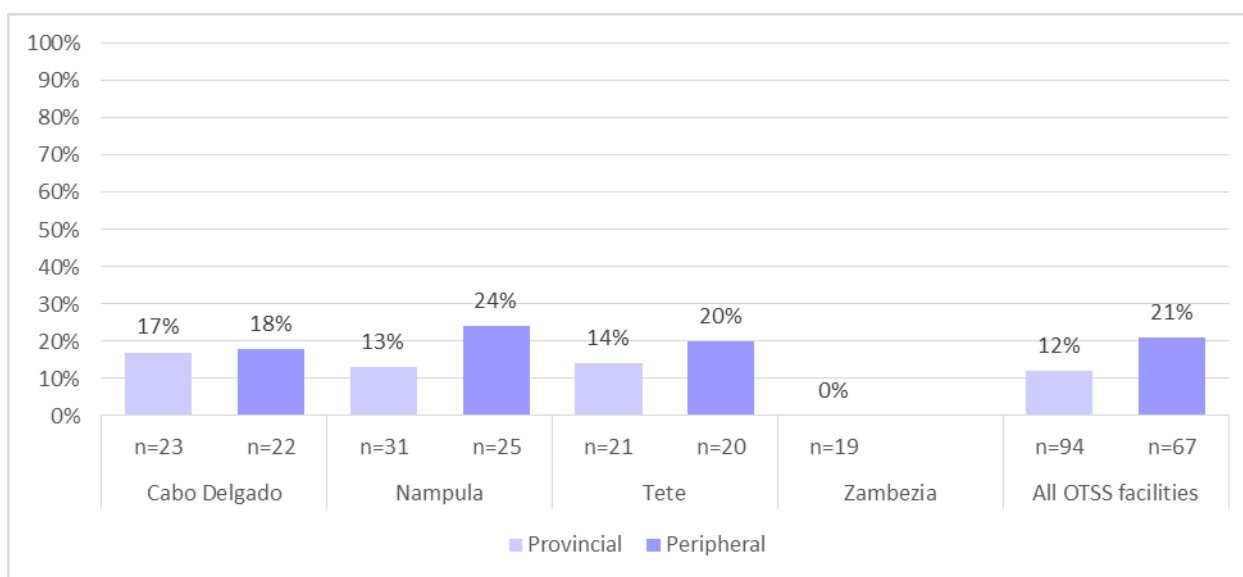
While MalariaCare’s mandate does not include malaria commodity procurement or supply chain distribution, the project does collect information during OTSS visits on availability of key items necessary for high-quality malaria case management. Unfortunately, deficits in adequate RDT and ACT stock remain. Figure 74 shows the proportion of facilities that have had a significant stock-out of RDTs of longer than seven days in the last three-month period. Peripheral facilities in Tete and provincial facilities in Zambezia noted a significant stock-out of RDTs.

Figure 74. Proportion of health facilities reporting stock-outs of RDTs lasting more than 7 days in the 3 months prior to OTSS visit, by province and health facility level, Mozambique.



Compared to RDT stock-outs, fewer facilities (both provincial and peripheral) reported a first-line ACT stock-out (Figure 75). In fact, no provincial facilities in Zambezia reported an ACT stock-out. Across all provinces, ACT stock-outs tended to be more common in peripheral facilities than in provincial facilities (21 percent versus 12 percent).

Figure 75. Proportion of facilities with stock-outs of a first-line ACT lasting more than 7 days in the 3 months prior to most recent OTSS visit, by region and overall, Mozambique.



Challenges

Challenge	Solution
Regular turnover of trained district supervisors and health care providers.	MalariaCare had to train several new supervisors in PY4. MalariaCare will continue routine onsite training/mentoring of health care providers to create a pool of trained providers at each facility.
Frequent local stock-outs of drugs and RDTs due to gaps in forecasting product need.	MalariaCare strengthened the stock management skills of the district and facility malaria focal point during OTSS visits.
OTSS data analysis was delayed due to technical issues in sending data to the server via the electronic data system. For example, without a strong internet connection, supervisors would get an error message, and, on the tablet, it looked as though the data had not been sent, when in fact it had. Also, supervisors were not entering the correct name and password, which prevented the data collected from being sent to the server.	Since the release of the second version of EDS, this has been resolved. Now, supervisors mark a module as complete and the application automatically pushes the data whenever the tablet finds a strong enough data connection. This change has resulted in no further technical issues in the most recent round of OTSS. In addition, challenges with supervisors not correctly entering the name as password has improved over time with increased use of the system.

Next steps

- Continue to strengthen and consolidate central- and provincial-level managerial, diagnostic, and clinical case management capacity to plan and coordinate implementation of QA interventions at all levels, and to supervise and mentor staff in Cabo Delgado, Tete, and Nampula. As per the Mission, MalariaCare will no longer be supporting specific malaria case management QA activities in Zambezia in PY5, and the MCSP will be managing integrated case management going forward. Activities in Nampula will also be transitioned to MCSP, but not until later in PY5. Two rounds of OTSS will be conducted in each of the three provinces. The second round of OTSS in Nampula will be a joint OTSS with MCSP, with full transition of case management support to MCSP occurring after this round. During OTSS, supervisors will continue to conduct onsite RDT refresher training for health care workers not previously trained in PY4 during OTSS.
- Facilitate a provincial LLW in Cabo Delgado and Tete following the second round of OTSS. These will be combined with close-out meetings during which MalariaCare will share results and lessons learned with stakeholders. Provincial coordinators in Cabo Delgado and Tete provinces will continue to work closely with the DPS and district-level management teams through provincial-level technical working groups (TWGs) and facility-based malaria case management committees to disseminate OTSS data and identify actions to understand and close gaps emerging from visits. These activities in Nampula will be transitioned to MCSP in PY5. MalariaCare will also conduct another round of intensive mentoring in Cabo Delgado and Tete for those facilities demonstrating the lowest performance during OTSS.

- Conduct an aMDRT with representatives from all four PMI-supported provinces and the national malaria reference laboratory. This training will serve as a screening for selection of participants to attend the WHO ECAMM. The participants (no more than five) who score at an L2 or above in parasite detection (score of 80 percent or greater) will be eligible for ECAMM. MalariaCare will also continue proficiency panel testing in Cabo Delgado, Tete, and Nampula in PY5.

Nigeria



Introduction

Starting in PY2, MalariaCare has partnered with the Expanded Social Marketing Project in Nigeria (ESMPIN), which is led by the Society for Family Health (SFH) and the Federal Ministry of Health (FMOH), to implement, evaluate, and monitor an iCCM pilot using private-sector health providers, also known as patent proprietary medicine vendors (PPMVs). The pilot aims to demonstrate that case management of common childhood illnesses (malaria and other febrile illnesses) can be substantially improved on a population basis by using PPMVs to provide high-quality case management of these diseases.

MalariaCare leads the monitoring and evaluation of the pilot at baseline, during implementation, and at endline, in addition to providing technical assistance to ESMPIN while implementing the pilot intervention. MalariaCare conducted baseline household surveys, outlet surveys, and focus group discussions to provide preliminary data, which will be used as a comparison to endline data gathered through similar sources for an overall evaluation of the pilot's impact.

To monitor PPMV case management knowledge and practices throughout actual implementation of the nine-month pilot intervention, MalariaCare designed and managed an electronic management and information system, which was utilized by canvassers to collect data via electronic tablets. MalariaCare is also leading a cost analysis to provide the FMOH with information on the costs of the pilot implementation to guide national decision-makers about whether to expand the program to other target areas within Nigeria.

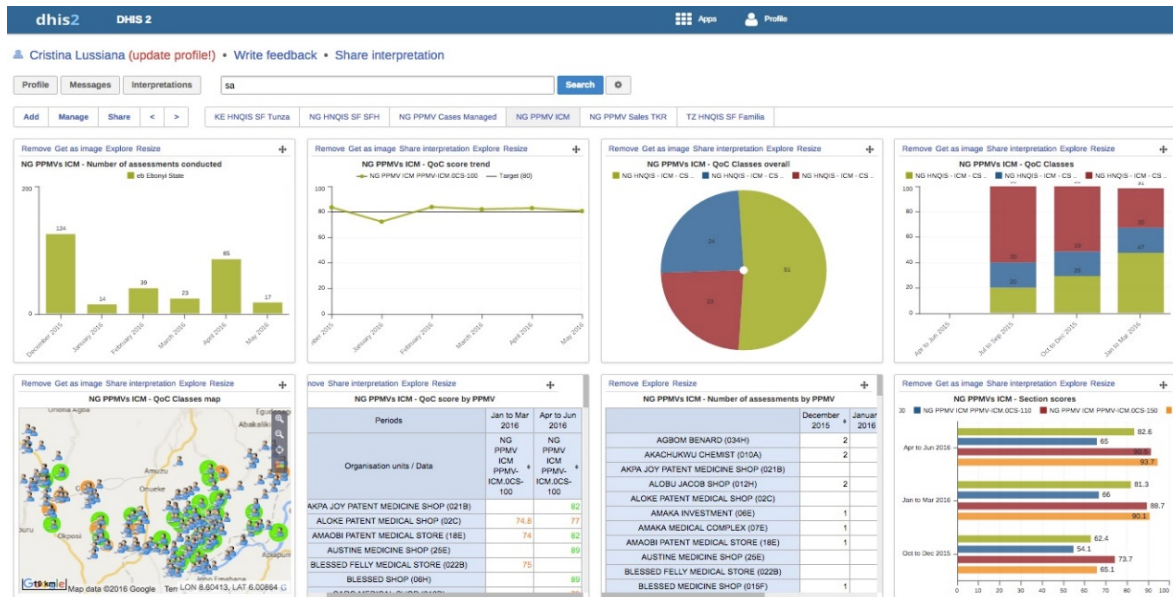
Key accomplishments

- Finalized a report on baseline findings emerging from analysis of the data collected during the baseline evaluation. The report was shared with PMI, the FMOH, the Ebonyi State Ministry of Health, and the Federal Task Force.
- Continued expansion of the electronic management system. In PY3, PSI adapted its HNQIS, a tablet-based Android application made up of four modules: *Assess*, *Monitor*, *Plan*, and *Improve*, for this pilot. In PY4, PSI, as a MalariaCare partner, expanded on the HNQIS tool by building additional electronic tools for data collection during canvasser visits. This system takes a holistic approach to improving the quality of iCCM by PPMVs by monitoring three key indicators that underpin high-quality service provision: i) quality of PPMV

performance in managing cases; ii) PPMVs' case load; and iii) stock and sales of health commodities. This integrated system is composed of three tools. Data collected from all three tools were built for integration into the SFH DHIS2. The tools are:

- *HNQIS*: The first two modules (*Assess* and *Improve*) were launched with the implementation of the pilot intervention in November 2015 and were used by canvassers in the field to assess PPMVs' skills and knowledge in iCCM and to provide on-the-spot coaching to improve their malaria testing and fever case management practices. The second two modules (*Plan* and *Monitor*) were finalized but not used in implementation of the intervention due to technical glitches in the system causing delays in finalization and due to administrative issues causing delays in the training on these modules. Therefore, the pilot was not able to test the impact of using these modules to make data-informed decisions at the project manager level.
- *Case management monthly summary form*: The form is a national tool for tracking, originally developed by the Nigerian Ministry of Health for Community Health Workers. The form tracks the quantity and the composition of fever cases recorded at provider level. PPMVs were trained on how to fill in the form on a daily basis during the initial PPMV training in PY3. During each canvasser visit, aggregated data were collected from the form that sits at PPMV level. Although aggregated data were collected by the canvassers on paper forms, data are currently being entered by the pilot intervention program managers into an electronic configuration of the aggregated form in DHIS2, which was developed by MalariaCare.
- *Stock and sales tracker form*: MalariaCare finalized the electronic configuration of this form in DHIS2. This form monitors availability, stock-out, and expiration date of key health commodities at PPMV level, like RDTs, quality-assured artemisinin-based combination therapies (QAACs), oral rehydration salts (ORS), and zinc. However, due to administrative issues that caused delays in roll-out, the tool was not used during the implementation of the pilot intervention. Therefore, the pilot was not able to test this form in collecting stock and commodity data for use in planning for commodity distribution.
- Although not all tools were used to their full capacity during the pilot intervention, MalariaCare configured a number of dashboards in DHIS2 to display the data collected, which would track progress on quality, case load, and availability and sales of key health commodities so program managers could plan project activities accordingly (Figure 76).

Figure 76. DHIS2 dashboard to track quality of iCCM of PPMVs.



- In October 2015, conducted an end-user training for nine canvassers. The three-day training introduced canvassers to HNQIS and also focused on improving mentoring skills. Canvassers learned how to use both the *Assess* and *Improve* modules, with a practical field session at local PPMV shops. Canvassers reviewed best practices for mentoring and used the *Assess* module to refine feedback and mentoring skills.
- In August 2016, conducted a three-day training for data users of the monitoring system, which included a total of 13 participants from the PMI Nigeria Mission and SFH. Participants were trained on how to conduct data analysis on data collected through the monitoring system, through utilization of the *Data for Decision-Making* manual which was developed by MalariaCare. By the end of the training, participants were able to:

Data users of the integrated monitoring system for PPMVs.



- Understand data dimensions and where they originated.
- Create charts, graphs, pivot tables, and event reports for data analysis using specific indicators.
- Interpret and explain custom dashboards.
- Understand the different types of visualizations used for data analysis.
- Understand how data outputs could be used to make decisions.

- Created training materials to support the end-user and data-user training. A summary of these is outlined in Table 33.

Table 33. Summary of training tools created to support monitoring system.

Tool	Audience	Purpose
HNQIS End-user Manual	End users (canvassers)	Outlined how to use the HNQIS application and the sales and stock tracker form.
DHIS2 Data-capture End-user Manual	End users (canvassers)	Outlined how to use the case management monthly summary form.
HQNIS Data-user Manual	Data users (program managers)	Outlined how to navigate dashboards available in DHIS2 and to use these in analyzing available data.
Data for Decision-making Manual	Data users (program managers)	Outlined how to critically interpret and apply the data generated by the monitoring system to improve quality of iCCM service provision by PPMVs.

- Conducted routine monitoring throughout the implementation phase of the pilot. A total of four monitoring visits were conducted by MalariaCare during the pilot implementation period. During each monitoring visit, the MalariaCare project coordinator accompanied the iCCM state manager and canvassers during supervision visits to PPMV shops enrolled in the pilot to observe PPMV progress in conducting proper case management of malaria, diarrhea, and pneumonia for children under five years of age. The monitoring visits were also an opportunity to understand the standard procedures used by canvassers to guide PPMVs throughout the implementation, as well as to identify any issues in the monitoring system operation.
- Submitted an abstract to the ASTMH for the 2016 conference. The abstract was accepted in September 2016. The poster presentation will be presented at the conference in November. The baseline findings along with an overview of pilot activities will be displayed.
- Prepared for endline evaluation. MalariaCare began preparation for the endline evaluation to assess the impact of the PPMV iCCM intervention. A household survey will focus on households that had a sick child within two weeks prior to the survey. It will be administered in the two intervention Local Government Areas (LGAs)—Ikwo and Onicha. An outlet survey will be administered to all PPMVs in both the intervention and control (Abakaliki and Afikpo North) LGAs. The quantitative survey tools from the baseline were refined to ensure that outcomes from the iCCM intervention were appropriately captured. The qualitative tools are currently under review.
- Recruited a local contractor to complete endline data collection activities. A request for proposals (RFP) was drafted and released in mid-August 2016. Three organizations submitted proposals and were evaluated on the demonstrated experience required to accomplish the scope of work included in the RFP, competitiveness of the cost proposal, overall completeness, and responsiveness to RFP requirements. In September 2016, a survey company, Binomial Optimus Limited, was selected as the agency that best met or exceeded expectations in each evaluation category. The contracting process to onboard the survey company is currently ongoing.

- Provided technical assistance in capturing iCCM pilot cost data for the cost analysis. A costing template was developed for the SFH finance team to guide the capture of cost data during implementation of the pilot intervention. In October 2015, a consultant traveled to Nigeria to observe the PPMV iCCM step-down training to understand the capture of cost data at the field level, and to provide recommendations to improve data capture and reporting. Currently the costs of the iCCM training of trainers and the iCCM step-down trainers have been captured. Other costs associated with mentoring and monitoring of PPMV activities, distributions of commodities, and the operations of the supply chain will be captured in PY5. Once all of the intervention data are collected, they will be analyzed to determine the cost-effectiveness of the pilot and presented as part of the final evaluation report.

Challenges

Challenge	Solution
The push feature of the HNQIS application, which allows data to be pushed from the tablet to DHIS2, was not working correctly. Therefore, data collected from the canvassers early in the pilot were not showing up in the system.	A member of the PSI development team traveled to Nigeria to fix the issue and retrieve all the data that were on the tablets. The issue has been resolved, and all data has been uploaded directly to DHIS2.
The server used by HNQIS was upgraded, causing interruptions in obtaining the original and accurate analytics that were set up in the server prior to the upgrade.	The PSI development team has addressed the issues, and HNQIS analytics are functioning correctly.
Baseline evaluation analysis was delayed, leading to delays in the final report.	MalariaCare is redesigning how the endline evaluation will be managed to improve survey methodology and data collection. MalariaCare will be playing a larger role in survey implementation— leading data collection and analysis. The survey contractor role will be limited to supporting data collection, survey operations, and recruitment of enumerators and survey participants.
Technical glitches in HNQIS led to delays in the release of the final two modules: <i>Monitor</i> and <i>Plan</i> .	MalariaCare is working with the PSI development team to solve technical issues. The two modules were finalized at the end of May 2016.
There was a gap in funding (May–early July) for canvassers and pilot intervention program managers, as the SFH budget limit, under their MalariaCare (via PATH) subagreement, was met mid-pilot intervention. Because of this funding gap, canvassers and program managers were unable to attend training on several elements of the monitoring system, including the final two modules, <i>Monitor</i> and <i>Plan</i> ; the sales and stock	MalariaCare was able to allocate additional funding to SFH through a subagreement cost extension; however, it did take some time to process the updated budget and the amendment for execution of the extension. Although these tools could not be implemented during the intervention, MalariaCare did provide an overview of their function to program managers. Also, during the time of the funding gap, canvassers did continue to perform supervision visits,

form; and the electronic version of the case management summary form. Because the funding issue was not resolved until early July, there was no time to roll out these additional tools for implementation prior to the end of the pilot period (July 30, 2016).

though the number and frequency of these visits did decrease, as funding was not guaranteed to canvassers.

Due to the funding gap mentioned above, MalariaCare was unable to complete a technical visit to update the HNQIS system in the canvasser tablets. Once the system was updated remotely at the end of May 2016, canvassers were unable to access the system on their tablets.

Because canvassers were unable to access the electronic assessments, it was decided that the canvassers would conduct assessments and capture them on paper forms. Currently those assessment forms are being entered into the HNQIS.

Next steps

- Preparations for the endline evaluation are ongoing, with data collection for the endline expected to begin in November 2016 and to be completed in December 2016. Data will be analyzed across all data sources—baseline, monitoring, and endline—and developed into a final report.
- Develop a final cost analysis once pilot intervention operational cost data are collected. The final report and cost analysis will be disseminated among partners and key stakeholders.
- Commence preparations for publication during PY5. MalariaCare is also working on compiling case studies and lessons learned on the development and implementation of an integrated monitoring system for quality improvement in the private health care sector. MalariaCare intends to share these valuable lessons learned from this project with partners, key stakeholders, and the community.

Senegal

Introduction



In Senegal, starting in PY5, MalariaCare was scheduled to support the NMCP and UCAD in Dakar to implement an antimalarial artemisinin TES to monitor and evaluate for clinical and/or genetic evidence of *Pf* artemisinin resistance. This TES would be the fourth round of efficacy testing supported by PMI in Senegal in recent years.

Due to the delays, study implementation could not start as planned in July–September 2016. Consequently, the malaria season for the originally planned sites passed. The study team then started looking to new study sites with malaria cases prevalent into the

first quarter of 2017. This would have allow for patient enrollment and data collection to begin the first quarter of PY5 (i.e., the last quarter of 2016).

The MalariaCare HQ team met with key staff from the Senegal Mission. The outcome of the meeting was to reprogram the funds originally budgeted for the TES to perform a reference laboratory assessment of the parasitology laboratory in the School of Medicine at UCAD. This laboratory is to serve as the national reference laboratory for malaria diagnosis and treatment in Senegal.

Challenges

Challenge	Solution
The documents required multiple professional translations between English and French, slowing down the approval processes and incurring unexpectedly high process costs.	Time delays incurred with each round of translation must be accounted for in the planning timeline. Funding allocations must take the costs of professional translation into consideration.
Significant protocol revision requirements and delays in development of a subagreement that would be legally acceptable to all parties caused prolonged implementation delays, requiring changing the study sites and/or the planned implementation time frame by six months or more.	In order to implement the TES this year, the study site(s) would have had to be moved to a location(s) where a sufficient number of patients can be enrolled per protocol. It seems advisable that more time be allocated in the future to allow for development and finalization of the necessary steps. A funding level that adequately reflects the need for adequate oversight by the project (in this case MalariaCare) that is legally accountable for the quality of the work delivered should be made available.

Next steps

- Following discussions between the Senegal Mission, PMI HQ and MalariaCare, the team has decided to move forward with the laboratory assessment. MalariaCare is awaiting the receipt of a scope of work from the Senegal Mission to begin drafting a plan of our strategy and timeline.

Tanzania

MalariaCare began work in Tanzania in PY3 (October 2014). In its second year of operation in the country, the project continued to implement a case management QA strategy in eight high-burden regions in the country: Geita, Mara, Mwanza, Shinyanga, and Simiyu in the Lake Zone, and Dar es Salaam, Morogoro, and Pwani in the Eastern Zone. In addition, MalariaCare provides technical assistance to the Zanzibar Malaria Elimination Program (ZAMEP) to support implementation of its independent malaria case management QA program.

Key accomplishments

Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent.

- Conducted three regional sessions of a three-day RDT QA TOT for a total of 90 regional health management team (RHMT) and council health management team (CHMT) designated supervisors from Dar es Salaam, Pwani, and Morogoro regions. The course focused on mentoring skills associated with quality-testing procedures, monitoring for problems with test kits, and improving use of test results by clinicians to improve clinical decision-making. A theory pre- and post-test revealed that participant knowledge improved by 20 percentage points, from a mean score of 65 percent at pre-test (median 67 percent, range: 6 to 93 percent) to 85 percent at post-test (median 90 percent, range: 33 to 100 percent).
- Conducted the first MDRT for 22 laboratory technologists from the Eastern Zone regions. The objective of this course is to identify and train regional- and district-level microscopists who will act as supervisors during OTSS visits. The five-day course covered malaria epidemiology and the biology of the malaria vector and parasite; preparation of high-quality thick and thin blood films; and microscopy skills, including parasite identification, species identification, and quantification (see Table 2 for WHO equivalent score summary)..
- Performance was evaluated through both theory and practical microscopy skills testing. As shown in Table 34 below, the participants showed significant improvement in all categories, with overall best performances in parasite detection (68 percent mean) and theoretical knowledge (65 percent mean). As noted in other countries, mean performance on species identification and parasite counting was significantly lower at post-test, at 43 percent and 31 percent, respectively. Overall, while showing improvement, the microscopists in this cadre are not meeting the target for WHO L2 criteria: ≥ 80 percent for parasite detection, ≥ 80 percent for species identification, and ≥ 40 percent for parasite counting.

Table 34. Malaria diagnostics refresher training (MDRT) microscopy practical pre- and post-test results for Eastern Zone microscopists, Tanzania (n=22).

Competency area	Pre-test Mean (median [range])	Post-test Mean (median [range])	Average % point change in score
Parasite detection	40% (37% [21%–64%])	68% (70% [48%–83%])	28
Species identification	9% (0% [0%–33%])	43% (40% [16%–60%])	34
Parasite counting	19% (10% [0%–75%])	31% (29% [0%–57%])	12
Theory	46% [31%–58%]	65% [43.5%–87%]	19

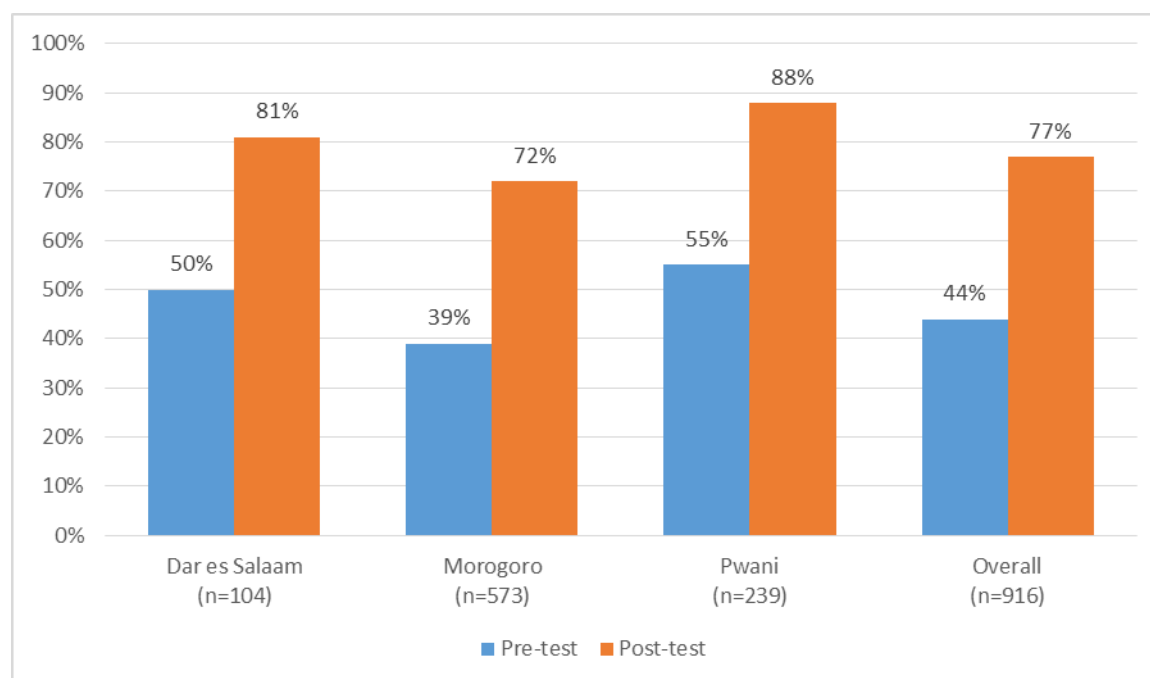
- Supported two technical working group meetings to develop a national malaria microscopy QA manual. While the national microscopy guidelines and microscopy manual have been edited and updated to align with the *WHO Malaria Microscopy QA Manual - Version 2, 2016*, a training manual based on these updated national guidelines is still under development. During PY5, the NMCP plans to conduct a third and final meeting to complete this tool.

Objective 2: Increased percentage of patients suspected to have malaria or a febrile illness who receive a diagnostic test for malaria.

- Supported implementation of a cascade QA training for health care workers on RDT skills and use of test results in the three Eastern Zone regions, training a total of 917 health care workers. They were drawn from

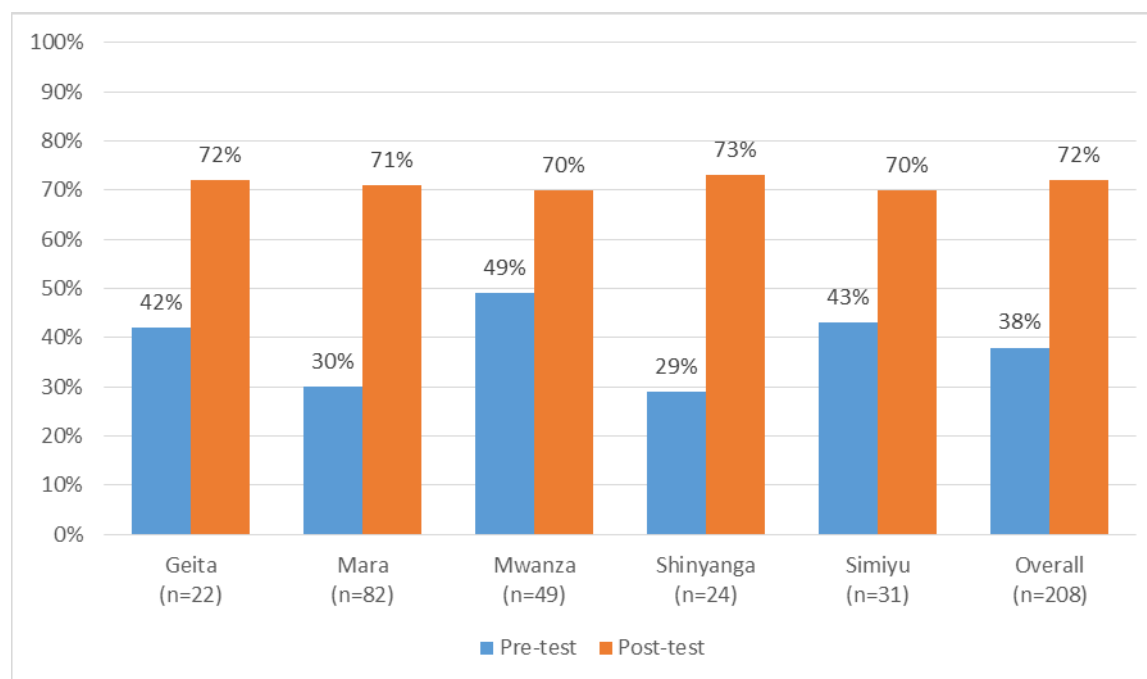
646 (86 percent) of the estimated 752 of the public, parastatal, faith-based, and nongovernmental organization (NGO)-managed facilities in all three regions. The training covered proper test kit storage and testing procedures, addressed common errors in testing technique, provided opportunities for practical experience, and discussed how test results should be used in clinical decision-making. The mean post-test score was 77 percent (an increase of 33 percentage points from the pre-test mean of 44 percent), and 24 percent of attendees scored 90 percent or higher at post-test. While performance was similar across the three regions, performance in Pwani was slightly higher than the other regions, with an average post-test score of 88 percent (median 90 percent; range 47-100 percent). This average score increased by 33 percentage points from an average pre-test score of 55 percent (median 59 percent, range 0-93 percent). While Morogoro also showed a 33 percentage point increase from average pre-test to post-test score, it had the lowest median score (73 percent) at post-test. Figure 77 below provides additional information on performance by region.

Figure 77. Average pre- and post-test scores for rapid diagnostic test quality assurance training, Eastern Zone public health facilities, Tanzania.



At the request of the NMCP, this training was then expanded to reach providers from parastatal organizations, faith-based organizations, and additional public-sector facilities in the five Lake Zone regions. A total of 208 participants, drawn from 117 (98 percent) of the targeted 119 facilities across the five regions, participated in regional training sessions. The mean pre-test score increased from 38 percent (median 35 percent; range 0 to 93 percent) to 72 percent at post-test (median 70 percent; range 33 to 100 percent). Figure 78 below provides a breakdown of performance by region.

Figure 78. Average pre- and post-test scores for rapid diagnostic test quality assurance training, Lake Zone parastatal, faith-based organization and additional public sector facilities health facilities, Tanzania.



- Printed and distributed 5,000 copies of malaria case management algorithms, developed jointly by the NMCP, WHO, and Clinton Health Access Initiative, to outpatient and inpatient departments in public health facilities across the project's eight regions. In PY5, these algorithms will be translated into Swahili and distributed to health facilities nationwide.



Supervisor reviewing case management algorithms with a clinician during an OTSS visit.
Credit: MalariaCare Tanzania

Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illness—consistent with the result of the diagnostic test.

- Collaborated with the NMCP to train 62 medical doctors, assistant medical officers, clinical officers, assistant clinical officers, and nurses from the Eastern Zone regions in malaria case management in two sessions. The training provided technical updates on malaria testing procedures, use of ACTs to treat uncomplicated malaria, treatment of severe malaria, management of malaria in special situations, monitoring of malaria activities, and malaria recording and reporting tools. To avoid duplication, MalariaCare worked closely with district and regional malaria focal persons to select prescribers who were newly employed or those who were not earlier trained by the MOH. Training evaluation indicated improvement in knowledge: the post-test mean was 84 percent (median score 83 percent; range 69 to 97 percent), a 19 percentage point improvement from the pre-test mean score of 65 percent (median 69 percent; range 14 to 84 percent).
- Conducted OTSS supervisor training (including updating mentoring skills and instructions on using the tablet-based EDS tool) for 215 clinical and laboratory supervisors in the project focus regions. Prior to the

launch of OTSS Round 4 in September, all supervisors were trained on the second iteration of the EDS (E2)—an updated version that improves usability and data submission processes. The training oriented supervisors to the key EDS changes and reviewed the roles and responsibilities of each supervision team member.

- An electronic data use training was performed for a core group of seven MalariaCare staff, key personnel from the NMCP, and the Mwanza regional malaria focal person. This workshop focused on using OTSS data from within the DHIS2 platform. It included training on building graphs and tables and using the data to evaluate individual health facility performance. The training was timely, as the NMCP is currently reviewing all the tools that are used by implementing partners for harmonization. The NMCP staff present at this training identified EDS as a potential platform that could incorporate all NMCP modules for the purpose of health facility visits in one integrated system.

Following the national-level data user training, MalariaCare conducted intensive training on using the DHIS2 system to review OTSS data for 35 RHMT staff, including the regional malaria focal point, regional clinician, regional laboratory technician, regional pharmacist, and regional M&E/HMIS officer from each region. The two-day course occurred immediately prior to the LLW in each region and focused on the practical use of the DHIS2 system to review OTSS data. Regional M&E/HMIS officers were trained to make their own graphs in the system; other participants were trained to use the dashboard system to interpret existing graphs that update with each round of OTSS. Those participants who were familiar with DHIS2—generally the M&E/HMIS officers—were able to understand the sections on building graphs and analyzing data; those with less familiarity with DHIS2 had trouble internalizing and understanding the process. By the end of the training, all trained supervisors were able to generate their regional data and orient CHMTs to understand graphs presenting district-specific data before presenting them during the LLWs.

- Conducted three rounds of joint clinical and laboratory OTSS in the project's eight regions. In order to target facilities where the impact of mentoring would affect the quality of care received by the most patients, priority was given to high-volume facilities, such as the district hospital and facilities with the lowest performance scores. Five high-volume and low-performing health facilities in each district were targeted to receive OTSS visits aimed at observing and refreshing the skills of laboratory workers on microscopy, of clinicians on patient examination and appropriate treatment in adherence to test results, and of both cadres on RDT competency.



Busega district supervisors developing an action plan to address new staff's unfamiliarity with the health facility registers during the lessons learned workshop.

Photo credit: PATH Tanzania

Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.

- Conducted the first regional LLW in each of seven regions after OTSS Round 2, and in Morogoro following Round 3. These workshops brought together CHMTs and RHMTs to discuss OTSS data and develop action plans addressing systemic problems. MalariaCare will work with the regional teams to ensure implementation prior to the next LLW (planned to occur every six months).
- Initiated discussions with the National Institute of Medical Research (NIMR) to purchase sets of malaria slides to be used by ZAMEP for proficiency testing and training in Zanzibar. It is expected that a purchase order will be signed in early PY5, and that the samples will have been collected, slides validated and delivered, and a final report prepared within five months of the date of the purchase order.
- Provided technical support to ZAMEP during two rounds of diagnostics supervision visits—which cover all laboratories performing malaria diagnostics including public and faith-based organization facilities—to facilities with laboratories. This included 16 hospitals and 18 primary health care units (PHCUs). Major findings are shown in Table 35 below.

Table 35. Key findings from laboratory supervision visits to health facility laboratories, Zanzibar (n=34).

Indicator	Hospitals (n=16)	Primary health care units (n=18)
At least one staff trained in malaria microscopy	12 (75%)	18 (100%)
At least one staff trained on RDTs	10 (63%)	16 (89%)
SOPs for malaria diagnosis available	2 (13%)	0 (0%)
Laboratory has high-quality, functional microscope	13 (81%)	14 (78%)
Evidence of IQA practices regularly followed	0 (0%)	0 (0%)

Findings are that, surprisingly, in Zanzibar, where the MOH is pushing toward malaria elimination, many facilities lack capacity for key diagnostic functions. MalariaCare has made the following recommendations to ZAMEP to improve supervision and its malaria diagnostics QA approach in general:

- Despite the fact that all laboratories performed parasite quantitation, ZAMEP does not include or request parasite counting slides as part of their proficiency testing panel. MalariaCare recommends including parasite counting in the PT program.
- The ZAMEP supervision checklists (five separate forms) require strengthening. MalariaCare shared its OTSS checklist for ZAMEP to review.
- Due to lack of a standardized laboratory register, each facility collects different information. MalariaCare recommends that the register used in hospitals be distributed to PHCUs for use.

It was agreed that MalariaCare and ZAMEP will work together to strengthen external and internal QA and tailor tools to be more appropriate for the elimination setting.

Progress made on key MalariaCare indicators

Trend data

In July 2015, OTSS implementation started in the Lake Zone, then expanded to include the Eastern Zone. For the first round in each zone, MalariaCare planned to visit all public health facilities, estimated at 1,418 facilities

across both zones and was able to visit 1,313 (93 percent). After this first visit, the team then focused on lower-performing facilities—those that did not meet the MalariaCare minimum targets of 75 percent for diagnostic and treatment observations, and 90 percent for adherence measures. In each subsequent round, the MalariaCare team, in collaboration with regional and district supervisors, chose the district hospital and the four lowest-performing facilities within each district for an additional visit. If after the second visit a facility was found to meet all minimum standards, another low-performing facility identified during the first round was selected to take its place in the third round of OTSS.

Of the 1,418 originally planned facilities in the Lake and Eastern zones, 1,313 facilities (93 percent) were visited at least once since the start of MalariaCare in Tanzania. These 1,313 facilities represent 20 percent of the 6,518 health facilities in mainland Tanzania and 51 percent of the 2,587 total health facilities within these zones, including faith based and private facilities, among others.¹⁴ Of these, 330 facilities (25 percent) have been visited twice and 143 facilities (9 percent) have been visited three times or more. Only 25 facilities have been visited four times.

Figure 79 compares the performance of facilities that had two visits. Of the 330 facilities visited twice, the number of facilities with sufficient data to produce scores varied from 118 facilities for RDT performance (36 percent), to 22 facilities for microscopy (56 percent of the 39 microscopy-performing facilities) and 257 facilities for testing prior to treatment (77 percent). Data completeness over the two visits and three visits is low, primarily due to the paper-based data collection in the first round of OTSS. With the introduction of EDS during the second round of OTSS, data quality has improved to above 85 percent for five of the six key indicators, as shown in the most recent visit analysis.

In the two visit trend analysis, the findings are notable for the relatively high baseline at which these facilities are starting and the significant improvement for all indicators by the second visit. The measures of adherence are particularly notable, as most facilities with adequate records are meeting MalariaCare's overall performance target of 90 percent compliance with the checklist for testing before treatment, treating those with a positive test with ACTs, and not treating with ACTs those with a negative test. In diagnostics, most health facilities are also meeting performance standards.

¹⁴ US President's Malaria Initiative. *Tanzania Malaria Operational Plan FY2016*

Figure 79. Proportion of health facilities meeting minimum performance target (75%) for technical competencies and overall performance target (90%) for measures of adherence, Visit 1 versus Visit 2, Tanzania.

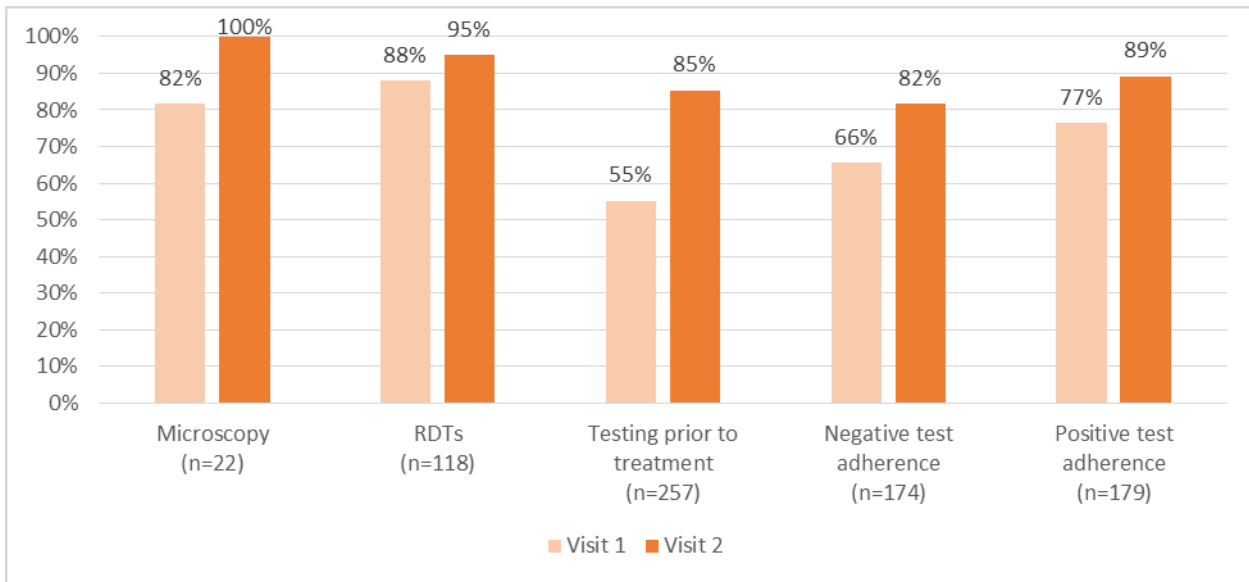
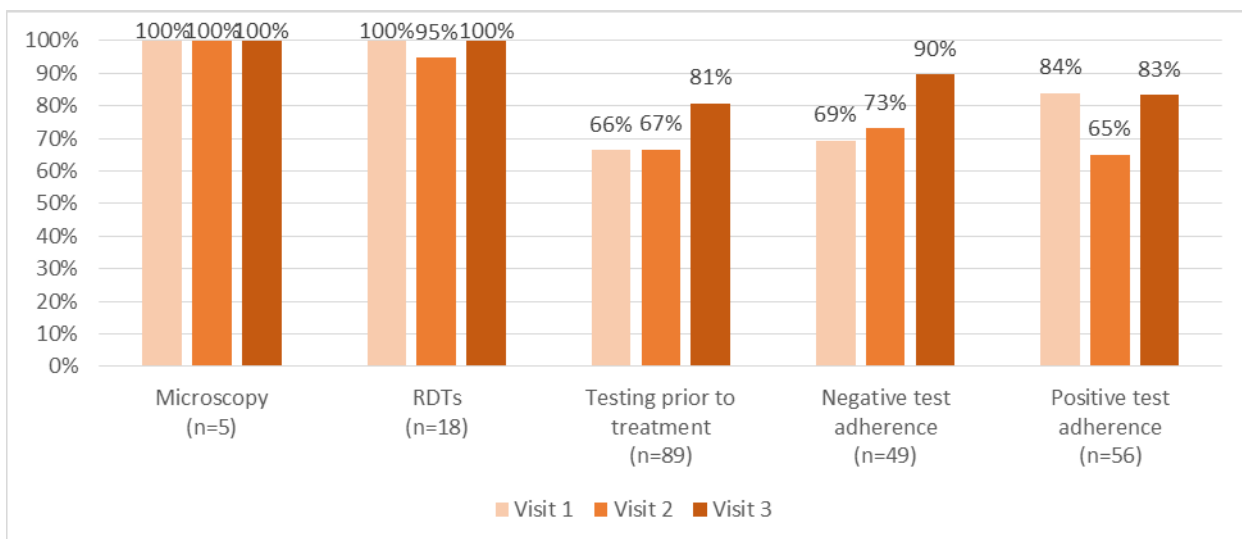


Figure 80 shows performance for facilities that have received at least three visits. For the 143 facilities visited at least three times, availability of scores ranged from 18 facilities for RDT performance (13 percent), 5 facilities (for microscopy, or 14 percent of the 36 microscopy-performing facilities that were visited in both rounds) to 86 facilities (for testing prior to treatment, or 60 percent of facilities). The trends over visits are similar to those facilities that have received two visits for testing prior to treatment and adherence to negative test results. Although the sample was small, among those with scores on RDT performance, scores were high at the first visit, then maintained over the three visits. Microscopy and adherence to positive test results showed a slight decline. As additional facilities are visited for the third time we should get a better understanding of the effects of multiple visits on performance.

Figure 80. Proportion of health facilities meeting minimum performance target (75%) for technical competencies and overall performance target (90%) for measures of adherence, Visit 1 versus Visit 2 versus Visit 3, Tanzania.



Evaluation of clinical care performance

Due to improvements made to the clinical checklist, clinical scores between the rounds conducted in PY3 are not comparable to the rounds conducted in PY4. However, Table 36 reports trends for the minimum standard steps that are included in both versions of the checklists. For the 157 facilities visited twice that had clinical observations completed, improvements are seen for all indicators. The biggest improvement is seen in checking for at least one sign of severe malaria, which is a step consistently missed in many other countries. Between the first and second visits, the average performance for this indicator increased from 71 to 87 percent. Additionally, performance increased from 88 to 96 percent for correct prescription per test result (if available) and diagnosis. Similar trends were seen in facilities visited three times (Table 37).

Table 36. Average health facility performance on minimum standard steps for clinical case management, Visit 1 and Visit 2, Tanzania (n=112).

Step	Visit 1	Visit 2
Checks for at least one sign of severe malaria (or apparent)	71%	87%
Supervisor agrees with whether a malaria test should be ordered*	95%	98%
Correct prescription per test result (if available) & diagnosis	88%	96%

*Counted as yes if test is not available.

Table 37. Average health facility performance on minimum standard steps for clinical case management, Visit 1 and Visit 2 versus Visit 3, Tanzania (n=44).

Step	Visit 1	Visit 2	Visit 3
Checks for at least one sign of severe malaria (or apparent)	71%	87%	89%
Supervisor agrees with whether a malaria test should be ordered*	95%	98%	98%
Correct prescription per test result (if available) & diagnosis	88%	96%	97%

*Counted as yes if test is not available.

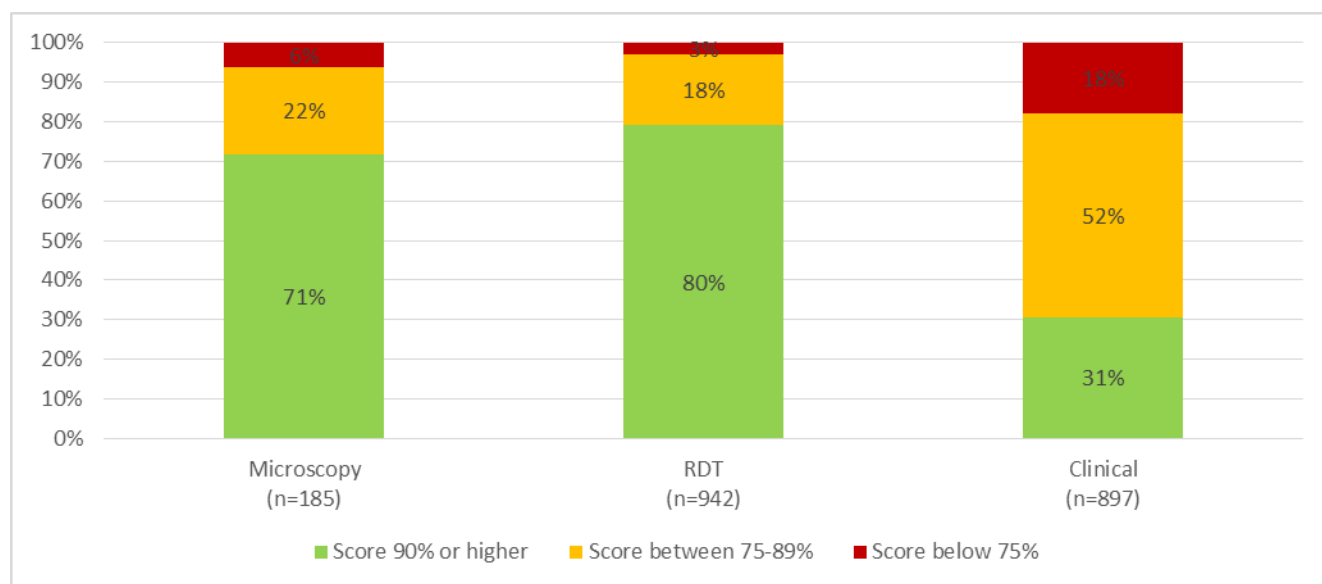
Most recent visit

The following section provides an overview of the current status of technical skills performance (microscopy, RDTs, clinical performance) and adherence (testing before treatment, adherence to negative test results, adherence to positive test results) indicators for the most recent visit for each facility conducted since October 2015.

Performance on key competencies

In PY4, 993 facilities were visited at least once in the three rounds conducted from March 2016 to September 2016. Of these facilities, 298 report performing microscopy, and 185 facilities (62 percent) had sufficient data entered in the checklist to receive a score. For RDTs, 942 of the 993 facilities visited (95 percent) had scores available; for clinical case management, 897 (90 percent) had sufficient data to receive a score. Figure 81 summarizes their performance.

Figure 81. Proportion of health facilities meeting minimum (75%) and overall (90%) targets on technical performance indicators during the most recent OTSS visit, Tanzania.



In Tanzania, microscopy performance is at a high level of competence, with 93 percent of facilities meeting our target for the minimum standard (75 percent or higher). The most commonly missed minimum standard step was spreading the thick film into a 1-2 cm diameter circle and reading the print placed under the slide. Eighty (80) percent of observations performed this step correctly. An additional area of weakness was filtering the stain prior to use (average of 73 percent of observations per facility).

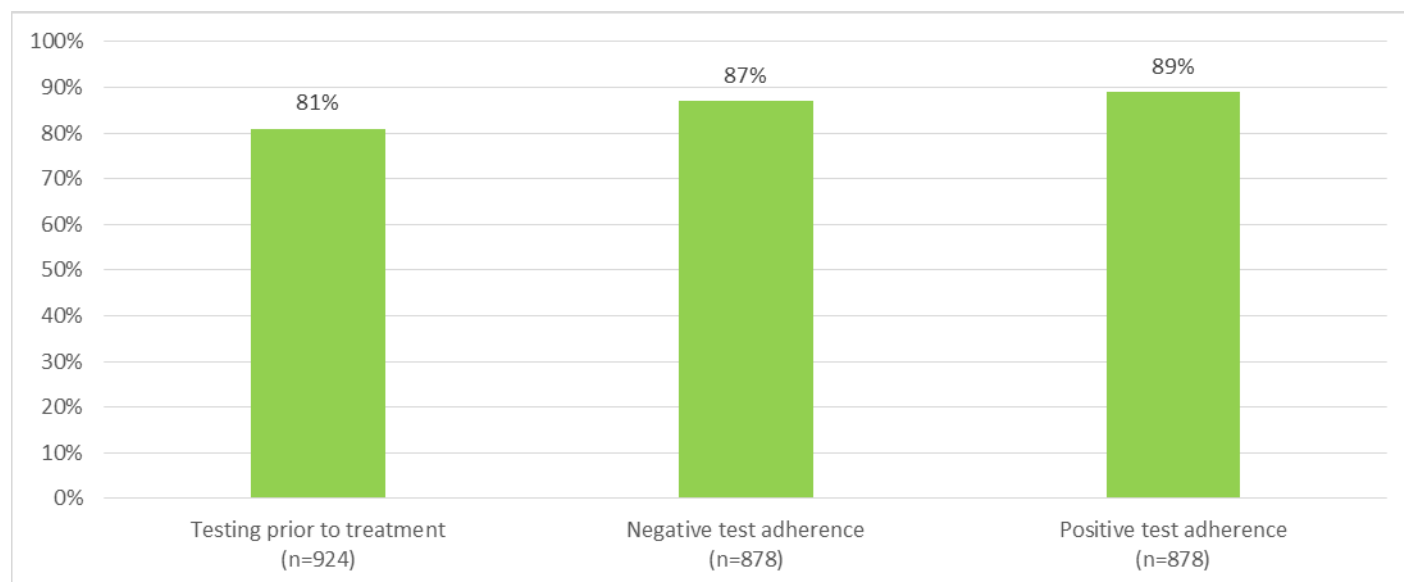
RDT performance is at a similar level of competence, with 98 percent of facilities meeting the minimum performance target at the most recent visit. The most commonly missed steps were checking the expiry date of the RDT device (average of 71 percent of observations per facility).

For clinical case management, 88 percent of facilities met the minimum performance target (score of 75 percent or greater), indicating that health workers by and large correctly carried out the most important (minimum standard) steps. However, only 31 percent met the overall target (90 percent); as with other countries, performing comprehensive physical exams were found to be rare. Steps that were performed the least frequently were conducting a neck exam checking heart rate, and conducting an eye, ear, nose and throat exam (average of 32-34 percent of observations per facility).

Measures of adherence

To gain a better understanding of testing and treatment behavior outside of clinical observations, OTSS supervisors review a sample of health facility register records to estimate testing before antimalarial treatment, as well as treatment adherence to malaria test results. Of the 993 facilities visited, 924 (93 percent) and 878 (88 percent) had completed scores for testing prior to treatment and adherence to negative and positive test results, respectively (Figure 82). Many facilities are meeting the 90 percent minimum standard for negative and positive test adherence, with 87 percent and 89 percent meeting this target, respectively. Performance is lower as regards testing prior to treatment (81 percent).

Figure 82. Proportion of health facilities meeting overall performance target (90%) on testing before treating and adherence to test results during the most recent OTSS visit, Tanzania.



Challenges

Challenge

Faith-based, parastatal, and some public-sector health facilities in the project focus regions were inadvertently left off of RDT QA training and OTSS during the initial round by any implementing partner.

Support to Zanzibar was delayed pending clarification of technical assistance required.

Solution

MalariaCare will conduct another session of RDT QA training in PY5 for one worker from each of these facilities in Dar and Pwani regions (these staff were reached in the remaining regions during PY4).

Further discussion with ZAMEP and the mission has resulted in a refined list of technical assistance activities, which will be implemented in PY5.

Next steps

- Present MalariaCare’s achievements on implementing a system of quality assured malaria diagnosis and treatment throughout eight regions and covering over 2,000 public health facilities with a poster during the ASTMH conference in 2016.
- Focus on updating the cadre of OTSS supervisors, conduct OTSS throughout the eight regions, and evaluate the performance of both the facilities to case management standards and the OTSS supervisors in their mentoring capacity. These performance data will be used as hand-off guidance to both the government and to new mechanisms for carrying on malaria case management performance enhancements.
- Data collected during OTSS will be analyzed and presented in eight regional LLWs – during which regional and district health authorities will plan on how best to use the information moving forward to improve individual facility, district and regional case management performance. In addition, the meetings will also

focus on how to continue ongoing case management QA and monitoring/use of individual health facility performance data post-MalariaCare.

- Provide financial – and to a limited extent technical - support to the NIMR to conduct a second year of artemisinin TES in PY5. This is the second leg of a planned two-year study and will evaluate on-going efficacy of artemether-lumefantrine (AL) at four new clinical sites. Each year’s data set will then be combined and published as a single update report on the state of AL efficacy in Tanzania for 2016-2017.
- Work with the NMCP to develop an activity plan and implementation timeline for malaria case management QA activities in three provinces without current case management QA activities - Kigoma, Tabora, and Tanga regions.
- Support ZAMEP to update malaria case management training materials, update their supervision checklist and provide technical assistance for implementation of OTSS in Zanzibar.

Zambia

MalariaCare has been active in Zambia since March 2013, MalariaCare’s first PY. In PY4, MalariaCare supported



four provinces (Central, Copperbelt, North Western, and Western) to strengthen malaria case management, utilizing Zambia’s highly trained OTSS supervisors and targeting low-performing facilities. The project continues to work closely with the NMCC to strengthen capacity at provincial, district, and local levels. MalariaCare rolled out the EDS, and supervisors in all four provinces have completed Zambia’s first OTSS rounds using the EDS at provincial and district levels. MalariaCare and the NMCC also conducted a TES in three geographically distinct clinical sites to assess the safety and clinical effectiveness of three commonly used ACTs for treatment of uncomplicated malaria. The project hired a new program

coordinator/technical advisor for diagnostics, following the tragic passing of Mr. Timothy Nzangwa. A senior program assistant was also recruited to provide operational support, as was a part-time research coordinator to support TES implementation.

Key accomplishments

Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent.

- In October 2016, supported the NMCC’s chief parasitologist to prepare for, attend, and pass the WHO ECAMM course. He attained L1 accreditation—considered international expert level—with a certification valid through 2019.

Objective 2: Increased percentage of patients suspected to have malaria or a febrile illness who receive a diagnostic test for malaria.

- Provided supervisor training to 25 laboratory and clinical supervisors to improve case management in lower-level facilities and address the high turnover of supervisors. This training, which MalariaCare co-facilitated with supervisors trained on EDS during PY3, included several new NMCC supervisors from Central, Copperbelt, North Western, and Western provinces. Laboratory supervisors participated in five days of

diagnostic-knowledge and skill-refresher training, while clinical supervisors underwent two days of update training on malaria case management guidelines. Participants then joined to undergo training in supervisory/mentorships skills. Overall, laboratory supervisors improved their knowledge scores from an average pre-test score of 62 percent (median 63 percent; range 53 to 69 percent) to 81 percent at post-test (median 76 percent; range 63 to 97 percent)—a 19 percentage point improvement. Clinical supervisors improved their knowledge pre- and post-tests from an average score of 74 percent at pre-test (75 percent median; range 60 to 86 percent) to 91 percent at post-test (median 93 percent; range 85 to 95 percent)—a 17 percentage point improvement.

- Rolled out the EDS at provincial and district levels across four provinces. Following supervisor training and EDS orientation for 25 provincial and 40 district supervisors, supervisors conducted Zambia’s first OTSS rounds (Round 15 and Round 16) using the EDS at provincial and district levels. With the EDS, OTSS data can now be analyzed more quickly than in prior years when paper-based checklists were used.
- Conducted four EDS end user training sessions for district supervisors in Lusaka, Kabwe (Central), Solwezi (North Western), Ndola (Copperbelt), and Mongu (Western). The purpose was to introduce district supervisors to EDS and use of the tablet, to reinforce MalariaCare’s QA approach and to plan for the subsequent EDS-supported district OTSS across 20 districts.
- Collaborated with the Program for the Advancement of Malaria Outcomes (PAMO) to share project approaches and lessons learned. As PAMO activities got up and running this year, MalariaCare and PAMO worked closely with the NMCC to coordinate activity planning. MalariaCare also provided technical support to help PAMO lay the groundwork for using EDS during PAMO-supported OTSS rounds, including uploading PAMO-supported health facilities to the EDS and introducing PAMO to MalariaCare’s QA approach (with a focus on OTSS and EDS) during a PAMO-supported training late in PY4.

Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illness consistent with the result of the diagnostic test.

- To facilitate use of data for decision-making following each OTSS round, MalariaCare and NMCC supported EDS data-user training at national and provincial levels. During the national training in Chisamba, seven high-level NMCC officials, including M&E staff, were oriented to the EDS platform and MalariaCare’s scoring system for health facility competencies. Trainees then learned how to retrieve and analyze data and produce graphical results, using actual data from OTSS Round 15. The provincial-level training in Ndola followed a similar approach, and 19 participants (clinical supervisors, laboratory supervisors, the NMCC’s new head information officer, and a PAMO supervisor) took part. All four MalariaCare-supported provinces were represented at the training.
- Completed TES data collection across three sites: Katete (Eastern Province), Mansa (Luapula Province), and Gwembe (Southern Province). The study was designed to assess the safety and clinical effectiveness of three common ACTs for treatment of uncomplicated malaria. Enrollment data is summarized below (Table 38).



EDS data-user training in Ndola, Zambia. Photo: Victoria Kalota.

Table 38. Therapeutic efficacy study enrollment in Katete, Mansa, and Gwembe, February to May 2016.

Item	KATETE			MANSA			GWEMBE		
	# Male	# Female	Total	# Male	# Female	Total	# Male	# Female	Total
Screened	110	109	219	135	141	276	222	196	418
# Positive	69	67	136	62	59	121	145	132	277
# Enrolled	53	48	101	54	42	96	52	44	96
# Withdrawn	4	7	11	1	1	2	0	0	0
# Loss to follow-up	0	2	2	4	4	8	4	3	7
Total completed study	89			86			89		

Following analysis, MalariaCare will work with NMCC to prepare a report on TES findings early in PY5.

- Conducted two provincial OTSS rounds. Round 15 was conducted from December 2015 through January 2016. Round 16 was conducted from August through September 2016. MalariaCare developed a summary report of key findings from Round 15 that was shared with NMCC and supervisors to prepare for Round 16. The report highlighted facility and provincial performance against key targets for microscopy, RDT, and clinical indicators.
- Conducted one district OTSS round. The round was conducted from May through June 2016. Supervisors provided onsite support to approximately 104 health facilities. As the second district OTSS round was initiated late in PY4, results will be included in the next report.

Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.

- Began development of the Zambian NAMS. Following final IRB approval in early PY4, MalariaCare and the NMCC conducted NAMS training in Kabwe for ten laboratory technicians from the three sample collection sites: Katete (Eastern Province), Kalabo (Western Province), and Samfya (Luapula Province). To date, 10 donors have been collected from Sanfya (n=9) and Kalabo (n=1), stained, and passed the qa process, and approximately 2,000 slides have been made. PY5 work will focus on enrolling the remaining necessary donors, confirming their results via PCR analysis, and having all donor samples reviewed for concordance by six WHO approved L1 microscopists.

Progress made on key MalariaCare indicators

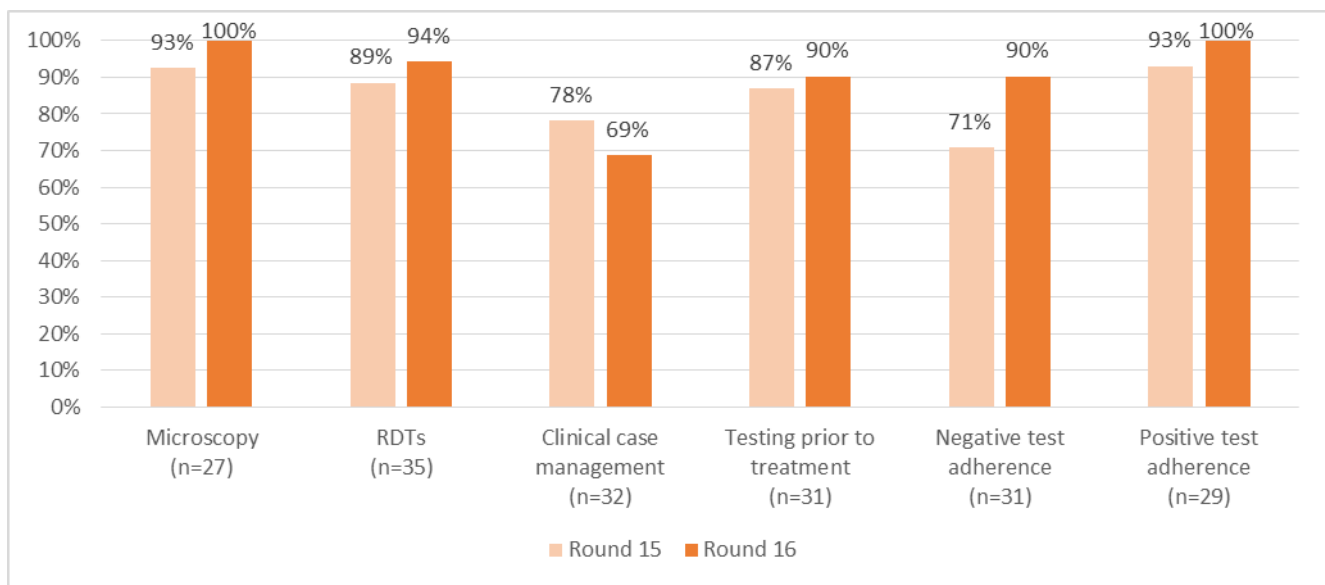
Trend data

To date, 16 rounds of provincial OTSS have been carried out (6 under the IMaD project, 10 under MalariaCare); starting in PY3, two rounds of district OTSS have been carried out. For provincial OTSS, performance trends for the majority of facilities currently participating in provincial OTSS are only available for PY4, due to changes to improve the checklist questions and different facilities being visited for each round. However, the trend results in Figure 83 provide some indication of the impact of successive visits among a group of facilities with three or more OTSS visits at the start of PY4. MalariaCare has also improved communication with NMCC and OTSS

supervisors to concentrate on visiting the same facilities in each round so that improvement among specific facilities can be tracked.

In PY4, 43 high-volume facilities were visited during provincial OTSS rounds, and 103 lower-level facilities were visited during district OTSS rounds. In total, this represents approximately 7 percent of all health facilities in Zambia, and 18 percent of facilities in the four provinces where MalariaCare works.¹⁵ Of the 43 provincial OTSS facilities visited in PY4, 39 facilities (91 percent) were visited in both Round 15 and Round 16. Figure 83 compares the performance of these facilities between rounds with available scores. The number of facilities with sufficient data to obtain scores in both rounds varied from 27 facilities (84 percent of microscopy-performing facilities that were visited in both rounds) for microscopy, to 35 facilities (90 percent of facilities visited in both rounds) for RDTs.

Figure 83. Proportion of provincial OTSS health facilities meeting minimum performance target (75%) for technical competencies and overall performance (90%) for measures of adherence.

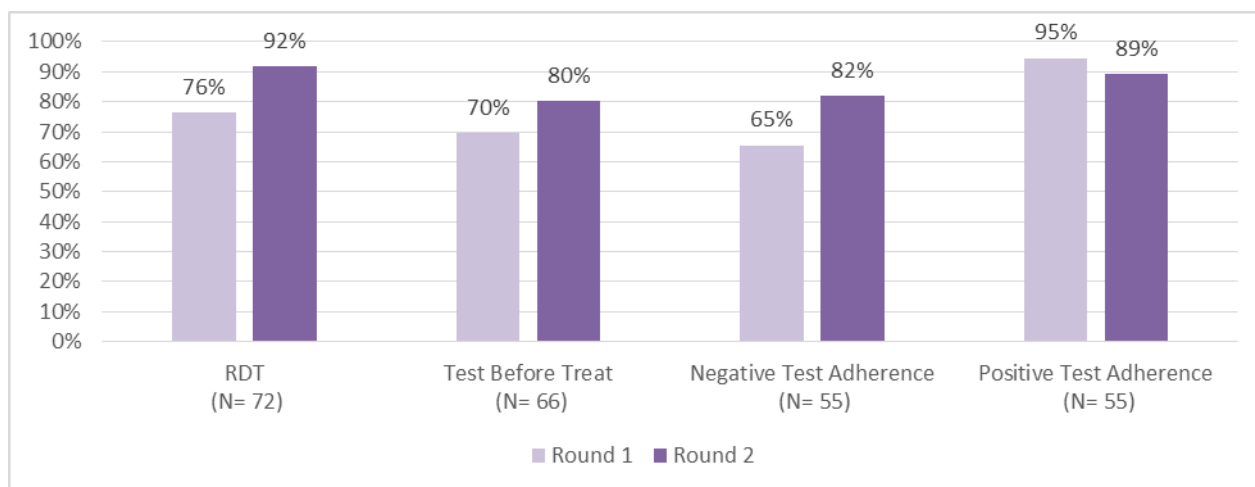


Among these facilities, in Round 15, the majority met MalariaCare’s minimum performance targets for the technical competencies (75 percent for microscopy, RDTs, and clinical case management) and overall performance targets for measures of adherence (90 percent for testing prior to treatment, negative test adherence and positive test adherence). In Round 16, significant improvement was noted in the adherence to negative test results: an additional 19 percent of facilities met the MalariaCare overall performance target. On the other hand, the proportion of facilities meeting the clinical competency target declined from 78 to 69 percent. Clinical improvement and performance overall in MalariaCare countries has lagged compared to diagnostic competencies. This is not unexpected as RDT and microscopy performance are a set of defined, repetitive steps while clinical competency is more complex with varying clinical presentations requiring both objective and subjective decision making on the part of the provider. MalariaCare is working with clinical supervisors to improve their skills and their ability to mentor effectively to target areas of weakness.

¹⁵ Ministry of Health Zambia. 2012 List of Health Facilities in Zambia, Retrieved October 26, 2016 from <http://www.moh.gov.zm/docs/facilities.pdf>

Round 2 of district OTSS was conducted in May 2016; Round 3 started in September 2016, continuing into PY5. During Round 1 and Round 2, 167 facilities were visited in total, with 80 of those visited in both rounds. Figure 84 summarizes results for this group of facilities. The number of facilities with scores in both rounds ranged from 55 facilities (or 69 percent of facilities visited both times) for adherence to test results, to 72 (or 90 percent) for RDT performance.

Figure 84. Proportion of district OTSS health facilities meeting minimum performance target (75%) for technical competencies and overall performance (90%) for measures of adherence.



The proportion of district OTSS facilities meeting the minimum performance target for RDT performance improved to 92 percent by Round 2. Similar improvement was seen with testing prior to treatment and negative test adherence. The proportion of health facilities meeting targets for positive test adherence declined slightly between Round 1 and Round 2; however, this may in part be due to increases in ACT stock-outs (during Round 1, 10 percent of these facilities reported stock-outs of all first-line ACTs, whereas in Round 2, 45 percent did). Although the clinical competency checklist was updated between Round 1 and Round 2, and scores are therefore not comparable, facilities also demonstrated improvements in key minimum standard steps conducted during the observation, such as checking for severe malaria signs (from an average of 53 percent of observations per facility to 66 percent; n=42) and the decision to order a malaria test as measured by supervisor agreement during clinical observation (77 percent to 92 percent).

Most recent visit

Performance on key competencies

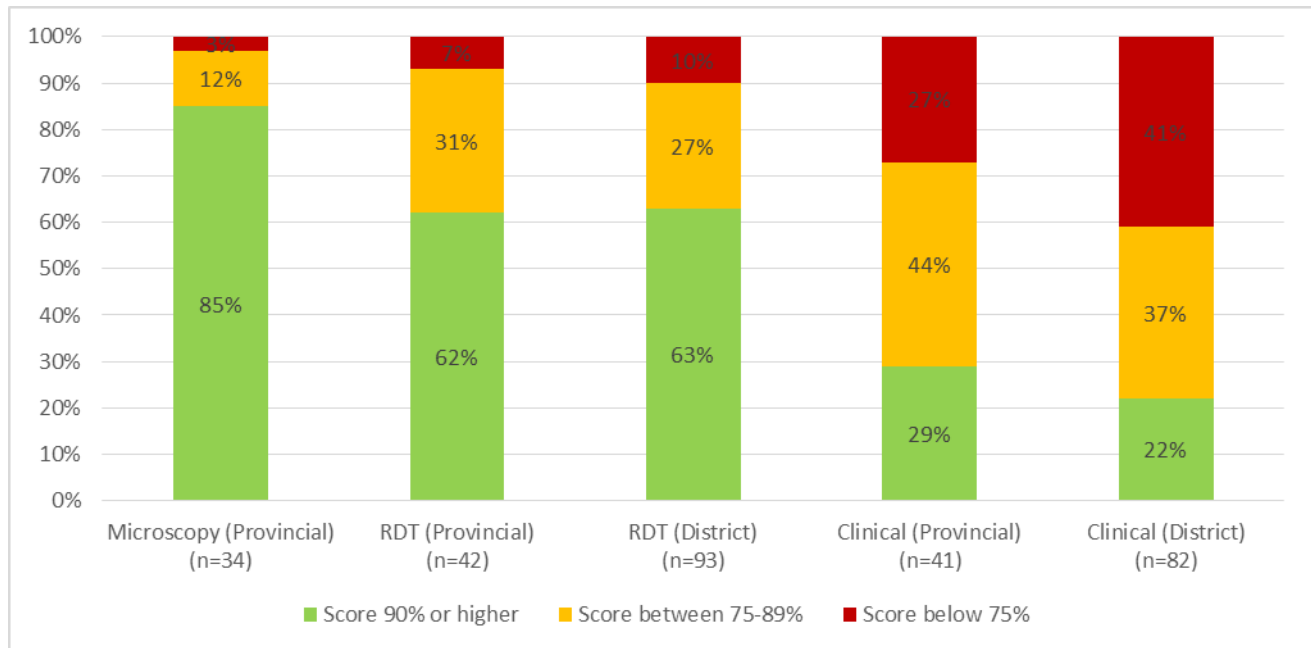
The following section provides an overview of the current status of technical performance (microscopy, RDTs, clinical performance) and adherence (testing before treatment, adherence to negative test results, adherence to positive test results) indicators.

Technical performance

In PY4, 43 provincial OTSS facilities and 103 district facilities were visited. Of the 43 provincial OTSS facilities, 36 facilities (84 percent) performed microscopy; of these, 34 facilities (94 percent) had sufficient data to receive a score. For RDTs, 42 (98 percent) provincial facilities and 93 (90 percent) district facilities had scores available;

for clinical case management, 41 (95 percent) provincial OTSS and 82 (80 percent) district OTSS facilities had sufficient data to receive a score. Figure 85 below summarizes their performance.

Figure 85. Proportion of health facilities meeting minimum (75%) and overall (90%) targets on technical performance indicators during the most recent OTSS visit, provincial and district, Zambia.



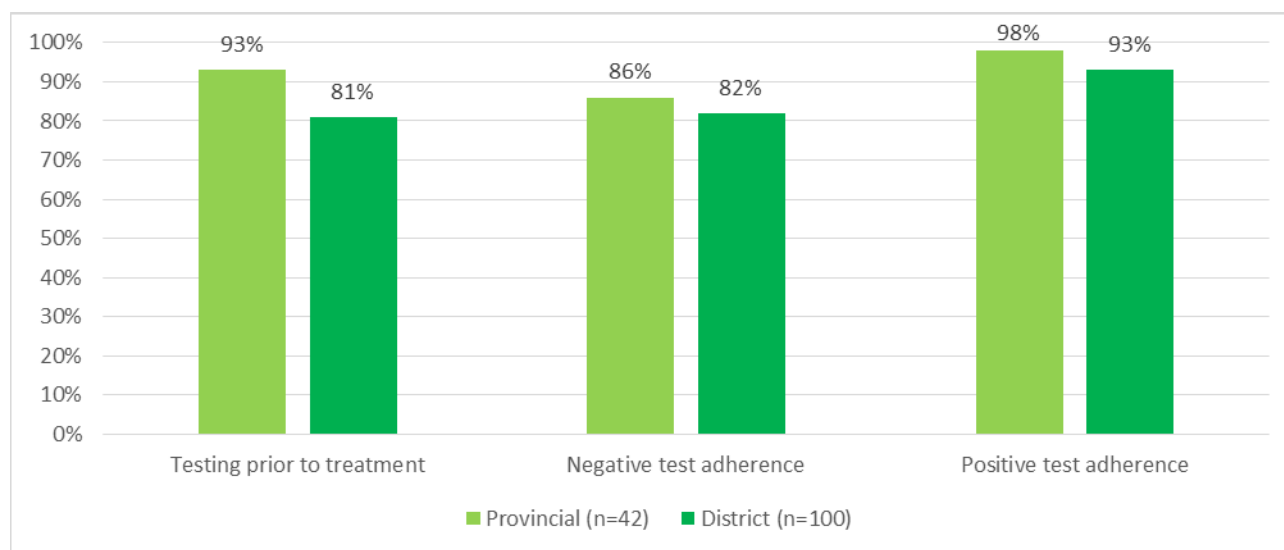
Note: Due to rounding, percentages presented here may not sum to 100%; and the proportion of facilities meeting the minimum performance target is most accurately calculated as 100% minus the number reported as not meeting the minimum performance target (i.e. scored below 75%).

Microscopy performance is high, with 97 percent meeting the minimum standard (75 percent compliance) or higher. Of the three major areas of microscopy procedures (preparation, staining, and reading), the weakest area is slide preparation, where 71 percent reach the target. Clinical case management had the lowest level of competence, with 73 percent of provincial OTSS and 59 percent of district OTSS facilities meeting the minimum standard target. As stated above, this is not unusual across MalariaCare countries. Clinical staff are typically ordering a diagnostic test and treating uncomplicated malaria appropriately, but lagging behind in identification of signs of severe malaria and performing comprehensive history and physical exams to help them identify other causes of fever. Overall, facility performance was high for RDTs. Ninety-three percent of provincial OTSS and 90 percent of district facilities met the 75 percent minimum target for RDT.

Measures of adherence

To better understand testing and treatment behavior outside of clinical observations, OTSS supervisors review a sample of health facility register records to estimate testing before antimalarial treatment, as well as treatment adherence to malaria test results. Overall, 42 of the 43 provincial OTSS facilities and 100 of the 103 district facilities visited in PY4 collected sufficient information on ACT records to estimate performance on testing prior to treatment and test adherence. Results for these indicators are displayed in Figure 86.

Figure 86. Proportion of health facilities meeting overall performance target (90%) on testing before treating and adherence to test results during the most recent OTSS visit, Zambia.



In 93 percent of provincial OTSS facilities and 81 percent of district OTSS facilities with data, supervisors found a corresponding test result for 90 percent or more of the ACT records sampled. The availability of RDTs may partially explain the lower performance of district OTSS facilities compared with provincial: although 23 percent of provincial OTSS facilities reported significant RDT stock-outs in the recent past, 62 percent of district OTSS facilities reported the same. Stock-outs of RDTs among district OTSS facilities also varies significantly by province, with 38 percent of Central facilities reporting significant stock-outs, and 83 percent of North Western doing so. Despite this, health provider attitudes toward testing and/or poor record keeping may also play roles in performance, as Copperbelt had the lowest proportion of facilities meeting the testing before treating target and a lower stock-out rate than North Western.

The vast majority of facilities are meeting the 90 percent target for positive test adherence (positive test results with a corresponding ACT prescription): 98 percent of provincial OTSS facilities and 93 percent of district OTSS facilities met the target. Similar to other countries, a higher proportion of facilities met the target for positive test adherence than negative test adherence, with 82–86 percent of health facilities meeting the target for the latter.

Stock-outs

While MalariaCare’s mandate does not include the procurement of malaria commodities or supply chain distribution, the project does collect data on availability of key items necessary for high-quality malaria case management during OTSS visits. Unfortunately, in PY4, significant stock deficits remain. Figure 87 shows the proportion of facilities that reported a stock-out of RDTs greater than seven days in the three months prior to the visit. A notable finding is that the district-level facilities appear to have a high percentage of facilities with significant stock-out of RDTs (this is particularly important as they do not generally have access to microscopy), which means they more often have to revert to treatment based on just clinical diagnosis.

Figure 87. Proportion of health facilities reporting stock-outs of RDTs lasting more than 7 days in the 3 months prior to OTSS visit, by province and overall, Zambia.

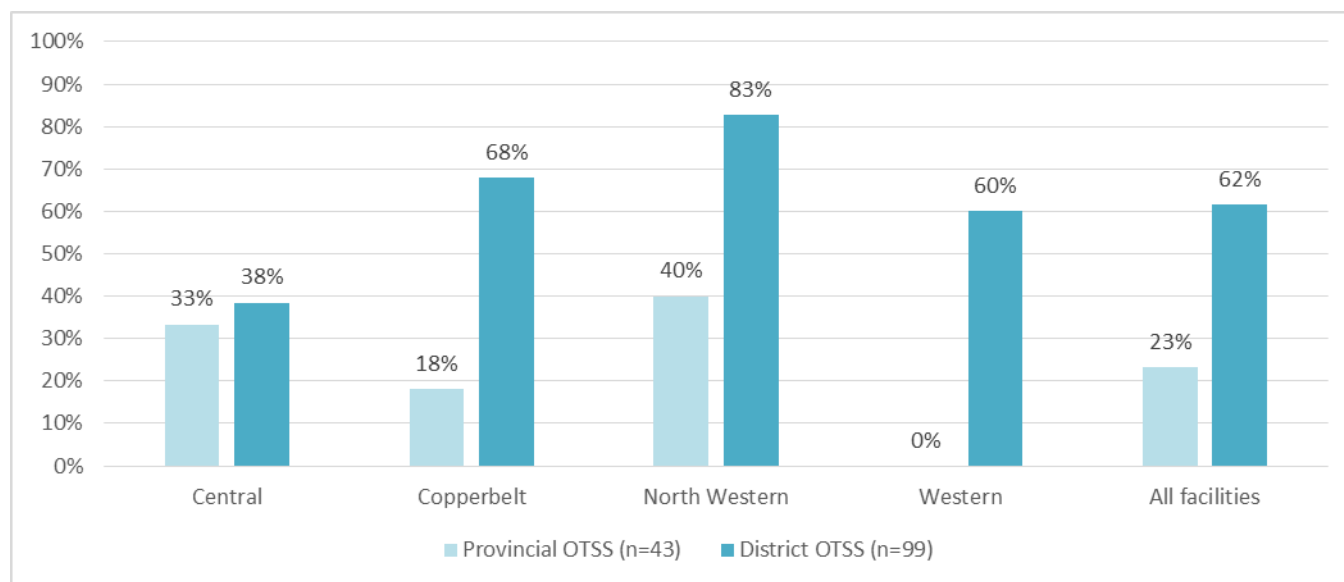
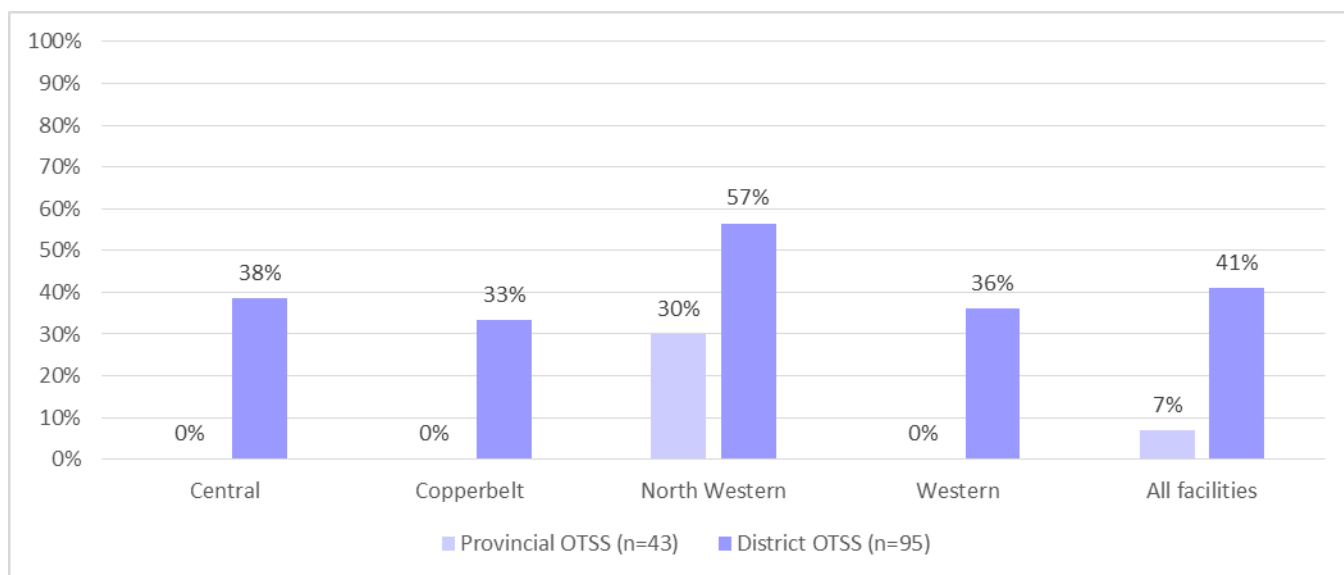


Figure 88 illustrates that the same general problem of higher stock-out levels in district facilities is also found with ACT stocks—thus making it difficult to maintain treatment guidelines at this level. ACT stock-outs may lead to inappropriate treatment for those diagnosed with malaria by use of a diagnostic test, or in the case of stock outs of both lead to inappropriate treatment of all fever cases with antibiotics or other alternative treatments.

Figure 88. Proportion of facilities reporting stock-outs of all first-line ACTs lasting more than 7 days in the 3 months prior to most recent OTSS visit, by region and overall, Zambia.



During the reporting period, North Western province appears to have had particular problems with stock-outs of both RDTs and ACTs, presenting a challenge for making consistent QA improvements in case management performance in the province. Similar to RDT stock-outs, ACT stock-outs appear to be a much more significant problem among district OTSS facilities, which may contribute to the lower performance in adherence to positive

test results (Figure 88). Except in North Western, no provincial OTSS facilities reported a significant stock-out of a first-line ACT (artemether lumefantrine, or Coartem; or dihydroartemisinin-piperaquine) for the three months prior to the OTSS visit. Among district OTSS facilities, however, 41 percent reported a significant stock-out.

Challenges

Challenge	Solution
Delays to NAMS due to the unfortunate illness and ultimate passing of MalariaCare’s diagnostics technical advisor (Timothy Nzangwa).	MalariaCare identified and hired a qualified diagnostics technical advisor to assist in the finalization of NAMS.
Shifts in the selection of OTSS supervisors and supported health facilities due to competing demands on NMCC.	MalariaCare’s new diagnostic technical advisor met with NMCC and provincial medical offices to update OTSS supervisor and health facility lists and review the process for engaging supervisors and selecting health facilities for OTSS.
Data upload difficulties due to poor internet connectivity.	MalariaCare procured internet bundles to support data upload in remote provinces. MalariaCare’s EDS consultant also worked closely with OTSS supervisors to troubleshoot data-upload issues on a daily basis (during OTSS rounds).
Stock-outs of RDTs and ACTs—particularly at district level and within some provinces—lead to backsliding to substandard case management practices.	MalariaCare will share the stock information obtained during OTSS with the NMCC, PMI, and other key stakeholders involved with procurement and supply distribution. The project will work with these bodies to establish a remediation plan and will provide ongoing stock reports back to the NMCC and PMI during future OTSS rounds.

Next steps

MalariaCare will continue to support improvements in health facility case management through the following major activities:

- The project will target support to lower-performing health facilities, particularly at district level. In addition, it will provide continued case management support to Central, Copperbelt, North Western, and Western. In subsequent rounds of OTSS, MalariaCare will address the diagnostic and clinical performance gaps identified above.
- To address problems related to high turnover among OTSS supervisors, MalariaCare will conduct refresher training for provincial and district OTSS supervisors in the four MalariaCare-supported provinces. To assess and ensure the quality of OTSS, MalariaCare will work with NMCC to assess supervisor performance at least once during the year.
- As MalariaCare enters its final year, the team will continue to collaborate with PMI, NMCC, and PAMO to help transition OTSS, mentorship, and EDS approaches to supervisors in the four PAMO-supported provinces (Eastern, Luapula, Muchinga, and Northern provinces). In addition, MalariaCare will help further transition

these approaches to NMCC in the four MalariaCare-supported provinces (Central, Copperbelt, North Western, and Western).

- MalariaCare will use EDS data to focus OTSS on lower-performing facilities: up to 21 high-volume facilities at provincial level and up to 100 low performers at district level in 20 target districts. Each OTSS session will end with an action plan to address gaps—and the outcomes of these plans will be discussed during lessons learned workshops.
- MalariaCare will continue to support the NMCC to finalize a report on TES findings, including potential publication of these findings.
- To enhance longer-term, national microscopy training and capacity-building efforts, MalariaCare will continue to support slide development and validation for Zambia's NAMS. This will include validation of donors for species identification by PCR and parasite quantitation using WHO L1-certified microscopists based in Africa. A NAMS Access database will then be customized to accommodate the storage unit purchased for Zambia, which will allow for tracking of physical slides and MOH user preferences.

Appendix A: Performance monitoring plans

The following tables report global PMP indicator results for each country. Results are reported for all health workers, facilities, and availability of tools that are a) targeted per the country work plans, and b) have data available to calculate the indicator. For several of our OTSS outcome indicators (i.e. percentage of targeted laboratory technicians demonstrating competence in RDTs), the denominator is dependent on the number of health workers reached during an OTSS visit and the numerator is the proportion performing at the standard. Additional information on data completeness for those entities targeted are reported in the Comments column.

As most of our PMP indicators are threshold indicators (i.e. proportion of the targeted group meeting the target), we have also included the mean and median scores for indicators where possible. The mean and median provide additional information on how the targeted groups are progressing towards the targets.

Following the Mid-Term Evaluation and discussions with the PMI Global Team, we have discontinued the use of the country-specific PMPs--which were used in PY3 and PY4--and replaced these with the global PMP approved during PY1. This enables MalariaCare to easily compare indicators across countries and over time.

This affects our PY4 reporting in several ways:

- We are now reporting on a consistent set of indicators across all of our country programs, rather than tailoring the PMP to only include indicators relevant to that country. This results in some indicators being reported as “N/A”, which means no relevant activity was conducted for that country in the given year.
- For indicators where we had the same indicator in our PY4 work plan PMP we have included the same PY4 target.
- For some indicators, the indicator is the same as the PY4 work plan PMP but disaggregated differently. For example where the indicator was formerly reported out of health workers as a whole, it is now reported as two separate indicators for lab and clinical staff, respectively. For these indicators, we have noted in the PMP comments that there was no specific target for each subgroup in the PY4 WP PMP, and used the overall target included in the PY4 work plan PMP as the target for each subgroup.

DRC Performance Monitoring Plan

GOAL: Contribute to PMI's overall goal 50% reduction in the burden of malaria in 70% of the at-risk population in PMI focus countries.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Objective 2: Increased percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test.											
Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses-consistent with the diagnostic test.											
Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Description: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent. The activities described in this section relate to addressing the laboratory technician and health care provider competency related to providing quality diagnostic services.											
Intermediate Objectives											
Clear and disseminated laboratory guidelines, procurement policies, supervision structures											
Clear and functioning quality assurance procedures for regulation of diagnostics for malaria and other IDs											
Reporting on malaria indicators is complete and accurate											
Country has complete national guidelines for the diagnosis of malaria											
Providers demonstrate competence in RDTs and/or microscopy											
Intermediate Outcomes											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
1	Percentage of targeted countries with national malaria diagnostics supervision tools whose indicators adhere to global standards.	Number of targeted countries whose national malaria diagnostics supervision tools adhere to global standards/Total number of targeted countries.	None	National Supervision Tools	No PY4 target set	1/1	1	1			In the DRC PY4 work plan PMP, no PMP target was set for this indicator. Please see the paragraph at the beginning of the country PMPs for a full explanation of the change in the PMP from PY4 to PY5 and why targets are not available for some indicators. MalariaCare's diagnostic supervision tools adhere to global standards; in the DRC, this tool is endorsed by the national government and used by the government and partners as the national supervision tool.

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2	Percentage of targeted laboratory technicians demonstrating competence in RDTs.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of lab staff who received a supervisory visit during the reporting period.	3.3	OTSS checklist data	80%	79%	63	80	94%	98%	<p>Target not reached. The PMP target in the PY4 work plan was set based on performance among all health care workers. In the revised global PMP, this indicator is disaggregated by cadre. We have maintained the PY4 work plan PMP overall target for this indicator.</p> <p>The laboratory staff observed fell short of the target by one percentage point. However, mean and median scores are well above the 90%, and we expect to meet this target in PY5 by ensuring that appropriate mentoring occurs at the lowest-performing sites.</p>
3	Percentage of targeted laboratory technicians demonstrating competence in malaria microscopy.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklist measuring slide preparation and parasite detection/Total number of laboratory technicians who received a supervisory visit during the reporting period.	3.3	OTSS checklist data	70%	54%	56	103	86%	96%	<p>Target not reached. Lab workers performed more poorly on slide preparation than slide staining or reading. The most commonly missed steps were cleaning the finger (59% of providers at each facility did this correctly, on average) and pricking the finger appropriately (58%).</p> <p>In PY5 we plan to focus on these areas during OTSS as well as emphasize these steps during MDRTs.</p>

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4	Percentage of targeted clinical providers that demonstrate competence in RDTs.	Number of targeted clinical providers who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of clinical providers who received a supervisory visit during the reporting period.	3.3	OTSS checklist data	80%	93%	13	14	98%	100%	<p>Target exceeded.</p> <p>The PMP target in the PY4 work plan was set based on performance among all health care workers. In the revised global PMP, this indicator is disaggregated by cadre. We have maintained the PY4 work plan PMP overall target for this indicator.</p> <p>Clinical staff, although a smaller fraction of staff than laboratory workers, performed better than laboratory staff, and thus exceeded the target for this area.</p>
5	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality diagnosis of malaria.	Number of targeted clinics that meet 90% or greater on facility checklists for diagnosis during supervisory visits /Total number of targeted facilities who received a supervisory visit during the reporting period.	3.3	OTSS checklist data	80%	58%	32	55			<p>Target not reached.</p> <p>Of the 57 facilities visited, 55 (96%) reported all variables required for a quality diagnosis assessment.</p> <p>32 (58%) of the 55 facilities with data available met all standards for the quality diagnosis of malaria.</p> <p>Of the 55 facilities with OTSS data available:</p> <p>39 (71%) reported no stock-outs of RDTs of seven days or more over the past three months</p> <p>42 (75%) reported availability of RDT bench aids and/or SOPs, and</p> <p>53 (95%) reported at least one person trained in RDTs in the past two years.</p> <p>MalariaCare, per the DRC work plan, has a limited role in improving performance on this indicator. MalariaCare is sharing this information with the national malaria program for future action as needed.</p>

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6	Percentage of supervisors demonstrating competence in malaria microscopy.	<p>Percentage of supervisors who score 90% or greater in slide preparation and parasite detection during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers.</p> <p>Note: Must score at least L1 or L2 on parasite detection (>=80%) and parasite quantification (>=40%)</p>	1.1	MDRT Activity Report	No PY4 target set	50%	9	18			<p>In the DRC PY4 work plan PMP, no target was set for this indicator.</p> <p>In PY4, of the 39 MDRT participants, 18 were lab supervisors. Of those 18 supervisors, 15 (83%) scored at a WHO L1 or L2 (>=80%) for parasite detection, and 9 (50%) scored at a WHO L1 or L2 for parasite quantification (>=40%).</p>
7	Percentage of supervisors demonstrating competence in RDTs.	Percentage of supervisors who score 90% or greater in preparation and reading of RDTs during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers.	1.1, 3.1	n/a	No PY4 target set	n/a	n/a	n/a	n/a	n/a	Because this indicator was not included in the PY4 work plan PMP, testing supervisors on RDT knowledge was not included as a standard part of supervisor training; instead, additional time was devoted to strengthening general mentoring and supervisory skills. However, pre- and post-tests will be administered during supervisor trainings in PY5.

Outputs										
8	Percentage of targeted facilities with at least one provider trained in RDTs.	Number of targeted facilities with one or more providers trained in RDT/Total number of targeted facilities.	3.3	OTSS checklist data	85%	95%	54	57		Target exceeded. Of the 57 facilities visited in PY4, 54 (95%) had at least one staff member formally trained in RDTs in the previous 2 years.
9	Percentage of targeted facilities with at least one provider trained in malaria microscopy.	Number of target facilities with one or more providers trained in malaria microscopy/Total number of targeted facilities.	3.3	OTSS checklist data	No PY4 target set	50%	28	56		In the DRC PY4 work plan PMP, no target was set for this indicator. OTSS data for this indicator was available for 56 (98%) of the 57 facilities visited in PY4. Of these 56 facilities, 28 (50%) had at least one provider trained in malaria microscopy.
10	Percentage of targeted facilities with at least one provider who received malaria diagnostic refresher training (MDRT) in the last two years.	Number of targeted facilities with one or more providers who received MDRT in the last two years/Total number of targeted facilities.	1.1	MDRT Activity Report	No PY4 target set	105%	42	40		In the DRC PY4 work plan PMP, no target was set for this indicator. However, in the PY4 work plan, MalariaCare planned to train 40 laboratory staff from unique facilities in malaria microscopy; 42 (105%) laboratory workers were actually trained.
11	Percentage of targeted clinical providers trained in RDTs.	Number of clinical providers trained in RDTs/Total number of targeted clinical providers.	2.3 (PY3 carry-over activity)	Activity/ Training Reports	No PY4 target set	125%	175	140		In the DRC PY4 work plan PMP, no target was set for this indicator. However, in the PY3 work plan, MalariaCare estimated that 10 health workers per health zone would be trained in the RDT QA cascade training; out of the 14 health zones covered in PY4, 175 were trained.
12	Percentage of targeted laboratory technicians trained in RDTs.	Number of laboratory technicians trained in RDTs/Total number of targeted laboratory technicians.	1.1	MDRT Activity Report	No PY4 target set	105%	42	40		In the DRC PY4 work plan PMP, no target was set for this indicator. However, in the PY4 work plan, MalariaCare planned to train 40 laboratory staff from unique facilities in RDTs; 42 (105%) laboratory workers were actually trained.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
14	Percentage of targeted laboratory technicians participating in MDRT.	Number of laboratory technicians participating in malaria diagnostics refresher trainings/Total number of targeted laboratory technicians.	1.1	MDRT Activity Report	No PY4 target set	100%	20	20			In the DRC PY4 work plan PMP, no target was set for this indicator. However, per the PY4 work plan MalariaCare planned to conduct one basic MDRT session for 20 participants; 20 (100%) laboratory workers were actually trained.
16	Percentage of targeted clinical supervisors trained in supervision of malaria diagnostics.	Number of clinical supervisors trained in supervision of malaria diagnostics/Total number of targeted clinical supervisors.	3.2	Supervis or Training reports	No PY4 target set	184%	35	19			In the DRC PY4 work plan PMP, no target was set for this indicator. However, in the PY4 work plan, MalariaCare planned to train 19 clinical supervisors in supervision of malaria diagnostics and 35 (184%) were trained.
17	Percentage of targeted laboratory supervisors trained in supervision for laboratory diagnosis of malaria.	Number of supervisors trained in supervision for laboratory diagnosis of malaria/Total number of targeted laboratory supervisors.	3.2	Supervis or Training reports	No PY4 target set	79%	15	19			In the DRC PY4 work plan PMP, no target was set for this indicator. However, in the PY4 work plan MalariaCare planned to train 19 laboratory supervisors in supervision of malaria diagnostics; 15 (79%) were trained. The remainder of the places in the training were allocated to clinical supervisors.
Objective 2: Increase percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test for malaria											
Description: Increased percentage of patients suspected to have malaria or febrile illnesses who receive a diagnostic test for malaria. These activities relate to addressing health care provider performance in the use of diagnostic tools after appropriate training. Emphasis is on supervision and use of performance monitoring tools.											
Intermediate Objectives											
Providers demonstrate competence in detecting suspected malaria cases											
Providers demonstrate competence in ordering/conducting malaria diagnostic tests for suspected cases											
Private facilities are linked with the public sector											
Intermediate Outcomes											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
19	Country has full national guidelines for determining suspected malaria cases.	Country has full national guidelines for determining suspected malaria cases (including age, duration of fever, fever history) that meet global standards.	None	PNLP	No PY4 target set	0/1	0	1			In the DRC PY4 work plan PMP, no target was set for this indicator. Currently, the national guidelines for malaria case management do not include guidelines for determining suspected malaria cases that meet global standards. However, MalariaCare plans to support their revision in PY5.

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20	Percentage of providers demonstrating competence in identifying suspected malaria cases according to global standards.	Number of providers who demonstrate correct procedures for differential diagnosis of possible malarial symptoms according to global standards during team supervision observation/Total number of providers targeted for team supervision during the reporting period.	3.3	OTSS checklist data	75%	100%	41	41			Target exceeded. All 41 providers observed during clinical observation asked the patient about history of fever or checked for temperature.
21	Percentage of providers demonstrating competence in testing suspected patients for malaria.	Number of providers who appropriately order or perform testing of suspected malaria patients according to global standards during team supervision observations/Total number of providers targeted for team supervision observations during the reporting period.	3.3	OTSS checklist data	85%	95%	39	41			Target exceeded In 39 out of 41 observations with complete scores, OTSS supervisors agreed with the health provider observed on whether to order a malaria test.
22	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for determining possible malaria cases.	Number of targeted countries whose national clinical supervision tools adhere to global standards for determining possible malaria cases/Total number of targeted countries.	3.3	PNLP	No PY4 target set	1/1	1	1			In the DRC PY4 work plan PMP, no PMP target was set for this indicator. However, MalariaCare's clinical supervision tools adhere to global standards; and in DRC, this tool is endorsed by the national government and used by the government and partners as the national supervision tool.

Objective 3: Increase percentage of patients who receive appropriate treatment for malaria or other febrile illnesses - consistent with the result of the diagnostic test

Description: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses—consistent with the result of the diagnostic test. The activities described in this section relate to addressing health care provider performance in delivering appropriate treatment after training has occurred. Emphasis is on supervision and ongoing use of performance monitoring tools.

Intermediate Objectives

Country has full national policies for malaria treatment

Service providers demonstrate competence in malaria treatment

Facilities are able to provide high quality case management services for malaria and other febrile illness

Country has supervisory structures and implementation of supervision of malaria case management practices

Intermediate Outcomes

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
24	Country has full national guidelines for malaria treatment.	Country has full national guidelines for malaria treatment, incl.QA/QC procedures, training of informal health providers, and recommendations for home treatment of febrile illness, suspected malaria, and recognition of the common danger signs that meet global standards.	None	National Guidelines	No PY4 target set	0/1	0	1			In the DRC PY4 work plan PMP, no target was set for this indicator. Currently, the national guidelines for malaria case management are missing the component for malaria treatment that meet global standards. However, MalariaCare is planning to support their revision in PY5.
25	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for malaria treatment.	Number of targeted countries whose national clinical supervision tools adhere to global standards for malaria treatment/Total number of targeted countries.	3.3	PNLP	No PY4 target set	1/1	1	1			In the DRC PY4 work plan PMP, no PMP target was set. However, MalariaCare's clinical supervision tools adhere to global standards; and in DRC, this tool is endorsed by the national government and used by the government and partners as the national supervision tool.
26	Percentage of targeted clinics that meet standards (including appropriate materials,	Number of targeted clinics that meet 90% or greater on facility checklists during supervisory visits /Total number of targeted facilities who received	3.3	OTSS checklist data	35%	59%	33	56			Target exceeded. In PY4, OTSS data was available for 56 (98%) out of 57 facilities at their most recent visit for this indicator. Facilities must meet all conditions below to reach 90%. Of the 56 facilities with data, 33 (59%) met all

	documentation, and qualified staff) for quality treatment of malaria.	a supervisory visit during the reporting period.										conditions required for quality treatment of malaria. Among the 56 facilities with data the following percentage met each of the standards: 1) Most recent malaria case management guidelines available (79%) 2) At least 1 staff trained in case management of malaria (89%) 3) First-line antimalarial in stock (84%) 4) Paracetamol cap/tab in stock (95%)
27	Percentage of targeted providers demonstrating compliance to treatment with WHO-recommended ACT for cases with positive malaria test results.	Number of providers who comply to treatment with a WHO-recommended anti-malarial for cases with positive malaria test results during clinical assessment visits measured through direct observation during team supervision visits/Total number of providers that received team supervision during the reporting period.	3.3	OTSS checklist data	55%	72%	292	408				Target exceeded. Of the 408 positive test records sampled by supervisors during OTSS visits, 292 were found to have a corresponding ACT prescription recorded.
28	Percentage of providers demonstrating adherence to negative test results according to global standards.	Number of providers demonstrating adherence to negative test results according to global standards during team supervision measured through direct observation during team supervision visits/Total number of providers that received team supervision during reporting period.	3.3	OTSS checklist data	35%	72%	299	413				Target exceeded. Out of 413 negative test records sampled by supervisors during OTSS visits, 299 (72%) were not found to have a corresponding ACT prescription.

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29	Percentage of supervisors demonstrating competence in malaria treatment.	Number of supervisors who score greater than 80% on a treatment post-test during TOTs/Total number of supervisors who completed a post-test during a TOT.	3.1	Activity/ Training Reports	No PY4 target set	15%	3	20			<p>In the DRC PY4 work plan PMP, no target was set for this indicator.</p> <p>Of the 20 supervisors who received clinical case management refresher training 3 (15%) received a score of at least 80% at post-test.</p>
30	Percentage of targeted facilities receiving at least two clinical supervisory visits per annum for malaria treatment.	Number of facilities receiving at least two clinical supervisory visits per annum for malaria treatment with WHO-recommended ACTs/Total number of targeted facilities.	3.3	OTSS checklist data	No PY4 target set	100%	52	52			<p>In the DRC PY4 work plan PMP, no target was set for this indicator.</p> <p>According to the DRC PY4 work plan, 3 rounds of OTSS in 52 facilities were planned. During PY4, 57 facilities were visited at least once, and 52 (100%) visited at least twice.</p>
31	Percentage of targeted providers trained in malaria treatment.	Number of providers trained in malaria treatment with WHO-recommended ACTs/Total number of targeted providers.	3.1	Activity/ Training Reports	90%	113%	34	30			<p>Target exceeded.</p> <p>In PY4 MalariaCare planned to train 30 clinical providers in malaria treatment; 34 (113%) were trained.</p>
32	Percentage of targeted providers that received training in malaria treatment by supervisors during the reporting period.	Number of providers that received training in malaria treatment by supervisors based on documented errors during the reporting period/Total number of providers that had documented errors during team supervision during the reporting period.	3.3	OTSS checklist data	No PY4 target set	98%	45	46			<p>In the DRC PY4 work plan PMP, no target was set for this indicator.</p> <p>However, during 46 observations of unique providers, feedback was provided for 45 of the observations (98%).</p>
33	Percentage of targeted clinical supervisors trained in supervision for treatment of	Number of clinical supervisors trained in supervision for treatment of malaria with WHO-	3.1	Activity/ Training Reports	No PY4 target set	105%	20	19			<p>In the DRC PY4 work plan PMP, no target was set for this indicator.</p> <p>In PY4 MalariaCare planned to train 19 clinical supervisors in supervision of malaria treatment;</p>

	malaria.	recommended ACTs/Total number of targeted clinical supervisors.										20 (105%) were trained.
Objective 4: Strengthen laboratory systems at the country level for detecting malaria and other infectious diseases												
Description: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases. These activities relate to addressing the health systems issues that are a barrier to achieving universal access to malaria diagnostics and appropriate case management practices such as physical health facilities, human and financial resources, and support systems required to deliver quality diagnosis and treatment services.												
Intermediate Objectives												
Reference laboratories and facilities able to provide high quality diagnostics for malaria and other febrile illnesses												
Private sector laboratories are integrated into national QA/QC and supervision strategies												
Reporting and monitoring information for malaria is integrated, complete and accurate												
Intermediate Outcomes												
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment	
						%	Num.	Den.	Mean	Median		
35	Percentage of targeted countries with national laboratory supervision tools whose indicators adhere to global standards for laboratory system analysis.	Number of targeted countries whose national laboratory supervision tools adhere to global standards for laboratory system analysis/Total number of targeted countries.	3.3	PNLP	No PY4 target set	1/1	1	1			In the DRC PY4 work plan PMP, no PMP target was set. However, MalariaCare's diagnostic supervision tools adhere to global standards; and in DRC, this tool is endorsed by the national government and used by the government and partners as the national supervision tool.	
Outputs												
36	Percentage of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards.	Number of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards/Total number of targeted facilities.	3.3	OTSS checklist data	No PY4 target set	53%	29	55			In the DRC PY4 work plan PMP, no target was set for this indicator. OTSS data was available for 55 (96%) out of the 57 facilities with labs, visited during OTSS in PY4. Of those 55 facilities, 29 (53%) had complete updated malaria guidelines at the most recent visit. MalariaCare, per the DRC work plan, has a limited role in improving performance on this indicator. MalariaCare is sharing this information with the national malaria program for future action that may be needed.	
37	Percentage of targeted laboratories that meet global	Number of targeted laboratories that meet 90% or greater on re-checking of malaria	3.3	OTSS checklist data	No PY4 target set	74%	39	53	92%	100%	In the DRC PY4 work plan PMP, no target was set for this indicator. OTSS data was available for 53 (93%) out	

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
	standards for quality malaria diagnostics	slides during supervisory visits/Total number of targeted who received a supervisory visit during the reporting period.									of the 57 facilities with labs visited in PY4 for this indicator. Of those 53 facilities, 39 (74%) scored 90% or greater on slide rechecking at the most recent visit.
38	Percentage of targeted laboratory facilities with all the required materials to confirm malaria diagnosis according to global standards.	Number of targeted facilities with all the required materials to confirm malaria diagnosis according to the global standards (including functioning microscope, slides, giemsa stain, and a trained lab technician)/Total number of targeted facilities with labs.	3.3	OTSS checklist data	No PY4 target set	19%	6	31			In the DRC PY4 work plan PMP, no target was set for this indicator. OTSS data was available for 31 (54%) out of the 57 facilities with labs visited in PY4 for this indicator. Of these 31 facilities, 6 (19%) had all required materials available. .The main limitations to meeting this target are pH paper/meter and glycerol which only 45% and 71% of facilities had in stock, respectively. MalariaCare, per its mandate and the DRC work plan, has a limited role in improving performance on this indicator. MalariaCare is sharing this information with the national malaria program for future action needed.
39	Percentage of targeted facilities receiving at least two laboratory supervisory visits per annum.	Number of facilities receiving at least two laboratory supervisory visits per annum/Total number of targeted facilities.	3.3	OTSS checklist data	No PY4 target set	100%	52	52			In the DRC PY4 work plan PMP, no target was set for this indicator. According to the DRC PY4 work plan, 3 rounds of OTSS in 52 facilities were planned. During PY4, 57 facilities were visited at least once, and 52 (100%) visited at least twice.

Ghana Performance Monitoring Plan

GOAL: Contribute to PMI's overall goal 50% reduction in the burden of malaria in 70% of the at-risk population in PMI focus countries.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Objective 2: Increased percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test.											
Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses-consistent with the diagnostic test.											
Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Description: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent. The activities described in this section relate to addressing the laboratory technician and health care provider competency related to providing quality diagnostic services.											
Intermediate Objectives											
Clear and disseminated laboratory guidelines, procurement policies, supervision structures											
Clear and functioning quality assurance procedures for regulation of diagnostics for malaria and other IDs											
Reporting on malaria indicators is complete and accurate											
Country has complete national guidelines for the diagnosis of malaria											
Providers demonstrate competence in RDTs and/or microscopy											
Intermediate Outcomes											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Med.	
1	Percentage of targeted countries with national malaria diagnostics supervision tools whose indicators adhere to global standards.	Number of targeted countries whose national malaria diagnostics supervision tools adhere to global standards/Total number of targeted countries.	1.4	National Supervision Tools	No PY4 target set	1/1	1	1			In the Ghana PY4 work plan PMP, no target was set for this indicator. Please see the paragraph at the beginning of the country PMPs for a full explanation of the change in the PMP from PY4 to PY5 and why targets are not available for some indicators. MalariaCare's diagnostic supervision tools adhere to global standards; and in Ghana, this tool is used as the national laboratory supervision tool by the CLU.

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2	Percentage of targeted laboratory technicians demonstrating competence in RDTs.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of lab staff who received a supervisory visit during the reporting period.	1.4	Lab OTSS database	85%	73%	314	429	93%	96%	<p>Target not reached. Areas that lab workers performed relatively poorly on were RDT and patient preparation (on average, 91% of steps in these areas were performed correctly). MalariaCare will share this information with CLU as they move forward with conducting lab OTSS.</p> <p>(Note: lab and clinical/M&E checklists for RDT observations are different; thus, scores are not comparable.)</p>
3	Percentage of targeted laboratory technicians demonstrating competence in malaria microscopy.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklist measuring slide preparation and parasite detection/Total number of laboratory technicians who received a supervisory visit during the reporting period.	1.4	Lab OTSS database	80%	50%	315	628	80%	91%	<p>Target not reached. Areas that lab workers performed relatively poorly on were slide reading and reporting results (on average, 84% of steps in these areas were performed correctly). MalariaCare will share this information with CLU as they move forward with continuing lab OTSS.</p> <p>(Note: Microscopy observation checklists for Ghana and other MalariaCare countries are different; thus, scores are not comparable.)</p>

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4	Percentage of targeted clinical providers that demonstrate competence in RDTs.	Number of targeted clinical providers who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of clinical providers who received a supervisory visit during the reporting period.	2.4	Clinical/M&E OTSS data from EDS	85%	74%	1419	1928	92%	96%	<p>Target not reached.</p> <p>Items most commonly missed were labeling the cassette and documenting the time when the buffer was added.</p> <p>MalariaCare supervisors will be encouraged to reinforce these points at low-performing facilities, since on average RDT scores are very high.</p> <p>(Note: lab and clinical/M&E checklists for RDT observations are different; thus, scores are not comparable.)</p>

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5	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality diagnosis of malaria.	Number of targeted clinics that meet 90% or greater on facility checklists for diagnosis during supervisory visits /Total number of targeted facilities who received a supervisory visit during the reporting period.	2.4	Clinical/ M&E OTSS data from EDS	No PY4 target set	50%	878	1773			<p>In the Ghana PY4 work plan PMP, no target was set for this indicator.</p> <p>OTSS data for this indicator was available for 1773 (93%) of the 1,910 facilities visited.</p> <p>878 (50%) of the 1,773 facilities with data available met all standards for the quality diagnosis of malaria.</p> <p>Of the 878 facilities with OTSS data available: -74% reported no stock-outs of RDTs of seven days or more over the past three months; -62% reported availability of RDT bench aids and/or SOPs; and -87% reported at least on person trained in RDTs in the past two years.</p> <p>MalariaCare, per the Ghana work plan, has a limited role in improving performance on this indicator. MalariaCare is sharing this information with the NMCP for further action that may be needed.</p>

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6	Percentage of supervisors demonstrating competence in malaria microscopy.	Percentage of supervisors who score 90% or greater in slide preparation and parasite detection during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers. Note: Must score at least L1 or L2 on parasite detection (>=80%) and parasite quantification (>=40%)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	During PY4, supervisors for lab OTSS were trained in supervision only, and were not tested in microscopy skills.
7	Percentage of supervisors demonstrating competence in RDTs.	Percentage of supervisors who score 90% or greater in preparation and reading of RDTs during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers.	2.3	Activity/ Training Reports	No PY4 target set	57%	385	671	91%	94%	In the Ghana PY4 work plan PMP, no target was set for this indicator. Of the 671 supervisors tested on RDT use, 385 (57%) received a score of at least 90%. In Ghana, a pre- and post-test of knowledge questions on RDT performance is administered, but supervisors are not scored on preparing and reading RDTs.	
8	Percentage of targeted facilities with at least one provider trained in RDTs.	Number of targeted facilities with one or more providers trained in RDT/Total number of targeted facilities.	2.4	Clinical/ M&E OTSS data from EDS	No PY4 target set	87%	1565	1791			In the Ghana PY4 work plan PMP, no target was set for this indicator. OTSS data for this indicator was available for 1,791 (94%) of the 1,910 facilities visited. Of these 1,791 facilities, 1,565 (87%) had at least one provider formally trained in RDTs.	

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9	Percentage of targeted facilities with at least one provider trained in malaria microscopy.	Number of target facilities with one or more providers trained in malaria microscopy/Total number of targeted facilities	1.4	Lab OTSS database	No PY4 target set	80%	236	295			In the Ghana PY4 work plan PMP, no target was set for this indicator. OTSS data for this indicator was available for 295 (88%) of the 334 facilities visited. Of these 295 facilities, 236 (80%) had at least one provider formally trained in malaria microscopy.
10	Percentage of targeted facilities with at least one provider who received malaria diagnostic refresher training (MDRT) in the last two years.	Number of targeted facilities with one or more providers who received MDRT in the last two years/Total number of targeted facilities.	n/a	n/a	n/a	n/a	n/a	n/a			No applicable activity was conducted in PY4.
11	Percentage of targeted clinical providers trained in RDTs.	Number of clinical providers trained in RDTs/Total number of targeted clinical providers.	2.1	Activity/ Training Reports	90%	98%	492	500			Target exceeded. The work plan proposed to train around 500 health workers and during Activity 2.1, trained 492 newly posted healthcare workers on RDTs.
12	Percentage of targeted laboratory technicians trained in RDTs.	Number of laboratory technicians trained in RDTs/Total number of targeted laboratory technicians.	n/a	n/a	n/a	n/a	n/a	n/a			No applicable activity was conducted in PY4.
14	Percentage of targeted laboratory technicians participating in MDRT.	Number of laboratory technicians participating in malaria diagnostics refresher trainings/Total number of targeted laboratory technicians.	n/a	n/a	n/a	n/a	n/a	n/a			No applicable activity was conducted in PY4.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Med.	
16	Percentage of targeted clinical supervisors trained in supervision of malaria diagnostics.	Number of clinical supervisors trained in supervision of malaria diagnostics/Total number of targeted clinical supervisors.	2.3	Activity/ Training Reports	No PY4 target set	156%	182	117			In the Ghana PY4 work plan PMP, no target was set for this indicator. However, assuming that the minimum number of clinical supervisors required for training is one clinical supervisor per district (107), sub-metro of Kumasi (5), and regions (5), 65 additional supervisors were trained over the minimum requirement.
17	Percentage of targeted laboratory supervisors trained in supervision for laboratory diagnosis of malaria.	Number of supervisors trained in supervision for laboratory diagnosis of malaria/Total number of targeted laboratory supervisors.	1.4	Activity/ Training Reports	No PY4 target set	93%	41	44			In the Ghana PY4 work plan PMP, no target was set for this indicator. However, in the PY4 work plan, MalariaCare planned to train 44 laboratory supervisors (10 per region, plus 4 national supervisors) in supervision of malaria diagnostics and 41 (93%) were trained.
Objective 2: Increase percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test for malaria											
Description: Increased percentage of patients suspected to have malaria or febrile illnesses who receive a diagnostic test for malaria. These activities relate to addressing health care provider performance in the use of diagnostic tools after appropriate training. Emphasis is on supervision and use of performance monitoring tools.											
Intermediate Objectives											
Providers demonstrate competence in detecting suspected malaria cases											
Providers demonstrate competence in ordering/conducting malaria diagnostic tests for suspected cases											
Private facilities are linked with the public sector											
Intermediate Outcomes											

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19	Country has full national guidelines for determining suspected malaria cases.	Country has full national guidelines for determining suspected malaria cases (including age, duration of fever, fever history) that meet global standards.	None	National Guidelines	No PY4 target set	1/1	1	1			<p>In the Ghana PY4 work plan PMP, no target was set for this indicator.</p> <p>However, the Government of Ghana recently updated its national guidelines for malaria case management which includes guidelines for determining suspected malaria cases and meet global standards.</p>
20	Percentage of providers demonstrating competence in identifying suspected malaria cases according to global standards.	Number of providers who demonstrate correct procedures for differential diagnosis of possible malarial symptoms according to global standards during team supervision observation/Total number of providers targeted for team supervision during the reporting period.	2.4	Clinical/ M&E OTSS data from EDS	No PY4 target set	99%	2257	2270			<p>In the Ghana PY4 work plan PMP, no target was set for this indicator.</p> <p>However, 99% of providers observed asked about history of fever or checked temperature during the most recent visit.</p>
21	Percentage of providers demonstrating competence in testing suspected patients for malaria.	Number of providers who appropriately order or perform testing of suspected malaria patients according to global standards during team supervision observations/Total number of providers targeted for team supervision observations during the reporting period.	2.4	Clinical/ M&E OTSS data from EDS	90%	92%	2099	2276			<p>Target exceeded.</p> <p>In 2099 out of 2276 clinical observations, supervisors agreed with the provider observed on whether to order a malaria test.</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Med.	
22	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for determining possible malaria cases.	Number of targeted countries whose national clinical supervision tools adhere to global standards for determining possible malaria cases/Total number of targeted countries.	2.4	Clinical/ M&E OTSS data from EDS	No PY4 target set	1/1	1	1			In the Ghana PY4 work plan PMP, no target was set for this indicator. However, MalariaCare's clinical supervision tools adhere to global standards for determining malaria suspects; and in Ghana, this tool is endorsed by the national government as one of the approved national supervision tools and used in MalariaCare supported areas. NMCP plans to use this tool in its focus areas in the future.
Objective 3: Increase percentage of patients who receive appropriate treatment for malaria or other febrile illnesses - consistent with the result of the diagnostic test											
Description: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses—consistent with the result of the diagnostic test. The activities described in this section relate to addressing health care provider performance in delivering appropriate treatment after training has occurred. Emphasis is on supervision and ongoing use of performance monitoring tools.											
Intermediate Objectives											
Country has full national policies for malaria treatment											
Service providers demonstrate competence in malaria treatment											
Facilities are able to provide high quality case management services for malaria and other febrile illness											
Country has supervisory structures and implementation of supervision of malaria case management practices											
Intermediate Outcomes											
24	Country has full national guidelines for malaria treatment.	Country has full national guidelines for malaria treatment, incl.QA/QC procedures, training of informal health providers, and recommendations for home treatment of febrile illness, suspected malaria, and recognition of the common danger signs that meet global standards.	Nat'l Guideline Support	National Guidelines	1/1	1/1	1	1			In the Ghana PY4 work plan PMP, no target was set for this indicator. However, the Government of Ghana recently updated its national guidelines for malaria case management which includes guidelines for determining suspected malaria cases and meet global standards.

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25	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for malaria treatment .	Number of targeted countries whose national clinical supervision tools adhere to global standards for malaria treatment/Total number of targeted countries.	2.4	National Supervision Tools	No PY4 target set	1/1	1	1			<p>In the Ghana PY4 work plan PMP, no target was set for this indicator.</p> <p>However, MalariaCare's clinical supervision tools adhere to global standards for malaria treatment; and in Ghana, this tool is endorsed by the national government as one of the approved national supervision tools and used in MalariaCare supported areas. NMCP plans to use this tool in its focus areas in the future.</p>
26	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality treatment of malaria.	Number of targeted clinics that meet 90% or greater on facility checklists during supervisory visits /Total number of targeted facilities who received a supervisory visit during the reporting period.	2.4	Clinical/ M&E OTSS data from EDS	50%	69%	1194	1729			<p>Target exceeded.</p> <p>In PY4, OTSS data was available for 1,729 out of 1,910 facilities visited (91%) had data on all criteria required at their most recent visit. Facilities must meet all conditions listed below to reach 90%.</p> <p>Of the 1,729 facilities with data, 69% met all conditions required for quality treatment of malaria.</p> <p>Among these facilities the following percentage met each of the following standards:</p> <ol style="list-style-type: none"> 1) Most recent malaria case management guidelines available (82%) 2) At least 1 staff trained in case management of malaria (88%) 3) First-line antimalarial in stock (91%) 4) Paracetamol cap/tab in stock (88%)

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27	Percentage of targeted providers demonstrating compliance to treatment with WHO-recommended ACT for cases with positive malaria test results.	Number of providers who comply to treatment with a WHO-recommended anti-malarial for cases with positive malaria test results during clinical assessment visits measured through direct observation during team supervision visits/Total number of providers that received team supervision during the reporting period.	2.4	Clinical/ M&E OTSS data from EDS	95%	98%	9094	9248			Target exceeded. Of the 9,248 records of positive test results sampled from the registers during OTSS visits, 9,094 (98%) had a corresponding ACT prescription found.
28	Percentage of providers demonstrating adherence to negative test results according to global standards.	Number of providers demonstrating adherence to negative test results according to global standards during team supervision measured through direct observation during team supervision visits/Total number of providers that received team supervision during reporting period.	2.4	Clinical/ M&E OTSS data from EDS	70%	89%	7894	8835			Target exceeded. Of the 8835 records of positive test results sampled from the registers during OTSS visits, 7894 (89%) had a corresponding ACT prescription found.
29	Percentage of supervisors demonstrating competence in malaria treatment.	Number of supervisors who score greater than 80% on a treatment post-test during TOTs/Total number of supervisors who completed a post-test during a TOT.	2.3	Activity/ Training Reports	No PY4 target set	80%	143	178	72%	76%	In the Ghana PY4 work plan PMP, no target was set for this indicator. Of the 182 clinical supervisors who attended the supervisor training, 178 were tested; of the 178 tested, 143 (80%) received a score of at least 80% during the post-test on clinical skills.

Outputs											
30	Percentage of targeted facilities receiving at least two clinical supervisory visits per annum for malaria treatment.	Number of facilities receiving at least two clinical supervisory visits per annum for malaria treatment with WHO-recommended ACTs/Total number of targeted facilities.	2.4	Clinical/M&E OTSS data from EDS	No PY4 target set	63%	729	1,162			<p>In the Ghana PY4 work plan PMP, no target was set for this indicator.</p> <p>Although GHS does not have an exact count of the number of health facilities in Ghana, over the course of EDS a total of 1,937 unique facilities have been visited. Assuming that this represents the total number of facilities eligible for clinical/M&E OTSS, and supervisors are supposed to visit 80% of facilities in each round, at least 60% (or 1,162 facilities) are expected to be visited twice. In PY4, clinical checklists were submitted for 729 facilities in both Round 5 and 6. This does not include checklists where an observation was incomplete, however.</p>
31	Percentage of targeted providers trained in malaria treatment.	Number of providers trained in malaria treatment with WHO-recommended ACTs/Total number of targeted providers.	2.1	Activity/ Training Reports	No PY4 target set	98%	492	500			<p>In the Ghana PY4 work plan PMP, no target was set for this indicator.</p> <p>However, the PY4 work plan proposed to train approximately 500 health workers; 492 (98%) were trained.</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Med.	
32	Percentage of targeted providers that received training in malaria treatment by supervisors during the reporting period.	Number of providers that received training in malaria treatment by supervisors based on documented errors during the reporting period/Total number of providers that had documented errors during team supervision during the reporting period.	2.4	Clinical/ M&E OTSS data from EDS	90%	100%	2114	2124			Target exceeded. Out of 2,124 clinical observations of unique providers, supervisors provided feedback for 2,114 of them (or over 99%).
33	Percentage of targeted clinical supervisors trained in supervision for treatment of malaria.	Number of clinical supervisors trained in supervision for treatment of malaria with WHO-recommended ACTs/Total number of targeted clinical supervisors.	2.3	Activity/ Training Reports	No PY4 target set	156%	182	117			In the Ghana PY4 work plan PMP, no target was set for this indicator. Assuming that the minimum number of clinical supervisors required for training is one clinical supervisor per district (107), sub-metro of Kumasi (5), and regions (5), 65 additional supervisors were trained over the minimum requirement.
Objective 4: Strengthen laboratory systems at the country level for detecting malaria and other infectious diseases											
Description: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases. These activities relate to addressing the health systems issues that are a barrier to achieving universal access to malaria diagnostics and appropriate case management practices such as physical health facilities, human and financial resources, and support systems required to deliver quality diagnosis and treatment services.											
Intermediate Objectives											
Reference laboratories and facilities able to provide high quality diagnostics for malaria and other febrile illnesses											
Private sector laboratories are integrated into national QA/QC and supervision strategies											
Reporting and monitoring information for malaria is integrated, complete and accurate											
Intermediate Outcomes											

35	Percentage of targeted countries with national laboratory supervision tools whose indicators adhere to global standards for laboratory system analysis.	Number of targeted countries whose national laboratory supervision tools adhere to global standards for laboratory system analysis/Total number of targeted countries.	1.4	National Supervision Tools	No PY4 target set	1/1	1	1			In the Ghana PY4 work plan PMP, no target was set for this indicator. However, MalariaCare's diagnostic supervision tools adhere to global standards; and in Ghana, this tool is used as the national laboratory supervision tool by the CLU.
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Outputs

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Med.	
36	Percentage of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards.	Number of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards/Total number of targeted facilities.	n/a	n/a	n/a	n/a	n/a	n/a			In the Ghana PY4 work plan PMP, no target was set for this indicator. Currently, the lab OTSS checklist does not include whether the facility has the most recent MOH guidelines for microscopy.
37	Percentage of targeted laboratories that meet global standards for quality malaria diagnostics	Number of targeted laboratories that meet 90% or greater on re-checking of malaria slides during supervisory visits/Total number of targeted who received a supervisory visit during the reporting period.	OTSS	Lab OTSS database	No PY4 target set	91%	275	303	97%	100%	In the Ghana PY4 work plan PMP, no target was set for this indicator. Of the 334 facilities visited for lab OTSS and that regularly perform malaria microscopy, 303 (91%) had sufficient data for slide rechecking. For 91% of these facilities, supervisors agreed with lab staff on parasite detection for 90% or more of slides rechecked.

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38	Percentage of targeted laboratory facilities with all the required materials to confirm malaria diagnosis according to global standards.	Number of targeted facilities with all the required materials to confirm malaria diagnosis according to the global standards (including functioning microscope, slides, giemsa stain, and a trained lab technician)/Total number of targeted facilities with labs.	OTSS	Lab OTSS database	No PY4 target set	70%	201	287			<p>In the Ghana PY4 work plan PMP, no target was set for this indicator.</p> <p>Of the 334 facilities visited for lab OTSS and that regularly perform malaria microscopy, 287 (86%) had sufficient data to calculate this indicator. 70% of these facilities had all of the required materials and trained staff to conduct microscopy. The most commonly missed requirement was having at least one lab staff formally trained in microscopy in the previous 2 years.</p>
39	Percentage of targeted facilities receiving at least two laboratory supervisory visits per annum.	Number of facilities receiving at least two laboratory supervisory visits per annum/Total number of targeted facilities.	OTSS	Lab OTSS database	No PY4 target set	n/a	n/a	n/a			<p>In the Ghana PY4 work plan PMP, no target was set for this indicator.</p> <p>However, the PY4 work plan proposed visiting 405 facilities of approximately 450 facilities eligible for lab OTSS, and by the end of PY4 visited 379 (94%). Of these 379 facilities, 7 were visited twice. The majority of facilities selected for visit differed for each round in PY4. This was done to provide support to as many lab OTSS-eligible facilities as possible, given budget constraints.</p>

Guinea Performance Monitoring Plan

Note: Due to Guinea's limited scope of activities, indicators not relevant to Guinea's work plan are omitted in the table below.

GOAL: Contribute to PMI's overall goal 50% reduction in the burden of malaria in 70% of the at-risk population in PMI focus countries.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Objective 2: Increased percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test.											
Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses-consistent with the diagnostic test.											
Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Description: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent. The activities described in this section relate to addressing the laboratory technician and health care provider competency related to providing quality diagnostic services.											
Intermediate Objectives											
Clear and disseminated laboratory guidelines, procurement policies, supervision structures											
Clear and functioning quality assurance procedures for regulation of diagnostics for malaria and other IDs											
Reporting on malaria indicators is complete and accurate											
Country has complete national guidelines for the diagnosis of malaria											
Providers demonstrate competence in RDTs and/or microscopy											
Intermediate Outcomes											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Med.	
6	Percentage of supervisors demonstrating competence in malaria microscopy.	Percentage of supervisors who score 90% or greater in slide preparation and parasite detection during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers. Note: Must score at least L1 or L2 on parasite detection (>=80%) and parasite quantification (>=40%)	1.1	Activity/ Training Reports	No PY4 target set	5%	1	20			In the Guinea PY4 work plan PMP, no PMP target was set. Please see the paragraph at the beginning of the country PMPs for a full explanation of the change in the PMP from PY4 to PY5 and why targets are not available for some indicators. 15 out of 20 (75%) of participants scored at a WHO L1 or L2 (>=80%) for parasite detection. 1 out of 20 (5%) scored at a WHO L1 or L2 for parasite counting

											(>=40%)
14	Percentage of targeted laboratory technicians participating in MDRT.	Number of laboratory technicians participating in malaria diagnostics refresher trainings/Total number of targeted laboratory technicians.	1.1	Activity/Training Reports	95%	100%	20	20			Target exceeded. Per the PY4 work plan, MalariaCare planned to conduct one basic MDRT session for 20 participants; 20 (100%) laboratory workers were actually trained.
17	Percentage of targeted laboratory supervisors trained in supervision for laboratory diagnosis of malaria.	Number of supervisors trained in supervision for laboratory diagnosis of malaria/Total number of targeted laboratory supervisors.	1.1	Activity/ Training Reports	No PY4 target set	100%	20	20			In the Guinea PY4 work plan PMP, no target was set. In the PY4 work plan, MalariaCare planned to train 20 laboratory supervisors in supervision of malaria diagnostics; 20 (100%) were trained. The remainder of the places in the training were allocated to clinical supervisors.

Kenya Performance Monitoring Plan

Note that the Kenya PMP reports against the targets in the PY3/PY4 Workplan and PMP.

GOAL: Contribute to PMI's overall goal 50% reduction in the burden of malaria in 70% of the at-risk population in PMI focus countries.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Objective 2: Increased percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test.											
Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses-consistent with the diagnostic test.											
Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Description: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent. The activities described in this section relate to addressing the laboratory technician and health care provider competency related to providing quality diagnostic services.											
Intermediate Objectives											
Clear and disseminated laboratory guidelines, procurement policies, supervision structures											
Clear and functioning quality assurance procedures for regulation of diagnostics for malaria and other IDs											
Reporting on malaria indicators is complete and accurate											
Country has complete national guidelines for the diagnosis of malaria											
Providers demonstrate competence in RDTs and/or microscopy											
Intermediate Outcomes											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
1	Percentage of targeted countries with national malaria diagnostics supervision tools whose indicators adhere to global standards.	Number of targeted countries whose national malaria diagnostics supervision tools adhere to global standards/Total number of targeted countries.	None	National Supervision Tools	No PY4 target set	1/1	1	1			In the Kenya PY4 work plan PMP, no PMP target was set. Please see the paragraph at the beginning of the country PMPs for a full explanation of the change in the PMP from PY4 to PY5 and why targets are not available for some indicators. MalariaCare's diagnostic supervision tools adhere to global standards. In Kenya this tool is endorsed by the national government as the national supervision tool and used in MalariaCare supported areas.

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2	Percentage of targeted laboratory technicians demonstrating competence in RDTs.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of lab staff who received a supervisory visit during the reporting period.	3.2	OTSS checklist data	70%	74%	106	143	90%	96%	<p>Target reached.</p> <p>The PMP target in the PY4 work plan was set based on performance among all health care workers. In the revised global PMP, this indicator is disaggregated by cadre. We have maintained the PY4 work plan PMP overall target for this indicator.</p> <p>The mean and median scores are above 90%.</p>
3	Percentage of targeted laboratory technicians demonstrating competence in malaria microscopy.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklist measuring slide preparation and parasite detection/Total number of laboratory technicians who received a supervisory visit during the reporting period.	3.2	OTSS checklist data	50%	46%	110	241	86%	88%	<p>Target not reached.</p> <p>Lab workers performed more poorly on slide preparation than slide staining or reading. The most commonly missed steps were spreading thick film into 1-2 cm diameter circle and reading print placed under the slide (59% of providers at each facility did this correctly, on average) and immersing slide Field stain A for 3 seconds (78%).</p> <p>In PY5 we plan to focus on these areas during OTSS and also conduct additional MDRT trainings for both supervisors and health facility staff.</p>
4	Percentage of targeted clinical providers that demonstrate competence in RDTs.	Number of targeted clinical providers who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of clinical providers who	3.2	OTSS checklist data	70%	65%	169	261	89%	96%	<p>Target not reached.</p> <p>The PMP target in the PY4 work plan was set based on performance among all health care workers. In the revised global PMP, this indicator is disaggregated by cadre. We have maintained the PY4 work plan PMP overall target for this indicator.</p> <p>Clinical staff did not perform as well as</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
		received a supervisory visit during the reporting period.									laboratory staff for this indicator.
5	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality diagnosis of malaria.	Number of targeted clinics that meet 90% or greater on facility checklists for diagnosis during supervisory visits /Total number of targeted facilities who received a supervisory visit during the reporting period.	3.2	OTSS checklist data	No PY4 target set	11%	58	546			<p>In the Kenya PY4 work plan PMP, no PMP target was set.</p> <p>OTSS data for this indicator was available for 546 (90%) of the 604 facilities visited. 58 (11%) of the 546 facilities with data available met all standards for the quality diagnosis of malaria.</p> <p>Of the 546 facilities with OTSS data available:</p> <ul style="list-style-type: none"> - 126 (23%) reported no stock-outs of RDTs of seven days or more over the past three months - 79 (14%) reported availability of RDT SOPs, - 182 (33%) reported availability of RDT bench aids, - 410 (75%) reported at least on person trained in RDTs in the past two years. <p>MalariaCare, per its mandate and the Kenya work plan, has a limited role in improving performance on this indicator. MalariaCare is sharing this information with the national malaria program for future action as needed.</p>
6	Percentage of supervisors demonstrating competence in malaria microscopy.	Percentage of supervisors who score 90% or greater in slide preparation and parasite detection during the training of trainers post-test/Total number of supervisors who completed a post-test	1.1	Activity / Training Reports	50%	29%	22	76			<p>Target not reached.</p> <p>62 out of 76 (83%) of participants scored at a WHO L1 or L2 (>=80%) for parasite detection. 24 out of 76 (32%) scored at a WHO L1 or L2 for parasite quantification (>=40%).</p> <p>Parasite counting continues to be a challenge for supervisors to conduct</p>

		during a training of trainers. Note: Must score at least L1 or L2 on parasite detection (>=80%) and parasite quantification (>=40%)										accurately, as the majority of supervisors have been promoted to management positions and do not spend a great deal of time on the bench. MalariaCare staff and high-performing supervisors will continue to work with those low-performing laboratory supervisors during OTSS visits to strengthen microscopy skills. In PY5 MalariaCare will also be conducting additional retraining of supervisors and testing a virtual microscopy training program to improve parasite quantification.
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment	
						%	Num.	Den.	Mean	Median		
7	Percentage of supervisors demonstrating competence in RDTs.	Percentage of supervisors who score 90% or greater in preparation and reading of RDTs during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers.	1.1	Activity / Training Reports	70%	42%	22	53	84%	83%	<p>Target not reached.</p> <p>Of the 76 laboratory supervisors trained, only 53 had an assessment on RDT skills done during their training. In Kenya, supervisors are scored on both preparation and reading of RDTs through observation at the end of training.</p> <p>Many participants were just under the threshold, as shown by the average score of 84%. Due to the low scores in RDT performance during the advanced MDRTs, supervisors will receive a refresher training during the MDRTs in PY5.</p>	
Outputs												
8	Percentage of targeted facilities with at least one provider trained in RDTs.	Number of targeted facilities with one or more providers trained in RDT/Total number of targeted facilities.	2.1	OTSS checklist data	85%	76%	410	542				<p>Target not reached.</p> <p>OTSS data for this indicator was available for 542 (90%) of the 604 facilities visited. Of the 542 facilities with data, 410 (76%) had at least one staff member formally trained in RDTs in the previous 2 years.</p> <p>In PY4, MalariaCare trained 444 staff in RDTs. However, despite the large numbers trained this was not enough to meet the target. In PY5, MalariaCare plans to continue to roll-out RDT training to an</p>

												additional 120 staff. With a projected 839 targeted facilities across all eight counties, and assuming these facilities have a similar 76% rate of facilities with trained staff we would need to train at least 75 additional staff at different facilities to meet this target. Therefore we should meet the 85% target by the end of PY5.
9	Percentage of targeted facilities with at least one provider trained in malaria microscopy.	Number of target facilities with one or more providers trained in malaria microscopy/Total number of targeted facilities	3.2	OTSS checklist data	75%	44%	107	244				<p>Target not reached.</p> <p>In PY4, MalariaCare trained 120 facility staff and 76 supervisors from higher levels to conduct microscopy. However, despite the large numbers trained this was not enough to meet the target.</p> <p>In PY5, MalariaCare will continue to roll-out microscopy training to an additional 40 facility staff and 22 supervisors. With a projected 356 targeted facilities with a laboratory across all eight counties and assuming these facilities have a similar 44% rate of facilities with trained staff we would need to train at least 110 additional staff at different facilities to meet this target. As we are only training 62, we would expect to reach 61% of facilities with at least one staff person trained in microscopy by the end of PY5.</p>
10	Percentage of targeted facilities with at least one provider who received malaria diagnostic refresher training (MDRT) in the last two years.	Number of targeted facilities with one or more providers who received MDRT in the last two years/Total number of targeted facilities.	1.2	Activity / Training Reports	No PY4 target set	101%	196	195				<p>In the Kenya PY4 work plan PMP, no PMP target was set for this indicator.</p> <p>However, in the PY4 work plan, MalariaCare planned to conduct 6 bMDRTs for up to 20 people each, and 3 aMDRTs with 25 participants each. In PY4 MalariaCare trained 120 laboratory staff and 76 supervisors.</p>

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11	Percentage of targeted clinical providers trained in RDTs.	Number of clinical providers trained in RDTs/Total number of targeted clinical providers.	2.1	Activity / Training Reports	No PY4 target set	78%	435	560			<p>In the Kenya PY4 work plan PMP, no target was set for this indicator.</p> <p>In PY4 MalariaCare planned to train 560 health providers from 620 facilities in malaria RDTs; there were no specific targets for clinicians vs. laboratory personnel. Overall, MalariaCare trained 435 health workers in RDTs, 78% of the overall goal. Of the 435 who were trained, 307 (69%) were clinicians (including nurses), 110 (27%) were lab staff, 6 (1%) were pharm techs and 12 (2%) were public health officers. When calling participants for training MalariaCare requests those that most often conduct RDTs at facilities to attend, which includes non-clinicians and lab staff.</p>
12	Percentage of targeted laboratory technicians trained in RDTs.	Number of laboratory technicians trained in RDTs/Total number of targeted laboratory technicians.	2.1	Activity / Training Reports	No PY4 target set	78%	435	560			<p>In the Kenya PY4 work plan PMP, no target was set for this indicator.</p> <p>In PY4 MalariaCare planned to train 560 health providers from 620 facilities in malaria RDTs; there were no specific targets for clinicians vs. laboratory personnel. Overall, MalariaCare trained 435 health workers in RDTs, 78% of the overall goal. Of the 435 who were trained, 307 (69%) were clinicians (including nurses), 110 (27%) were lab staff, 6 (1%) were pharm techs and 12 (2%) were public health officers. When calling participants for training MalariaCare requests those that most often conduct RDTs at facilities to attend, which includes non-clinicians and lab staff.</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
14	Percentage of targeted laboratory technicians participating in MDRT.	Number of laboratory technicians participating in malaria diagnostics refresher trainings/Total number of targeted laboratory technicians.	1.2	Activity / Training Reports	95%	100%	120	120			Target reached. In PY4 MalariaCare planned to train 120 laboratory staff at bMDRTs and 120 (100%) were trained.
16	Percentage of targeted clinical supervisors trained in supervision of malaria diagnostics.	Number of clinical supervisors trained in supervision of malaria diagnostics/Total number of targeted clinical supervisors.	3.1	Activity / Training Reports	95%	104%	78	75			Target reached. In the PY4 work plan, MalariaCare planned to train 75 clinical supervisors in supervision of malaria diagnostics and 78 (104%) were trained. The additional supervisors were replacements for those who left.
17	Percentage of targeted laboratory supervisors trained in supervision for laboratory diagnosis of malaria.	Number of supervisors trained in supervision for laboratory diagnosis of malaria/Total number of targeted laboratory supervisors.	1.1	Activity / Training Reports	95%	101%	76	75			Target reached. In the PY4 work plan MalariaCare planned to train 75 laboratory supervisors in supervision of malaria diagnostics and 76 (101%) were trained.
Objective 2: Increase percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test for malaria											
Description: Increased percentage of patients suspected to have malaria or febrile illnesses who receive a diagnostic test for malaria. These activities relate to addressing health care provider performance in the use of diagnostic tools after appropriate training. Emphasis is on supervision and use of performance monitoring tools.											
Intermediate Objectives											
Providers demonstrate competence in detecting suspected malaria cases											
Providers demonstrate competence in ordering/conducting malaria diagnostic tests for suspected cases											
Private facilities are linked with the public sector											
Intermediate Outcomes											

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19	Country has full national guidelines for determining suspected malaria cases.	Country has full national guidelines for determining suspected malaria cases (including age, duration of fever, fever history) that meet global standards.	None	National Guidelines	No PY4 target set	1/1	1	1			<p>In the Kenya PY4 work plan PMP, no target was set for this indicator.</p> <p>However, the Government of Ghana recently updated its national guidelines for malaria case management which includes guidelines for determining suspected malaria cases and meet global standards.</p>
20	Percentage of providers demonstrating competence in identifying suspected malaria cases according to global standards.	Number of providers who demonstrate correct procedures for differential diagnosis of possible malarial symptoms according to global standards during team supervision observation/Total number of providers targeted for team supervision during the reporting period.	3.2	OTSS checklist data	60%	96%	697	728			<p>Target exceeded.</p> <p>Out of 728 observations conducted and had complete OTSS data, 697 (96%) providers correctly about history of fever or checked for temperature.</p>
21	Percentage of providers demonstrating competence in testing suspected patients for malaria.	Number of providers who appropriately order or perform testing of suspected malaria patients according to global standards during team supervision observations/Total number of providers targeted for team supervision observations during the reporting period.	3.4	OTSS checklist data	95%	96%	699	728			<p>Target reached.</p> <p>In 669 out of 728 clinical observations (96%) with complete data, supervisors agreed with the provider on whether to order a malaria test.</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
22	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for determining possible malaria cases.	Number of targeted countries whose national clinical supervision tools adhere to global standards for determining possible malaria cases/Total number of targeted countries.	None	National Supervision Tools	No PY4 target set		1	1			In the Kenya PY4 work plan PMP, no PMP target was set. However, MalariaCare's clinical supervision tools adhere to global standards; and in Kenya this tool is endorsed by the national government as the national supervision tool and used in MalariaCare supported areas.
Objective 3: Increase percentage of patients who receive appropriate treatment for malaria or other febrile illnesses - consistent with the result of the diagnostic test											
Description: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses—consistent with the result of the diagnostic test. The activities described in this section relate to addressing health care provider performance in delivering appropriate treatment after training has occurred. Emphasis is on supervision and ongoing use of performance monitoring tools.											
Intermediate Objectives											
Country has full national policies for malaria treatment											
Service providers demonstrate competence in malaria treatment											
Facilities are able to provide high quality case management services for malaria and other febrile illness											
Country has supervisory structures and implementation of supervision of malaria case management practices											
Intermediate Outcomes											
24	Country has full national guidelines for malaria treatment.	Country has full national guidelines for malaria treatment, incl.QA/QC procedures, training of informal health providers, and recommendations for home treatment of febrile illness, suspected malaria, and recognition of the common danger signs that meet global standards.	None	National Guidelines	No PY4 target set	1/1	1	1			In the Kenya PY4 work plan PMP, no PMP target was set. However, the Government of Kenya recently updated its national guidelines for malaria case management and they adhere to global standards.

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25	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for malaria treatment .	Number of targeted countries whose national clinical supervision tools adhere to global standards for malaria treatment/Total number of targeted countries.	None	National Supervision Tools	No PY4 target set	1/1	1	1			<p>In the Kenya PY4 work plan PMP, no PMP target was set.</p> <p>However, MalariaCare's clinical supervision tools adhere to global standards for malaria treatment standards in Kenya this tool is endorsed by the national government as the national supervision tool and used in MalariaCare supported areas. During PY5, we will be transitioning these for use by the NMCP and partners.</p>
26	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality treatment of malaria.	Number of targeted clinics that meet 90% or greater on facility checklists during supervisory visits /Total number of targeted facilities who received a supervisory visit during the reporting period.	3.4	OTSS checklist data	No PY4 target set	25%	148	588			<p>In the Kenya PY4 work plan PMP, no PMP target was set for this indicator.</p> <p>OTSS data was available for 588 (97%) out of 604 facilities at their most recent visit for this indicator. Facilities must meet all conditions below to reach 90%.</p> <p>Of the 588 facilities with data, 148 (25%) met all conditions required for quality treatment of malaria. Facilities must meet all conditions below to reach 90%</p> <p>Among the 148 facilities with data, the following percentage met each of the standards:</p> <ol style="list-style-type: none"> 1) Most recent malaria case management guidelines available (55%) 2) At least 1 staff trained in case management of malaria (87%) 3) First-line antimalarial in stock (54%) 4) Paracetamol cap/tab in stock (71%) <p>MalariaCare, per its mandate and the Kenya work plan, has a limited role in improving this indicator. MalariaCare is sharing this information with the national malaria</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
27	Percentage of targeted providers demonstrating compliance to treatment with WHO-recommended ACT for cases with positive malaria test results.	Number of providers who comply to treatment with a WHO-recommended anti-malarial for cases with positive malaria test results during clinical assessment visits measured through direct observation during team supervision visits/Total number of providers that received team supervision during the reporting period.	3.4	OTSS checklist data	95%	93%	3192	3426			<p>program for future action as needed.</p> <p>Target not reached.</p> <p>Of the 3426 positive test records sampled by supervisors during OTSS visits, 3192 were found to have a corresponding ACT prescription recorded.</p>
28	Percentage of providers demonstrating adherence to negative test results according to global standards.	Number of providers demonstrating adherence to negative test results according to global standards during team supervision measured through direct observation during team supervision visits/Total number of providers that received team supervision during reporting period.	3.4	OTSS checklist data	90%	89%	2986	3363			<p>Target not reached.</p> <p>Of the 3363 negative test records sampled by supervisors during OTSS visits, 2986 (89%) were not found to have a corresponding ACT prescription.</p>

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29	Percentage of supervisors demonstrating competence in malaria treatment.	Number of supervisors who score greater than 80% on a treatment post-test during TOTs/Total number of supervisors who completed a post-test during a TOT.	3.1	Activity / Training Reports	90%	70%	54	77			<p>Target not reached.</p> <p>77 out of 78 clinical supervisors trained took the post-test during the OTSS supervisor training. Of these supervisors, 54 (70%) obtained a score of 80% or above. MalariaCare staff will continue to work with those low-performing supervisors during OTSS visits.</p>
30	Percentage of targeted facilities receiving at least two clinical supervisory visits per annum for malaria treatment.	Number of facilities receiving at least two clinical supervisory visits per annum for malaria treatment with WHO-recommended ACTs/Total number of targeted facilities.	3.4	OTSS checklist data	100%	51%	277	541			<p>Target not reached.</p> <p>According to the PY3/PY4 work plan, the 541 projected Phase 1 and Phase 2 facilities were to be visited twice by the end of PY4. However, Phase 2 facilities were not visited by the end of PY4. There were delays both in starting up the project and in the development of the EDS, which delayed the OTSS rounds.</p>
31	Percentage of targeted providers trained in malaria treatment.	Number of providers trained in malaria treatment with WHO-recommended ACTs/Total number of targeted providers.	Clinical Training (Not Supervisors)	Activity / Training Reports	N/A	N/A	N/A	N/A			<p>There were no clinical trainings for health providers included in the PY4 work plan.</p>
32	Percentage of targeted providers that received training in malaria treatment by supervisors during the reporting period.	Number of providers that received training in malaria treatment by supervisors based on documented errors during the reporting period/Total number of providers that had documented errors during team supervision during	3.4	OTSS checklist data	95%	73%	627	861			<p>Target not reached.</p> <p>Of the 861 staff at the health facilities visited during OTSS supervisors provided mentoring to 627 (73%).</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
33	Percentage of targeted clinical supervisors trained in supervision for treatment of malaria.	Number of clinical supervisors trained in supervision for treatment of malaria with WHO-recommended ACTs/Total number of targeted clinical supervisors.	OTSS Supervisor Training: Clinical	Activity / Training Reports	95%	104%	78	75			Target exceeded. In the PY3/PY4 work plan MalariaCare planned to train 75 clinical supervisors in supervision of malaria treatment and 78 (104%) were trained. The additional supervisors were replacements for those who left.
Objective 4: Strengthen laboratory systems at the country level for detecting malaria and other infectious diseases											
Description: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases. These activities relate to addressing the health systems issues that are a barrier to achieving universal access to malaria diagnostics and appropriate case management practices such as physical health facilities, human and financial resources, and support systems required to deliver quality diagnosis and treatment services.											
Intermediate Objectives											
Reference laboratories and facilities able to provide high quality diagnostics for malaria and other febrile illnesses											
Private sector laboratories are integrated into national QA/QC and supervision strategies											
Reporting and monitoring information for malaria is integrated, complete and accurate											
Intermediate Outcomes											
35	Percentage of targeted countries with national laboratory supervision tools whose indicators adhere to global standards for laboratory system analysis.	Number of targeted countries whose national laboratory supervision tools adhere to global standards for laboratory system analysis/Total number of targeted countries.	None	National Supervision Tools	No PY4 target set	1/1	1	1			In the Kenya PY4 work plan PMP, no PMP target was set for this indicator. However, MalariaCare's diagnostic supervision tools adhere to global standards. In Kenya this tool is endorsed by the national government as the national supervision tool and used in MalariaCare supported areas

Outputs											
36	Percentage of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards.	Number of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards/Total number of targeted facilities.	3.4	OTSS checklist data	No PY4 target set	41%	99	242			<p>In the Kenya PY4 work plan PMP, no PMP target was set for this indicator.</p> <p>OTSS data was available for 242 (94%) out of the 257 facilities with labs visited during OTSS in PY4. Of those 242 facilities, 99 (41%) had complete updated malaria guidelines at the most recent visit.</p> <p>While this indicator is currently low, in PY5 MalariaCare plans to print and disseminate 1,000 copies of the national diagnostic quality assurance guidelines. Thus we expect that 95% of facilities should have guidelines by the end of the project year.</p>
37	Percentage of targeted laboratories that meet global standards for quality malaria diagnostics	Number of targeted laboratories that meet 90% or greater on re-checking of malaria slides during supervisory visits/Total number of targeted who received a supervisory visit during the reporting period.	3.4	OTSS checklist data	No PY4 target set	81%	176	218	92%	100%	<p>In the Kenya PY4 work plan PMP, no PMP target was set.</p> <p>OTSS data was available for 218 (85%) out of the 257 facilities with labs visited in PY4 for this indicator. Of those 218 facilities, 176 (81%) scored 90% or greater on slide rechecking at the most recent visit.</p>

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38	Percentage of targeted laboratory facilities with all the required materials to confirm malaria diagnosis according to global standards.	Number of targeted facilities with all the required materials to confirm malaria diagnosis according to the global standards (including functioning microscope, slides, giemsa stain, and a trained lab technician)/Total number of targeted facilities with labs.	3.4	OTSS checklist data	No PY4 target set	1%	2	236			<p>In the Kenya PY4 work plan PMP, no PMP target was set for this indicator.</p> <p>OTSS data was available for 236 (92%) out of the 257 facilities with labs, visited during OTSS in PY4. Of these 236 facilities, 2 (1%) had all required materials available.</p> <p>The main limitations to meeting this target are pH paper/meter and buffer solution/tabs which only 14% and 33% of facilities had in stock, respectively. MalariaCare, per its mandate and the Kenya work plan, has a limited role in improving performance on this indicator. MalariaCare is sharing this information with the national malaria program for future action needed.</p>
39	Percentage of targeted facilities receiving at least two laboratory supervisory visits per annum.	Number of facilities receiving at least two laboratory supervisory visits per annum/Total number of targeted facilities.	3.4	OTSS checklist data	100%	41%	99	242			<p>Target not reached.</p> <p>According to the PY3/PY4 work plan, the Phase 1 and Phase 2 facilities were to be visited twice by the end of PY4. However, only facilities in Phase 1 were visited twice. There were delays both in starting up the project and in the development of the EDS which delayed the OTSS rounds.</p>

Liberia Performance Monitoring Plan

Note: Due to Liberia's limited scope of activities, indicators not relevant to Liberia's work plan are omitted in the table below.

GOAL: Contribute to PMI's overall goal 50% reduction in the burden of malaria in 70% of the at-risk population in PMI focus countries.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Objective 2: Increased percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test.											
Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses-consistent with the diagnostic test.											
Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Description: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent. The activities described in this section relate to addressing the laboratory technician and health care provider competency related to providing quality diagnostic services.											
Intermediate Objectives											
Clear and disseminated laboratory guidelines, procurement policies, supervision structures											
Clear and functioning quality assurance procedures for regulation of diagnostics for malaria and other IDs											
Reporting on malaria indicators is complete and accurate											
Country has complete national guidelines for the diagnosis of malaria											
Providers demonstrate competence in RDTs and/or microscopy											
Intermediate Outcomes											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Med.	
6	Percentage of supervisors demonstrating competence in malaria microscopy.	Percentage of supervisors who score 90% or greater in slide preparation and parasite detection during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers.	1.1 (National-level); 1.2 (CHT-level)	Activity Reports	No PY4 target set	74%	17	23			Of the 10 participants in the national-level MDRT, 5 scored 80% or above on parasite detection and all 10 scored 40% or above on parasite quantification. Of the 13 participants in the CHT-level MDRT, 12 scored 80% or above on parasite detection and all 13 scored 40% or above on parasite quantification.
17	Percentage of targeted laboratory supervisors trained in supervision for laboratory diagnosis of malaria.	Number of supervisors trained in supervision for laboratory diagnosis of malaria/Total number of targeted laboratory supervisors.	1.1 (National-level); 1.2 (CHT-level)	Supervisor Training reports	95%	92%	23	25			In PY4 MalariaCare planned to train 25 laboratory supervisors in supervision of malaria diagnosis and 23 (92%) were trained.

Madagascar Performance Monitoring Plan

GOAL: Contribute to PMI's overall goal 50% reduction in the burden of malaria in 70% of the at-risk population in PMI focus countries.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Objective 2: Increased percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test.											
Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses-consistent with the diagnostic test.											
Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Description: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent. The activities described in this section relate to addressing the laboratory technician and health care provider competency related to providing quality diagnostic services.											
Intermediate Objectives											
Clear and disseminated laboratory guidelines, procurement policies, supervision structures											
Clear and functioning quality assurance procedures for regulation of diagnostics for malaria and other IDs											
Reporting on malaria indicators is complete and accurate											
Country has complete national guidelines for the diagnosis of malaria											
Providers demonstrate competence in RDTs and/or microscopy											
Intermediate Outcomes											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Med.	
1	Percentage of targeted countries with national malaria diagnostics supervision tools whose indicators adhere to global standards.	Number of targeted countries whose national malaria diagnostics supervision tools adhere to global standards/Total number of targeted countries.	None	National Supervision Tools	No PY4 target set	0/1	0	1			In the Madagascar PY4 work plan PMP, no PMP target was set. Please see the paragraph at the beginning of the country PMPs for a full explanation of the change in the PMP from PY4 to PY5 and why targets are not available for some indicators. However, MalariaCare's supervision tools, which adhere to global standards, are currently only used within MalariaCare intervention areas and not nationally.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comments
						%	Num.	Den.	Mean	Med.	
2	Percentage of targeted laboratory technicians demonstrating competence in RDTs.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of lab staff who received a supervisory visit during the reporting period.	3.2	OTSS checklist data	65%	69%	9	13	94%	100%	<p>Target exceeded. The PMP target in the PY4 work plan was based on performance among all health care workers. In the revised global PMP, this indicator is disaggregated by cadre. We have maintained the PY4 work plan PMP overall target for this indicator.</p> <p>Laboratory staff performed better than clinical staff, and exceeded the target for this area.</p>
3	Percentage of targeted laboratory technicians demonstrating competence in malaria microscopy.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklist measuring slide preparation and parasite detection/Total number of laboratory technicians who received a supervisory visit during the reporting period.	3.2	OTSS checklist data	55%	63%	15	24	93%	98%	<p>Target exceeded. 15 out of 24 lab staff observed by OTSS supervisors obtained a microscopy competency score of at least 90%.</p>
4	Percentage of targeted clinical providers that demonstrate competence in RDTs.	Number of targeted clinical providers who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of	3.2	OTSS checklist data	65%	38%	5	13	90%	89%	<p>Target not reached. The PMP target in the PY4 work plan was based on performance among all health care workers. In the revised global PMP, this indicator is disaggregated by cadre. We have maintained the PY4 work</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Med.	
		clinical providers who received a supervisory visit during the reporting period.									<p>plan PMP overall target for this indicator.</p> <p>Clinical staff observed performed worse than lab staff, although mean scores were close to the target score. This information will be shared with the PMI for further sharing with in-country stakeholders.</p>
5	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality diagnosis of malaria.	Number of targeted clinics that meet 90% or greater on facility checklists for diagnosis during supervisory visits /Total number of targeted facilities who received a supervisory visit during the reporting period.	3.2	OTSS checklist data	45%	38%	9	24			<p>Target not reached.</p> <p>All 24 facilities visited in PY4 had sufficient data to calculate this indicator. Facilities must meet all conditions below to reach 90%; in Madagascar, 9 facilities (38%) did.</p> <p>Of the 24 facilities visited in PY4:</p> <ul style="list-style-type: none"> - 63% reported no stock-outs of RDTs of seven days or more over the past three months; - 75% reported availability of RDT bench aids and/or SOPs; and - 50% reported at least one person trained in RDTs in the past two years. <p>MalariaCare, per its mandate and the Madagascar work plan, has a limited role in improving performance on this indicator. MalariaCare will share this information with PMI for further sharing with in-country stakeholders.</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Med.	
6	Percentage of supervisors demonstrating competence in malaria microscopy.	Percentage of supervisors who score 90% or greater in slide preparation and parasite detection during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers. Note: Must score at least L1 or L2 on parasite detection (>=80%) and parasite quantification (>=40%)	n/a	n/a	n/a	n/a	n/a	n/a			Supervisors did not receive MDRT training in PY4.
7	Percentage of supervisors demonstrating competence in RDTs.	Percentage of supervisors who score 90% or greater in preparation and reading of RDTs during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers.	n/a	n/a	n/a	n/a	n/a	n/a			Supervisors did not receive MDRT training in PY4.

Outputs											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comments
						%	Num.	Den.	Mean	Med.	
8	Percentage of targeted facilities with at least one provider trained in RDTs.	Number of targeted facilities with one or more providers trained in RDT/Total number of targeted facilities.	3.2	OTSS checklist data	No PY4 target set	50%	12	24			In the Madagascar PY4 work plan PMP, no PMP target was set for this indicator. . Of the 24 facilities visited in PY4, 12 (50%) had at least one staff member formally trained in RDTs in the previous 2 years.
9	Percentage of targeted facilities with at least one provider trained in malaria microscopy.	Number of target facilities with one or more providers trained in malaria microscopy/Total number of targeted facilities	3.2	OTSS checklist data	No PY4 target set	38%	9	24			In the Madagascar PY4 work plan PMP, no PMP target was set for this indicator. Of the 24 facilities visited in PY4, 9 (38%) had at least one staff member formally trained in malaria microscopy s in the previous 2 years.
10	Percentage of targeted facilities with at least one provider who received malaria diagnostic refresher training (MDRT) in the last two years.	Number of targeted facilities with one or more providers who received MDRT in the last two years/Total number of targeted facilities.	n/a	n/a	n/a	n/a	n/a	n/a			Supervisors did not receive MDRT training in PY4.
11	Percentage of targeted clinical providers trained in RDTs.	Number of clinical providers trained in RDTs/Total number of targeted clinical providers.	3.1	Activity/ Training Reports	No PY4 target set	92%	55	60			In the Madagascar PY4 work plan PMP, no PMP target was set. However, in the PY4 work plan, MalariaCare planned to train 60 people in RDTs; 55 (92%) were actually trained.
12	Percentage of targeted laboratory technicians trained in RDTs.	Number of laboratory technicians trained in RDTs/Total number of targeted laboratory technicians.	n/a	n/a	n/a	n/a	n/a	n/a			No RDT training was conducted for laboratory workers in PY4.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comments
						%	Num.	Den.	Mean	Med.	
14	Percentage of targeted laboratory technicians participating in MDRT.	Number of laboratory technicians participating in malaria diagnostics refresher trainings/Total number of targeted laboratory technicians.	n/a	n/a	n/a	n/a	n/a	n/a			Supervisors did not receive MDRT training in PY4.
16	Percentage of targeted clinical supervisors trained in supervision of malaria diagnostics.	Number of clinical supervisors trained in supervision of malaria diagnostics/Total number of targeted clinical supervisors.	n/a	n/a	n/a	n/a	n/a	n/a			Supervisors did not receive training in PY4.
17	Percentage of targeted laboratory supervisors trained in supervision for laboratory diagnosis of malaria.	Number of supervisors trained in supervision for laboratory diagnosis of malaria/Total number of targeted laboratory supervisors.	n/a	n/a	n/a	n/a	n/a	n/a			Supervisors did not receive training in PY4.
Objective 2: Increase percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test for malaria											
Description: Increased percentage of patients suspected to have malaria or febrile illnesses who receive a diagnostic test for malaria. These activities relate to addressing health care provider performance in the use of diagnostic tools after appropriate training. Emphasis is on supervision and use of performance monitoring tools.											
Intermediate Objectives											
Providers demonstrate competence in detecting suspected malaria cases											
Providers demonstrate competence in ordering/conducting malaria diagnostic tests for suspected cases											
Private facilities are linked with the public sector											
Intermediate Outcomes											

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comments
						%	Num.	Den.	Mean	Med.	
19	Country has full national guidelines for determining suspected malaria cases.	Country has full national guidelines for determining suspected malaria cases (including age, duration of fever, fever history) that meet global standards.	n/a	National Guidelines	No PY4 target set	1/1	1	1			Madagascar recently updated its national guidelines (including on determining suspected malaria cases); these adhere to global standards.
20	Percentage of providers demonstrating competence in identifying suspected malaria cases according to global standards.	Number of providers who demonstrate correct procedures for differential diagnosis of possible malarial symptoms according to global standards during team supervision observation/Total number of providers targeted for team supervision during the reporting period.	3.2	OTSS checklist data	No PY4 target set	100%	21	21			In the Madagascar PY4 work plan PMP, no PMP target was set. All 21 providers observed during clinical observation asked the patient about history of fever or checked the patient's temperature.
21	Percentage of providers demonstrating competence in testing suspected patients for malaria.	Number of providers who appropriately order or perform testing of suspected malaria patients according to global standards during team supervision observations/Total number of providers targeted for team supervision observations during the reporting period.	3.2	OTSS checklist data	80%	90%	19	21			In the Madagascar PY4 work plan PMP, no PMP target was set. However, in 19 out of 21 providers observed during clinical observation (90%), OTSS supervisors agreed with the health provider on whether to order a malaria test.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Med.	
22	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for determining possible malaria cases.	Number of targeted countries whose national clinical supervision tools adhere to global standards for determining possible malaria cases/Total number of targeted countries.	3.2	National Supervision Tools	No PY4 target set	0/1	0	1			In the Madagascar PY4 work plan PMP, no PMP target was set. However, MalariaCare's supervision tools, which adhere to global standards, are currently used within MalariaCare intervention areas and not nationally.
Objective 3: Increase percentage of patients who receive appropriate treatment for malaria or other febrile illnesses - consistent with the result of the diagnostic test											
Description: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses—consistent with the result of the diagnostic test. The activities described in this section relate to addressing health care provider performance in delivering appropriate treatment after training has occurred. Emphasis is on supervision and ongoing use of performance monitoring tools.											
Intermediate Objectives											
Country has full national policies for malaria treatment											
Service providers demonstrate competence in malaria treatment											
Facilities are able to provide high quality case management services for malaria and other febrile illness											
Country has supervisory structures and implementation of supervision of malaria case management practices											
Intermediate Outcomes											
24	Country has full national guidelines for malaria treatment.	Country has full national guidelines for malaria treatment, incl.QA/QC procedures, training of informal health providers, and recommendations for home treatment of febrile illness, suspected malaria, and recognition of the common danger signs that meet global standards.	None	National Guidelines	No PY4 target set	1/1	1	1			Madagascar recently updated its national guidelines (including for malaria treatment); they adhere to global standards.

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25	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for malaria treatment .	Number of targeted countries whose national clinical supervision tools adhere to global standards for malaria treatment/Total number of targeted countries.	3.2	National Supervision Tools	No PY4 target set	0/1	0	1			<p>In the Madagascar PY4 work plan PMP, no PMP target was set.</p> <p>However, MalariaCare's supervision tools, which adhere to global standards, are currently used within MalariaCare intervention areas, not nationally.</p>
26	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality treatment of malaria.	Number of targeted clinics that meet 90% or greater on facility checklists during supervisory visits /Total number of targeted facilities who received a supervisory visit during the reporting period.	3.2	OTSS checklist data	35%	25%	6	24			<p>Target not reached.</p> <p>All 24 facilities visited in PY4 had sufficient OTSS data to calculate this indicator. Facilities must meet all conditions listed below in order to reach the 90% target; 6 (or 25%) did so.</p> <p>Among the 24 facilities visited, the following percentages met each of the following standards:</p> <ul style="list-style-type: none"> - 71% reported having on site the most recent case management guidelines or algorithms - 33% reported having at least one provider formally trained in malaria case management - 79% reported having no significant stock-outs of a first-line ACT in the previous 3 months - 88% reported having no significant stock-outs of paracetamol in the previous 3 months

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Med.	
27	Percentage of targeted providers demonstrating compliance to treatment with WHO-recommended ACT for cases with positive malaria test results.	Number of providers who comply to treatment with a WHO-recommended anti-malarial for cases with positive malaria test results during clinical assessment visits measured through direct observation during team supervision visits/Total number of providers that received team supervision during the reporting period.	3.2	OTSS checklist data	75%	78%	21	27			MalariaCare, per its mandate and the Madagascar work plan, has a limited role in improving performance on this indicator. MalariaCare will share this information with PMI for further sharing with in-country stakeholders.
28	Percentage of providers demonstrating adherence to negative test results according to global standards.	Number of providers demonstrating adherence to negative test results according to global standards during team supervision measured through direct observation during team supervision visits/Total number of providers that received team supervision during	3.2	OTSS checklist data	60%	100%	139	139			Target exceeded. Of the 27 positive test records sampled by supervisors during the most recent OTSS visit, 21 were found to have a corresponding ACT prescription recorded.
											Target exceeded. Of the 139 negative test records sampled by supervisors during OTSS visits, all were found to have no ACT prescription.

		reporting period.									
29	Percentage of supervisors demonstrating competence in malaria treatment.	Number of supervisors who score greater than 80% on a treatment post-test during TOTs/Total number of supervisors who completed a post-test during a TOT.	n/a	n/a	n/a	n/a	n/a	n/a			Supervisors did not receive training in PY4.
30	Percentage of targeted facilities receiving at least two clinical supervisory visits per annum for malaria treatment.	Number of facilities receiving at least two clinical supervisory visits per annum for malaria treatment with WHO-recommended ACTs/Total number of targeted facilities.	3.2	OTSS checklist data	90%	100%	24	24			Target exceeded. The 24 facilities planned for an OTSS visit in PY4 all were visited twice.
31	Percentage of targeted providers trained in malaria treatment.	Number of providers trained in malaria treatment with WHO-recommended ACTs/Total number of targeted providers.	3.2	Activity/ Training Reports	No PY4 target set	92%	55	60			In the Madagascar PY4 work plan PMP, no PMP target was set. However, in the PY4 work plan, MalariaCare planned to train 60 providers in malaria case management; 55 (92%) were actually trained.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comments
						%	Num.	Den.	Mean	Med.	
32	Percentage of targeted providers that received training in malaria treatment by supervisors during the reporting period.	Number of providers that received training in malaria treatment by supervisors based on documented errors during the reporting period/Total number of providers that had documented errors during team supervision during the reporting period.	3.1	OTSS checklist data	95%	100%	21	21			Target exceeded. Supervisors reported providing feedback to health workers during each of the 21 clinical observations of unique providers during the most recent OTSS visit.
33	Percentage of targeted clinical supervisors trained in supervision for treatment of malaria.	Number of clinical supervisors trained in supervision for treatment of malaria with WHO-recommended ACTs/Total number of targeted clinical supervisors.	n/a	n/a	n/a	n/a	n/a	n/a			Supervisors did not receive training in PY4.
Objective 4: Strengthen laboratory systems at the country level for detecting malaria and other infectious diseases											
Description: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases. These activities relate to addressing the health systems issues that are a barrier to achieving universal access to malaria diagnostics and appropriate case management practices such as physical health facilities, human and financial resources, and support systems required to deliver quality diagnosis and treatment services.											
Intermediate Objectives											
Reference laboratories and facilities able to provide high quality diagnostics for malaria and other febrile illnesses											
Private sector laboratories are integrated into national QA/QC and supervision strategies											
Reporting and monitoring information for malaria is integrated, complete and accurate											
Intermediate Outcomes											

#											
35	Percentage of targeted countries with national laboratory supervision tools whose indicators adhere to global standards for laboratory system analysis.	Number of targeted countries whose national laboratory supervision tools adhere to global standards for laboratory system analysis/Total number of targeted countries.	3.2	National Supervision Tools	No PY4 target set	0/1	0	1			In the Madagascar PMP, no target was developed for this indicator. However, MalariaCare's supervision tools, which adhere to global standards, are currently used within MalariaCare intervention areas, not nationally.
36	Percentage of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards.	Number of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards/Total number of targeted facilities.	3.2	OTSS checklist data	No PY4 target set	78%	18	23			In the Madagascar PY4 work plan PMP, no PMP target was set for this indicator. OTSS data was available for 23 out of 24 (96%) facilities visited in PY4. Of these 23 facilities, 18 (78%) had complete updated malaria guidelines at the most recent visit.
37	Percentage of targeted laboratories that meet global standards for quality malaria diagnostics	Number of targeted laboratories that meet 90% or greater on re-checking of malaria slides during supervisory visits/Total number of targeted who received a supervisory visit during the reporting period.	3.2	OTSS checklist data	No PY4 target set	100%	24	24	100%	100%	In the Madagascar PY4 work plan PMP, no PMP target was set for this indicator. OTSS data for this indicator was available for all facilities visited in PY4. All facilities scored 90% or greater on parasite detection agreement.

#											
38	Percentage of targeted laboratory facilities with all the required materials to confirm malaria diagnosis according to global standards.	Number of targeted facilities with all the required materials to confirm malaria diagnosis according to the global standards (including functioning microscope, slides, giemsa stain, and a trained lab technician)/Total number of targeted facilities with labs.	3.2	OTSS checklist data	40%	0%	0	23			<p>Target not reached. OTSS data was available for 23 out of 24 (96%) facilities visited in PY4. Of those 23 facilities, none had all of the required materials and staff.</p> <p>The main limitations to meeting this target are the lacking of pH paper/meter and glycerol, which only 17% and 30% of facilities had in stock, respectively.</p> <p>MalariaCare, per its mandate and the Madagascar work plan, has a limited role in improving performance on this indicator. MalariaCare will share this information with PMI for further sharing with in-country stakeholders.</p>
39	Percentage of targeted facilities receiving at least two laboratory supervisory visits per annum.	Number of facilities receiving at least two laboratory supervisory visits per annum/Total number of targeted facilities.	3.2	OTSS checklist data	90%	100%	24	24			<p>Target exceeded. The 24 facilities planned for an OTSS visit in PY4 were visited twice (all have laboratories).</p>

Malawi Performance Monitoring Plan

GOAL: Contribute to PMI's overall goal 50% reduction in the burden of malaria in 70% of the at-risk population in PMI focus countries.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Objective 2: Increased percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test.											
Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses-consistent with the diagnostic test.											
Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Description: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent. The activities described in this section relate to addressing the laboratory technician and health care provider competency related to providing quality diagnostic services.											
Intermediate Objectives											
Clear and disseminated laboratory guidelines, procurement policies, supervision structures											
Clear and functioning quality assurance procedures for regulation of diagnostics for malaria and other IDs											
Reporting on malaria indicators is complete and accurate											
Country has complete national guidelines for the diagnosis of malaria											
Providers demonstrate competence in RDTs and/or microscopy											
Intermediate Outcomes											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
1	Percentage of targeted countries with national malaria diagnostics supervision tools whose indicators adhere to global standards.	Number of targeted countries whose national malaria diagnostics supervision tools adhere to global standards/Total number of targeted countries.	None	National Supervision Tools	No PY4 target set	1/1	1	1			In the Malawi PY4 work plan PMP, no PMP target was set. Please see the paragraph at the beginning of the country PMPs for a full explanation of the change in the PMP from PY4 to PY5 and why targets are not available for some indicators. MalariaCare's diagnostic supervision tools adhere to global standards. In Malawi, this tool is endorsed by the national government as the national supervision tool and used in MalariaCare supported areas. During PY5, we will be transitioning these for use by the NMCP and partners.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
2	Percentage of targeted laboratory technicians demonstrating competence in RDTs.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of lab staff who received a supervisory visit during the reporting period.	3.3	OTSS checklist data	90%	69%	72	104	92%	96%	<p>Target not reached.</p> <p>The PMP target in the PY4 work plan was set based on performance among all health care workers. In the revised global PMP, this indicator is disaggregated by cadre. We have maintained the PY4 work plan PMP overall target for this indicator.</p> <p>Although the target was not met, mean and median scores were well above 90%, and we expect to meet this target in PY5 by ensuring that appropriate mentoring occurs at the lowest-performing sites.</p>
3	Percentage of targeted laboratory technicians demonstrating competence in malaria microscopy.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklist measuring slide preparation and parasite detection/Total number of laboratory technicians who received a supervisory visit during the reporting period.	3.3	OTSS checklist data	50%	31%	24	77	79%	81%	<p>Target not reached.</p> <p>Lab workers performed more poorly on slide preparation than slide staining or reading. The most commonly missed steps were spreading thick films into 1-2cm diameter circle and can read print placed under the slide (66%) and air-drying thick film slide before staining (68%).</p> <p>In PY5 MalariaCare will train 20 additional lab workers in malaria microscopy.</p>
4	Percentage of targeted clinical providers that demonstrate competence in RDTs.	Number of targeted clinical providers who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of	3.3	OTSS checklist data	90%	56%	27	48	88%	93%	<p>Target not reached.</p> <p>The PMP target in the PY4 work plan was set based on performance among all health care workers. In the revised global PMP, this indicator is disaggregated by cadre. We have maintained the PY4 work plan PMP overall target for this indicator.</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
		clinical providers who received a supervisory visit during the reporting period.									Clinical staff observed performed worse than laboratory workers. We expect to meet targets set for clinical staff in PY5 by ensuring that appropriate mentoring occurs at the lowest-performing sites.
5	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality diagnosis of malaria.	Number of targeted clinics that meet 90% or greater on facility checklists for diagnosis during supervisory visits /Total number of targeted facilities who received a supervisory visit during the reporting period.	3.3	OTSS checklist data	No PY4 target set	40%	147	366			<p>In the Malawi PY4 work plan PMP, no PMP target was set.</p> <p>OTSS data for this indicator was available for 366 (96%) of the 400 facilities visited.</p> <ul style="list-style-type: none"> - 70% reported no stock-outs of RDTs of seven days or more over the past three months - 56% reported availability of RDT SOPs, - 52% reported availability of RDT bench aids, and - 82% reported at least on person trained in RDTs in the past two years. <p>MalariaCare activities have a limited role in improving this indicator. MalariaCare is sharing this information with the national malaria program for future action that may be needed.</p>
6	Percentage of supervisors demonstrating competence in malaria microscopy.	Percentage of supervisors who score 90% or greater in slide preparation and parasite detection during the training of trainers post-test/Total number of	1.1	Activity/ Training Reports	65%	37%	7	19			<p>Target not reached.</p> <p>14 out of 19 (74%) of participants scored at a WHO L1 or L2 (>=80%) for parasite detection. 8 out of 19 (42%) scored at a WHO L1 or L2 for parasite quantification (>=40%).</p>

		supervisors who completed a post-test during a training of trainers. Note: Must score at least L1 or L2 on parasite detection (>=80%) and parasite quantification (>=40%)										Parasite counting continues to be a challenge for supervisors to conduct accurately. MalariaCare staff and high-performing supervisors will continue to work with those low-performing laboratory supervisors during OTSS visits to strengthen microscopy skills.
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment	
						%	Num.	Den.	Mean	Median		
7	Percentage of supervisors demonstrating competence in RDTs.	Percentage of supervisors who score 90% or greater in preparation and reading of RDTs during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers.	2.1, 3.2	Activity/ Training Reports	90%	63%	24	38	90%	91%	Target not reached. Many participants were just under the threshold, as shown by the average score of 90%.	
Outputs												
8	Percentage of targeted facilities with at least one provider trained in RDTs.	Number of targeted facilities with one or more providers trained in RDT/Total number of targeted facilities.	3.3	OTSS checklist data	No PY4 target set	82%	304	371			In the Malawi PY4 work plan PMP, no PMP target was set for this indicator. OTSS data for this indicator was available for 371 (93%) of the 400 facilities visited. Of these 371 facilities, 304 (82%) had a provider formally trained in RDTs in the previous 2 years.	

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comments
						%	Num.	Den.	Mean	Median	
9	Percentage of targeted facilities with at least one provider trained in malaria microscopy.	Number of target facilities with one or more providers trained in malaria microscopy/Total number of targeted facilities	1.2, 3.3	OTSS checklist data	No PY4 target set	53%	54	102			In the Malawi PY4 work plan PMP, no PMP target was set for this indicator. OTSS data for this indicator was available for 102 (94%) of the 109 facilities visited in PY4 that perform microscopy. Of these 102 facilities, 54 (53%) had at least one provider trained in malaria microscopy.
10	Percentage of targeted facilities with at least one provider who received malaria diagnostic refresher training (MDRT) in the last two years.	Number of targeted facilities with one or more providers who received MDRT in the last two years/Total number of targeted facilities.	1.2	Activity/ Training Reports	No PY4 target set	105%	40	38			In the Malawi PY4 work plan PMP, no PMP target was set. However, in the PY4 work plan MalariaCare planned to train 38 laboratory staff from unique facilities in malaria microscopy; 40 (105%) laboratory workers were actually trained.
11	Percentage of targeted clinical providers trained in RDTs.	Number of clinical providers trained in RDTs/Total number of targeted clinical providers.	2.1, 3.2	Activity/ Training Reports	N/A	N/A	N/A	N/A			There were no RDT trainings for facility staff in PY4. For RDT training results for supervisors, see indicators 16 and 17.
12	Percentage of targeted laboratory technicians trained in RDTs.	Number of laboratory technicians trained in RDTs/Total number of targeted laboratory technicians.	None	Activity/ Training Reports	95%	N/A	N/A	N/A			There were no RDT trainings for facility staff in PY4. For RDT training results for supervisors, see indicators 16 and 17.
14	Percentage of targeted laboratory technicians participating in MDRT.	Number of laboratory technicians participating in malaria diagnostics refresher trainings/Total number of targeted laboratory technicians.	1.1, 1.2	Activity/ Training Reports	95%	98%	59	60			Target exceeded. In PY4 MalariaCare planned to train 60 laboratory staff in MDRTs and 59 (98%) were trained.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comments
						%	Num.	Den.	Mean	Median	
16	Percentage of targeted clinical supervisors trained in supervision of malaria diagnostics.	Number of clinical supervisors trained in supervision of malaria diagnostics/Total number of targeted clinical supervisors.	3.1, 3.2	Activity/ Training Reports	95%	121%	29	24			Target exceeded. In PY4 MalariaCare planned to train 24 clinical supervisors in supervision of malaria diagnostics (20 in activity 2.1 and 14 under activity 3.2). 29 (121%) were trained - a total of 19 clinicians were trained under activity 3.2 (health center clinician OTSS supervisors) and 10 other clinicians trained under activity 3.1 (severe malaria supervisors and trainers).
17	Percentage of targeted laboratory supervisors trained in supervision for laboratory diagnosis of malaria.	Number of supervisors trained in supervision for laboratory diagnosis of malaria/Total number of targeted laboratory supervisors.	2.1	Activity/ Training Reports	95%	190%	19	10			Target exceeded. In PY4 MalariaCare planned to train 10 laboratory supervisors in supervision of malaria diagnostics and 19 (190%) were trained.
Objective 2: Increase percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test for malaria											
Description: Increased percentage of patients suspected to have malaria or febrile illnesses who receive a diagnostic test for malaria. These activities relate to addressing health care provider performance in the use of diagnostic tools after appropriate training. Emphasis is on supervision and use of performance monitoring tools.											
Intermediate Objectives											
Providers demonstrate competence in detecting suspected malaria cases											
Providers demonstrate competence in ordering/conducting malaria diagnostic tests for suspected cases											
Private facilities are linked with the public sector											
Intermediate Outcomes											

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
19	Country has full national guidelines for determining suspected malaria cases.	Country has full national guidelines for determining suspected malaria cases (including age, duration of fever, fever history) that meet global standards.	None	National Guidelines	No PY4 target set		1	1			In the Malawi PY4 work plan PMP, no target was set for this indicator. However, the Government of Malawi recently updated its national guidelines for malaria case management, which includes guidelines for determining suspected malaria cases and meet global standards.
20	Percentage of providers demonstrating competence in identifying suspected malaria cases according to global standards.	Number of providers who demonstrate correct procedures for differential diagnosis of possible malarial symptoms according to global standards during team supervision observation/Total number of providers targeted for team supervision during the reporting period.	3.3	OTSS checklist data	80%	97%	480	493			Target exceeded. 480 out of 493 providers observed during clinical observations (97%) asked about history of fever or checked the patient's temperature during the most recent visit at each facility.
21	Percentage of providers demonstrating competence in testing suspected patients for malaria.	Number of providers who appropriately order or perform testing of suspected malaria patients according to global standards during team supervision observations/Total number of providers targeted for team supervision observations during the reporting period.	3.3	OTSS checklist data	80%	97%	479	493			Target exceeded. In 479 out of 493 clinical observations conducted (97%), the supervisor agreed with the health provider observed on whether to order a malaria test.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
22	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for determining possible malaria cases.	Number of targeted countries whose national clinical supervision tools adhere to global standards for determining possible malaria cases/Total number of targeted countries.	None	National Supervision Tools	No PY4 target set	1/1	1	1			In the Malawi PY4 work plan PMP, no PMP target was set for this indicator. However, MalariaCare's clinical supervision tools adhere to global standards. In Malawi, this tool is endorsed by the national government as the national supervision tool and used in MalariaCare supported areas. During PY5, we will be transitioning these for use by the NMCP and partners.
Objective 3: Increase percentage of patients who receive appropriate treatment for malaria or other febrile illnesses - consistent with the result of the diagnostic test											
Description: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses—consistent with the result of the diagnostic test. The activities described in this section relate to addressing health care provider performance in delivering appropriate treatment after training has occurred. Emphasis is on supervision and ongoing use of performance monitoring tools.											
Intermediate Objectives											
Country has full national policies for malaria treatment											
Service providers demonstrate competence in malaria treatment											
Facilities are able to provide high quality case management services for malaria and other febrile illness											
Country has supervisory structures and implementation of supervision of malaria case management practices											
Intermediate Outcomes											
24	Country has full national guidelines for malaria treatment.	Country has full national guidelines for malaria treatment, incl.QA/QC procedures, training of informal health providers, and recommendations for home treatment of febrile illness, suspected malaria, and recognition of the common danger signs that meet global standards.	None	National Guidelines	No PY4 target set	1/1	1	1			In the Malawi PY4 work plan PMP, no target was set for this indicator. However, the Government of Malawi recently updated its national guidelines for malaria case management and they adhere to global standards.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
25	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for malaria treatment .	Number of targeted countries whose national clinical supervision tools adhere to global standards for malaria treatment/Total number of targeted countries.	3.3	National Supervision Tools	No PY4 target developed	1/1	1	1			In the Malawi PY4 work plan PMP, no target was set for this indicator. However, MalariaCare's clinical supervision tools adhere to global standards for malaria treatment standards and are used throughout the entire country. During PY5, we will be transitioning these for use by the NMCP and partners.
26	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality treatment of malaria.	Number of targeted clinics that meet 90% or greater on facility checklists during supervisory visits /Total number of targeted facilities who received a supervisory visit during the reporting period.	3.3	OTSS checklist data	No PY4 target set	44%	172	390			<p>In the Malawi PY4 work plan PMP, no PMP target was set for this indicator.</p> <p>OTSS data for this indicator was available for 390 (98%) of the 400 facilities visited. Facilities must meet all conditions below to reach 90%. Of the 390 facilities with data, 172 (44%) met all conditions required for quality treatment of malaria.</p> <p>Among the 390 facilities with data the following percentage met each of the standards:</p> <ol style="list-style-type: none"> 1) Most recent malaria case management guidelines available (66%) 2) At least 1 staff trained in case management of malaria (92%) 3) First-line antimalarial in stock (75%) 4) Paracetamol cap/tab in stock (83%) <p>MalariaCare, per its mandate and the Malawi work plan, has a limited role in improving this indicator. MalariaCare is sharing this information with the national malaria program for future action that may be needed.</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
27	Percentage of targeted providers demonstrating compliance to treatment with WHO-recommended ACT for cases with positive malaria test results.	Number of providers who comply to treatment with a WHO-recommended anti-malarial for cases with positive malaria test results during clinical assessment visits measured through direct observation during team supervision visits/Total number of providers that received team supervision during the reporting period.	3.3	OTSS checklist data	85%	92%	1916	2089			Target exceeded. Out of 2089 positive test records sampled by supervisors during OTSS visits, 1916 (92%) were found to have a corresponding ACT prescription recorded.
28	Percentage of providers demonstrating adherence to negative test results according to global standards.	Number of providers demonstrating adherence to negative test results according to global standards during team supervision measured through direct observation during team supervision visits/Total number of providers that received team supervision during reporting period.	3.3	OTSS checklist data	85%	97%	2041	2106			Target exceeded. Out of 2106 negative test records sampled by supervisors during OTSS visits, 2041 (97%) were not found to have a corresponding ACT prescription.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
29	Percentage of supervisors demonstrating competence in malaria treatment.	Number of supervisors who score greater than 80% on a treatment post-test during TOTs/Total number of supervisors who completed a post-test during a TOT.	3.1,3.2	Activity/ Training Reports	No PY4 target set	28%	8	29	76%	76%	In the Malawi PY4 work plan PMP, no PMP target was set. Of the 29 supervisors who received clinical case management refresher training, 8 (28%) received a score of at least 80% at post-test.
Outputs											
30	Percentage of targeted facilities receiving at least two clinical supervisory visits per annum for malaria treatment.	Number of facilities receiving at least two clinical supervisory visits per annum for malaria treatment with WHO-recommended ACTs/Total number of targeted facilities.	3.3	OTSS checklist data	95%	82%	369	448			Target not reached. According to the PY4 work plan, 280 facilities were to be visited three times for joint OTSS and 168 facilities were supposed to be visited three times for clinical OTSS. Due to delays in programming, only two rounds of each were conducted this year. Of the 280 facilities planned for joint OTSS, 248 (89%) were visited twice. Of the 168 facilities planned for clinical OTSS, 121 (72%) facilities were visited twice. Challenges in reaching the target were due to supervisors not visiting all facilities as planned and challenges pushing the data using EDS. In PY5 we will conduct additional follow-up to make sure all targeted facilities receive at least two visits and roll-out a new version of EDS which should address problems with pushing the data.
31	Percentage of targeted providers trained in malaria treatment.	Number of providers trained in malaria treatment with WHO-recommended ACTs/Total number of targeted providers.	N/A	Activity/ Training Reports	N/A	N/A	N/A	N/A			MalariaCare did not conduct any clinical training for facility staff in PY4.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
32	Percentage of targeted providers that received training in malaria treatment by supervisors during the reporting period.	Number of providers that received training in malaria treatment by supervisors based on documented errors during the reporting period/Total number of providers that had documented errors during team supervision during the reporting period.	3.3	OTSS checklist data	95%	99%	438	443			Target reached During 443 observations of unique providers, feedback was provided for 438 of the observations (99%).
33	Percentage of targeted clinical supervisors trained in supervision for treatment of malaria.	Number of clinical supervisors trained in supervision for treatment of malaria with WHO-recommended ACTs/Total number of targeted clinical supervisors.	2.1,3.2	Activity/ Training Reports	95%	121%	29	24			Target exceeded. According to the PY4 work plan, MalariaCare planned to train 14 health center clinicians as supervisors and 10 severe malaria mentors (24 supervisors total). Over the course of activity 2.1 and 3.2, MalariaCare trained 29 people.
Objective 4: Strengthen laboratory systems at the country level for detecting malaria and other infectious diseases											
Description: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases. These activities relate to addressing the health systems issues that are a barrier to achieving universal access to malaria diagnostics and appropriate case management practices such as physical health facilities, human and financial resources, and support systems required to deliver quality diagnosis and treatment services.											
Intermediate Objectives											
Reference laboratories and facilities able to provide high quality diagnostics for malaria and other febrile illnesses											
Private sector laboratories are integrated into national QA/QC and supervision strategies											
Reporting and monitoring information for malaria is integrated, complete and accurate											
Intermediate Outcomes											
35	Percentage of targeted countries with national laboratory supervision tools whose indicators adhere to global standards for laboratory system analysis.	Number of targeted countries whose national laboratory supervision tools adhere to global standards for laboratory system analysis/Total number of targeted countries.	None	National Supervision Tools	No PY4 target set	1/1	1	1			In the Malawi PY4 work plan PMP, no PMP target was set for this indicator. However, MalariaCare's national laboratory supervision tools adhere to global standards. In Malawi this tool is endorsed by the national government as the national supervision tool and used in MalariaCare supported areas. During PY5, we will be transitioning these for

Outputs											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
36	Percentage of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards.	Number of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards/Total number of targeted facilities.	3.3	OTSS checklist data	No PY4 target set	41%	41	101			In the Malawi PY4 work plan PMP, no PMP target was set for this indicator. Other than routine OTSS, which may help to improve guideline distribution, MalariaCare, per its mandate and the Malawi work plan, has a limited role in improving this indicator. MalariaCare is sharing this information with the national malaria program for future action that may be needed.
37	Percentage of targeted laboratories that meet global standards for quality malaria diagnostics	Number of targeted laboratories that meet 90% or greater on re-checking of malaria slides during supervisory visits/Total number of targeted who received a supervisory visit during the reporting period.	3.3	OTSS checklist data	No PY4 target set	79%	50	63	91%	100%	In the Malawi PY4 work plan PMP, no PMP target was set for this indicator. OTSS data was available for 63 (93%) out of the 109 facilities with labs visited in PY4 for this indicator. Of these 63 facilities, 50 (79%) scored 90% or greater on slide rechecking at the most recent visit.
38	Percentage of targeted laboratory facilities with all the required materials to confirm malaria diagnosis according to global standards.	Number of targeted facilities with all the required materials to confirm malaria diagnosis according to the global standards (including functioning microscope, slides, giemsa stain, and a trained lab technician)/Total number of targeted facilities with labs.	3.3	OTSS checklist data	No PY4 target set	8%	8	100			In the Malawi PY4 work plan PMP, no PMP target was set. The main limitations to meeting this target are glycerol and pH paper meters which only 38% and 36% of facilities had in stock, respectively. Other than routine OTSS, which may help to improve guideline distribution, MalariaCare activities have a limited role in improving this indicator. MalariaCare is sharing this information with the national malaria program for future action that may be needed.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comments
						%	Num.	Den.	Mean	Median	
39	Percentage of targeted facilities receiving at least two laboratory supervisory visits per annum.	Number of facilities receiving at least two laboratory supervisory visits per annum/Total number of targeted facilities.	3.3	OTSS checklist data	95%	89%	248	280			<p>Target not reached.</p> <p>According to the PY4 work plan, 280 facilities were to be visited three times for joint clinical laboratory OTSS. Only two rounds of each were done this year. Of the 280 planned facilities, 248 (89%) were visited twice for joint OTSS.</p> <p>Data collected during OTSS in PY4 revealed that not all of the planned joint OTSS facilities provide malaria microscopy. In PY5, MalariaCare and NMCP will work together to ensure that the supervision structure matches the facility's needs.</p>

Mali Performance Monitoring Plan

GOAL: Contribute to PMI's overall goal 50% reduction in the burden of malaria in 70% of the at-risk population in PMI focus countries.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Objective 2: Increased percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test.											
Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses-consistent with the diagnostic test.											
Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Description: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent. The activities described in this section relate to addressing the laboratory technician and health care provider competency related to providing quality diagnostic services.											
Intermediate Objectives											
Clear and disseminated laboratory guidelines, procurement policies, supervision structures											
Clear and functioning quality assurance procedures for regulation of diagnostics for malaria and other IDs											
Reporting on malaria indicators is complete and accurate											
Country has complete national guidelines for the diagnosis of malaria											
Providers demonstrate competence in RDTs and/or microscopy											
Intermediate Outcomes											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
1	Percentage of targeted countries with national malaria diagnostics supervision tools whose indicators adhere to global standards.	Number of targeted countries whose national malaria diagnostics supervision tools adhere to global standards/Total number of targeted countries.	None	National Supervision Tools	No PY4 target set	1/1	1	1			In the Mali PY4 work plan PMP, no PMP target was set. Please see the paragraph at the beginning of the country PMPs for a full explanation of the change in the PMP from PY4 to PY5 and why targets are not available for some indicators. MalariaCare's diagnostic supervision tools adhere to global standards; and in Mali, this tool is endorsed by the national government as the national supervision tool and used throughout the country.
2	Percentage of targeted laboratory technicians demonstrating competence in RDTs.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of	2.2	N/AOTSS checklist data	50%	86%	6	7	97%	100%	Target exceeded. The PMP target in the PY4 work plan was set based on performance among all health care workers. In the revised global PMP, this indicator is disaggregated by cadre. We have maintained the PY4 work plan PMP overall target for this indicator.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment	
						%	Num.	Den.	Mean	Median		
		lab staff who received a supervisory visit during the reporting period.										The PY4 target was based on previous performance among all health care workers; however, only a small minority of health workers observed conducting RDTs were lab workers. Laboratory staff performed better than clinical staff, and thus exceeded the target for this area.
3	Percentage of targeted laboratory technicians demonstrating competence in malaria microscopy.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklist measuring slide preparation and parasite detection/Total number of laboratory technicians who received a supervisory visit during the reporting period.	2.2	OTSS checklist data	40%	54%	19	35	88%	94%	Target exceeded. Of the 35 providers observed conducting malaria microscopy, 19 received an overall microscopy competency score of 90 percent or higher.	
4	Percentage of targeted clinical providers that demonstrate competence in RDTs.	Number of targeted clinical providers who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of clinical providers who received a supervisory visit during the reporting period.	2.2, 3.2	OTSS checklist data	50%	50%	84	167	87%	92%	Target reached. Of 142 facilities visited in PY4 that conduct RDTs, 128 (90%) had clinical staff that were observed and had scores for RDT performance.	
5	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality diagnosis of	Number of targeted clinics that meet 90% or greater on facility checklists for diagnosis during supervisory visits /Total number of targeted facilities who received a supervisory visit during the	2.2, 3.2	OTSS checklist data	45%	50%	70	139			Target exceeded. Of the 142 facilities visited that perform RDTs, 139 (98%) reported all variables required for a quality diagnosis assessment. 70 of the 139 facilities with data available met all standards for the quality diagnosis of malaria. Of the 139 facilities with data available: - 79% reported no stock-outs of RDTs of seven	

	malaria.	reporting period.										days or more over the past three months; - 65% reported availability of RDT bench aids and/or SOPs; and - 96% reported at least on person trained in RDTs in the past two years.
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment	
						%	Num.	Den.	Mean	Median		
6	Percentage of supervisors demonstrating competence in malaria microscopy.	Percentage of supervisors who score 90% or greater in slide preparation and parasite detection during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers. Note: Must score at least L1 or L2 on parasite detection (>=80%) and parasite quantification (>=40%)	1.3	Activity/Training Reports	45%	5%	1	20			Target not reached. Although 12 out of 20 (60%) of participants scored at a WHO L1 or L2 (>=80%) for parasite detection, only 1 participant (5%) scored at a WHO L1 or L2 for parasite quantification (>=40%). Parasite counting continues to be a challenge for supervisors to conduct accurately. MalariaCare staff will continue to work with those low-performing laboratory supervisors during OTSS visits to strengthen microscopy skills.	
7	Percentage of supervisors demonstrating competence in RDTs.	Percentage of supervisors who score 90% or greater in preparation and reading of RDTs during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers.	1.3	n/a	No PY4 target set	n/a	n/a	n/a			Because this indicator was not included in the PY4 work plan PMP, testing supervisors on RDT knowledge was not included as a standard part of supervisor training; instead, additional time was devoted to strengthening general mentoring and supervisory skills. However, pre- and post-tests will be administered during supervisor trainings in PY5.	
Outputs												

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
8	Percentage of targeted facilities with at least one provider trained in RDTs.	Number of targeted facilities with one or more providers trained in RDT/Total number of targeted facilities.	2.2, 3.2	OTSS checklist data	No PY4 target set	97%	136	140			In the Mali PY4 work plan PMP, no target was set for this indicator. Of the 142 facilities visited that conduct RDTs, 140 (99%) reported on whether staff were trained in RDTs. Of the 140 facilities with data, 136 (97%) reported having at least 1 staff formally trained in RDTs in the previous 2 years.
9	Percentage of targeted facilities with at least one provider trained in malaria microscopy.	Number of target facilities with one or more providers trained in malaria microscopy/Total number of targeted facilities	2.2	OTSS checklist data	No PY4 target set	50%	17	34			In the Mali PY4 work plan PMP, no target was set for this indicator. Of the 36 facilities visited that conduct microscopy, 34 (94%) reported on whether staff were trained in microscopy. Of these 34 facilities, 17 (50%) reported having at least one provider formally trained in malaria microscopy.
10	Percentage of targeted facilities with at least one provider who received malaria diagnostic refresher training (MDRT) in the last two years.	Number of targeted facilities with one or more providers who received MDRT in the last two years/Total number of targeted facilities.	1.1	Activity/ Training Reports	No PY4 target set	100%	20	20			In the Mali PY4 work plan PMP, no target was set for this indicator. In PY4 MalariaCare planned to train 20 providers from 20 facilities in malaria microscopy. Of these, all 20 were trained.
11	Percentage of targeted clinical providers trained in RDTs.	Number of clinical providers trained in RDTs/Total number of targeted clinical providers.	n/a	n/a	n/a	n/a	n/a	n/a			No applicable activity was conducted in PY4. For RDT training results for supervisors, see indicator 16 and 17.
12	Percentage of targeted laboratory technicians trained in RDTs.	Number of laboratory technicians trained in RDTs/Total number of targeted laboratory technicians.	n/a	n/a	n/a	n/a	n/a	n/a			No applicable activity was conducted in PY4. For RDT training results for supervisors, see indicator 16 and 17.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
14	Percentage of targeted laboratory technicians participating in MDRT.	Number of laboratory technicians participating in malaria diagnostics refresher trainings/Total number of targeted laboratory technicians.	n/a	n/a	n/a	n/a	n/a	n/a			No applicable activity was conducted in PY4. For RDT training results for supervisors, see indicator 16 and 17.
16	Percentage of targeted clinical supervisors trained in supervision of malaria diagnostics.	Number of clinical supervisors trained in supervision of malaria diagnostics/Total number of targeted clinical supervisors.	2.1n/a	Activity/Training Reports	No PY4 target set n/a	89% n/a	16 n/a	18 n/a			In the Mali PY4 work plan PMP, no target was set for this indicator. However, in PY4 MalariaCare planned to train 18 clinical supervisors in supervision, including of RDTs, and 16 (89%) were trained.
17	Percentage of targeted laboratory supervisors trained in supervision for laboratory diagnosis of malaria.	Number of supervisors trained in supervision for laboratory diagnosis of malaria/Total number of targeted laboratory supervisors.	2.1	Activity/Training Reports	No PY4 target set	83%	15	18			In the Mali PY4 work plan PMP, no target was set for this indicator. However, in PY4 MalariaCare planned to train 18 clinical supervisors in supervision of malaria treatment and 15 (83%) were trained.
Objective 2: Increase percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test for malaria											
Description: Increased percentage of patients suspected to have malaria or febrile illnesses who receive a diagnostic test for malaria. These activities relate to addressing health care provider performance in the use of diagnostic tools after appropriate training. Emphasis is on supervision and use of performance monitoring tools.											
Intermediate Objectives											
Providers demonstrate competence in detecting suspected malaria cases											
Providers demonstrate competence in ordering/conducting malaria diagnostic tests for suspected cases											
Private facilities are linked with the public sector											
Intermediate Outcomes											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
19	Country has full national guidelines for determining suspected malaria cases.	Country has full national guidelines for determining suspected malaria cases (including age, duration of fever, fever history) that meet global standards.	None	PNLP	No PY4 target set	1/1	1	1			In the Mali PY4 work plan PMP, no target was set for this indicator. However, the Government of Mali recently updated its national guidelines for malaria case management which includes guidelines for determining suspected malaria cases that meet global standards.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
20	Percentage of providers demonstrating competence in identifying suspected malaria cases according to global standards.	Number of providers who demonstrate correct procedures for differential diagnosis of possible malarial symptoms according to global standards during team supervision observation/Total number of providers targeted for team supervision during the reporting period.	2.2, 3.2	OTSS checklist data	98%	99%	170	171			Target exceeded. Of the 144 facilities visited at least once during OTSS in PY4, 121 (84%) conducted at least one complete clinical observation. In these facilities, in 170 out of 171 observations (99%), did providers ask about history of fever or checked for temperature.
21	Percentage of providers demonstrating competence in testing suspected patients for malaria.	Number of providers who appropriately order or perform testing of suspected malaria patients according to global standards during team supervision observations/Total number of providers targeted for team supervision observations during the reporting period.	2.2, 3.2	OTSS checklist data	80%	98%	167	171			Target exceeded. In 167 out of 171 clinical observations conducted (98%), the supervisor agreed with the health provider on whether to order a malaria test.
22	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for determining possible malaria cases.	Number of targeted countries whose national clinical supervision tools adhere to global standards for determining possible malaria cases/Total number of targeted countries.	2.2, 3.2	PNLP	No PY4 target set	1/1	1	1			In the Mali PY4 work plan PMP, no previous target was set for this indicator. However, MalariaCare's clinical supervision tools adhere to global standards; and in Mali, this tool is endorsed by the national government as the national supervision tool and used throughout the country.

Objective 3: Increase percentage of patients who receive appropriate treatment for malaria or other febrile illnesses - consistent with the result of the diagnostic test

Description: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses—consistent with the result of the diagnostic test. The activities described in this section relate to addressing health care provider performance in delivering appropriate treatment after training has occurred. Emphasis is on supervision and ongoing use of performance monitoring tools.

Intermediate Objectives

Country has full national policies for malaria treatment

Service providers demonstrate competence in malaria treatment

Facilities are able to provide high quality case management services for malaria and other febrile illness

Country has supervisory structures and implementation of supervision of malaria case management practices

Intermediate Outcomes

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
24	Country has full national guidelines for malaria treatment.	Country has full national guidelines for malaria treatment, incl. QA/QC procedures, training of informal health providers, and recommendations for home treatment of febrile illness, suspected malaria, and recognition of the common danger signs that meet global standards.	None	National Guidelines	No PY4 target set	1/1	1	1			In the Mali PY4 work plan PMP, no target was set for this indicator. However, the Government of Mali recently updated its national guidelines for malaria case management, which adhere to global standards.
25	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for malaria treatment.	Number of targeted countries whose national clinical supervision tools adhere to global standards for malaria treatment/Total number of targeted countries.	2.2, 3.2	PNLP	No PY4 target set	1/1	1	1			In the Mali PY4 work plan PMP, no previous target was set for this indicator. However, MalariaCare's clinical supervision tools adhere to global standards; and in Mali, this tool is endorsed by the national government as the national supervision tool and used throughout the country.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
26	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality treatment of malaria.	Number of targeted clinics that meet 90% or greater on facility checklists during supervisory visits /Total number of targeted facilities who received a supervisory visit during the reporting period.	2.2, 3.2	OTSS checklist data	30%	75%	104	138			<p>Target exceeded.</p> <p>In PY4, 138 out of 144 facilities visited (96%) had data on all criteria required at their most recent visit. Facilities must meet all conditions below to reach 90%. Among these facilities the following percentage met each of the standards:</p> <ol style="list-style-type: none"> 1) Most recent malaria case management guidelines available (80%); 2) At least 1 staff trained in case management of malaria (98%); 3) First-line antimalarial in stock (92%); 4) Paracetamol cap/tab in stock (93%)
27	Percentage of targeted providers demonstrating compliance to treatment with WHO-recommended ACT for cases with positive malaria test results.	Number of providers who comply to treatment with a WHO-recommended anti-malarial for cases with positive malaria test results during clinical assessment visits measured through direct observation during team supervision visits/Total number of providers that received team supervision during the reporting period.	2.2, 3.2	OTSS checklist data	75%	85%	676	800			<p>Target exceeded.</p> <p>Of the 800 positive test records sampled by supervisors during OTSS visits, 676 (85%) were found to have a corresponding ACT prescription recorded.</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
28	Percentage of providers demonstrating adherence to negative test results according to global standards.	Number of providers demonstrating adherence to negative test results according to global standards during team supervision measured through direct observation during team supervision visits/Total number of providers that received team supervision during reporting period.	2.2, 3.2	OTSS checklist data	60%	92%	773	836			Target exceeded. Of the 836 negative test records sampled by supervisors during OTSS visits, 773 (92%) were not found to have a corresponding ACT prescription.
29	Percentage of supervisors demonstrating competence in malaria treatment.	Number of supervisors who score greater than 80% on a treatment post-test during TOTs/Total number of supervisors who completed a post-test during a TOT.	3.1	Activity/ Training Reports	No PY4 target set	87%	33	38	93%	100%	Due to the change in the PMP, no target was set for this indicator. However, of the 38 clinical supervisors who took the post-test during the supervisor training, 33 (87%) received a score of 80% or greater.
Outputs											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
30	Percentage of targeted facilities receiving at least two clinical supervisory visits per annum for malaria treatment.	Number of facilities receiving at least two clinical supervisory visits per annum for malaria treatment with WHO-recommended ACTs/Total number of targeted facilities.	2.2, 3.2	OTSS checklist data	No PY4 target set	56%	81	144			Target not reached. 2 rounds of OTSS in 144 facilities were planned. All 72 facilities in Segou were visited for the second round, but due to competing ministry schedules, only 9 facilities in Mopti were visited twice. The OTSS activity in Mopti will conclude in early PY5.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
31	Percentage of targeted providers trained in malaria treatment.	Number of providers trained in malaria treatment with WHO-recommended ACTs/Total number of targeted providers.	3.1	Activity/ Training Reports	No PY4 target set	100%	38	38			In the Mali PY4 work plan, no target was set for this indicator. However, the PY4 work plan proposed to train 38 clinicians, and all were trained in CCMRT as planned.
32	Percentage of targeted providers that received training in malaria treatment by supervisors during the reporting period.	Number of providers that received training in malaria treatment by supervisors based on documented errors during the reporting period/Total number of providers that had documented errors during team supervision during the reporting period.	2.2, 3.2	OTSS checklist data	No PY4 target set	100%	144	144			In the Mali PY4 work plan, no target was set for this indicator. Of the 144 facilities visited at least once during OTSS in PY4, a clinical checklist was submitted for all of them (it is assumed that feedback was given for at least 1 provider if a checklist was submitted).
33	Percentage of targeted clinical supervisors trained in supervision for treatment of malaria.	Number of clinical supervisors trained in supervision for treatment of malaria with WHO-recommended ACTs/Total number of targeted clinical supervisors.	2.1	Activity/ Training Reports	No PY4 target set	89%	16	18			In the Mali PY4 work plan, no target was set for this indicator. However, in PY4 MalariaCare planned to train 18 clinical supervisors in supervision of malaria treatment and 16 (89%) were trained.

Objective 4: Strengthen laboratory systems at the country level for detecting malaria and other infectious diseases

Description: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases. These activities relate to addressing the health systems issues that are a barrier to achieving universal access to malaria diagnostics and appropriate case management practices such as physical health facilities, human and financial resources, and support systems required to deliver quality diagnosis and treatment services.

Intermediate Objectives

Reference laboratories and facilities able to provide high quality diagnostics for malaria and other febrile illnesses

Private sector laboratories are integrated into national QA/QC and supervision strategies

Reporting and monitoring information for malaria is integrated, complete and accurate

Intermediate Outcomes

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
35	Percentage of targeted countries with national laboratory supervision tools whose indicators adhere to global standards for laboratory system analysis.	Number of targeted countries whose national laboratory supervision tools adhere to global standards for laboratory system analysis/Total number of targeted countries.	2.2	PNLP	No PY4 target set	1/1	1	1			In the Mali PY4 work plan, no previous target was set for this indicator. However, MalariaCare's laboratory supervision tools adhere to global standards; and in Mali, this tool is endorsed by the national government as the national supervision tool and used throughout the country.
Outputs											
36	Percentage of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards.	Number of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards/Total number of targeted facilities.	2.2	OTSS checklist data	No PY4 target set	47%	16	34			In the Mali PY4 work plan, no previous target was set for this indicator. Of the 36 facilities that perform microscopy and were visited during OTSS in PY4, 34 (94%) had data on the presence of malaria guidelines at their most recent visit. MalariaCare is sharing this information with the national malaria program for future action that may be needed.
37	Percentage of targeted laboratories that meet global standards for quality malaria diagnostics	Number of targeted laboratories that meet 90% or greater on re-checking of malaria slides during supervisory visits/Total number of targeted who received a supervisory visit during the reporting period.	2.2	OTSS checklist data	No PY4 target set	56%	15	27	79%	90%	In the Mali PY4 work plan, no previous target was set for this indicator. Of the 36 facilities that perform microscopy and were visited during OTSS in PY4, 27 (75%) had data on slide rechecking at their most recent visit. Of these 27 facilities, 15 (56%) scored 90% or greater on slide rechecking at the most recent visit.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
38	Percentage of targeted laboratory facilities with all the required materials to confirm malaria diagnosis according to global standards.	Number of targeted facilities with all the required materials to confirm malaria diagnosis according to the global standards (including functioning microscope, slides, giemsa stain, and a trained lab technician)/Total number of targeted facilities with labs.	2.2	OTSS checklist data	No PY4 target set	7%	2	27			In the Mali PY4 work plan, no previous target was set for this indicator. Of the 36 facilities that perform microscopy and were visited during OTSS in PY4, 27 (75%) had data on had data on all required materials at their most recent visit. The main limitations to meeting this target are pH paper/meter and glycerol, which only 30% and 44% of facilities had in stock, respectively. Other than routine OTSS, which may help to improve guideline distribution, MalariaCare activities have a limited role in improving this indicator. MalariaCare is sharing this information with the national malaria program for future action that may be needed.
39	Percentage of targeted facilities receiving at least two laboratory supervisory visits per annum.	Number of facilities receiving at least two laboratory supervisory visits per annum/Total number of targeted facilities.	2.2	OTSS checklist data	No PY4 target set	42%	15	36			In the Mali PY4 work plan, no previous target was set for this indicator. 2 rounds of OTSS in 36 facilities that perform microscopy were planned. The second OTSS round in Mopti was delayed due to competing ministry priorities, and thus only 42 percent of facilities were visited.

Mozambique Performance Monitoring Plan

GOAL: Contribute to PMI's overall goal 50% reduction in the burden of malaria in 70% of the at-risk population in PMI focus countries.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Objective 2: Increased percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test.											
Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses-consistent with the diagnostic test.											
Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Description: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent. The activities described in this section relate to addressing the laboratory technician and health care provider competency related to providing quality diagnostic services.											
Intermediate Objectives											
Clear and disseminated laboratory guidelines, procurement policies, supervision structures											
Clear and functioning quality assurance procedures for regulation of diagnostics for malaria and other IDs											
Reporting on malaria indicators is complete and accurate											
Country has complete national guidelines for the diagnosis of malaria											
Providers demonstrate competence in RDTs and/or microscopy											
Intermediate Outcomes											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
1	Percentage of targeted countries with national malaria diagnostics supervision tools whose indicators adhere to global standards.	Number of targeted countries whose national malaria diagnostics supervision tools adhere to global standards/Total number of targeted countries.	None	National Supervision Tools	No PY4 target set	1/1	1	1			<p>In the Mozambique PY4 work plan PMP, no PMP target was set. Please see the paragraph at the beginning of the country PMPs for a full explanation of the change in the PMP from PY4 to PY5 and why targets are not available for some indicators.</p> <p>However, MalariaCare's diagnostic supervision tools adhere to global standards; in Mozambique, this tool is endorsed by the national government and used by the government and partners as the national supervision tool.</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
2	Percentage of targeted laboratory technicians demonstrating competence in RDTs.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of lab staff who received a supervisory visit during the reporting period.	3.3	OTSS checklist data	80%	80%	32	40	95%	96%	<p>Target reached.</p> <p>The PMP target in the PY4 work plan was set based on performance among all health care workers. In the revised global PMP, this indicator is disaggregated by cadre. We have maintained this PY4 work plan PMP target for this indicator.</p> <p>In Mozambique, lab staff performed better than clinical staff.</p>
3	Percentage of targeted laboratory technicians demonstrating competence in malaria microscopy.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklist measuring slide preparation and parasite detection/Total number of laboratory technicians who received a supervisory visit during the reporting period.	3.3	OTSS checklist data	50%	79%	96	121	94%	99%	<p>Target exceeded.</p> <p>Lab workers performed more poorly on slide preparation than slide staining or reading. The most commonly missed step was spreading thick film into 1-2 cm diameter circle and can read print placed under the slide (89% of providers at each facility did this correctly, on average).</p>
4	Percentage of targeted clinical providers that demonstrate competence in RDTs.	Number of targeted clinical providers who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of clinical providers who received a supervisory visit during the reporting period.	3.3	OTSS checklist data	80%	67%	141	212	89%	96%	<p>Target not reached.</p> <p>The PMP target in the PY4 work plan was set based on performance among all health care workers. In the revised global PMP, this indicator is disaggregated by cadre. We have maintained this PY4 work plan PMP target for this indicator.</p> <p>We expect to meet this target in PY5 by ensuring that mentoring focused on RDT testing occurs at the lowest-performing sites.</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
5	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality diagnosis of malaria.	Number of targeted clinics that meet 90% or greater on facility checklists for diagnosis during supervisory visits /Total number of targeted facilities who received a supervisory visit during the reporting period.	3.3	OTSS checklist data	75%	71%	64	90			<p>Target not reached.</p> <p>Of the 161 facilities visited, 90 (56%) reported all variables required for a quality diagnosis assessment.</p> <p>64 (71%) of these 90 facilities met all standards for the quality diagnosis of malaria.</p> <p>Of the 90 facilities with data:</p> <ul style="list-style-type: none"> - 72 (80%) reported no stock-outs of RDTs of seven days or more over the past three months - 70 (78%) reported availability of RDT SOPs, - 78 (87%) reported availability of RDT bench aids, - 83 (92%) reported at least on person trained in RDTs in the past two years. <p>MalariaCare, per the Mozambique work plan, has a limited role in improving this indicator. MalariaCare is sharing this information with the national malaria program for future action that may be needed.</p>
6	Percentage of supervisors demonstrating competence in malaria microscopy.	Percentage of supervisors who score 90% or greater in slide preparation and parasite detection during the training of trainers post-test/Total number of supervisors who	1.1, 1.2	Activity/ Training Reports	50%	61%	38	62			<p>Target not met.</p> <p>In PY4, 18 out of 25 (72%) aMDRT participants scored at a WHO L1 or L2 (>=80%) for parasite detection. 12 out of 25 (48%) aMDRT participants scored at a WHO L1 or L2 for parasite counting (>=40%).</p> <p>Parasite counting continues to be a</p>

		completed a post-test during a training of trainers. Note: Must score at least L1 or L2 on parasite detection (>=80%) and parasite quantification (>=40%)										challenge for supervisors to conduct accurately. MalariaCare staff and high-performing supervisors will continue to work with those low-performing laboratory supervisors during OTSS visits to strengthen microscopy skills.
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment	
						%	Num.	Den.	Mean	Median		
7	Percentage of supervisors demonstrating competence in RDTs.	Percentage of supervisors who score 90% or greater in preparation and reading of RDTs during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers.	1.1, 1.2	Activity/ Training Reports	No PY4 target set	n/a	n/a	n/a	n/a	n/a	Because this indicator was not included in the PY4 work plan PMP, testing supervisors on RDT knowledge was not included as a standard part of supervisor training; instead, additional time was devoted to strengthening general mentoring and supervisory skills. However, pre- and post-tests will be administered during supervisor trainings in PY5.	
Outputs												
8	Percentage of targeted facilities with at least one provider trained in RDTs.	Number of targeted facilities with one or more providers trained in RDT/Total number of targeted facilities.	2.1, 3.3	OTSS checklist data	60%	91%	85	93			Target exceeded. All of the 93 provincial-level facilities visited reported on whether staff were trained in RDTs, of which 85 (91%) reported having a provider formally trained in RDTs in the previous 2 years. Data was not collected for this indicator during the peripheral OTSS round.	
9	Percentage of targeted facilities with at least one provider trained in malaria microscopy.	Number of target facilities with one or more providers trained in malaria microscopy/Total number of targeted facilities	3.3	OTSS checklist data	40%	72%	59	82			Target exceeded. OTSS data for this indicator was available for 82 (99%) of the 83 facilities that perform microscopy and were visited in PY4. Of these 82 facilities, 59 (72%) had at least one provider trained in malaria microscopy.	

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
10	Percentage of targeted facilities with at least one provider who received malaria diagnostic refresher training (MDRT) in the last two years.	Number of targeted facilities with one or more providers who received MDRT in the last two years/Total number of targeted facilities.	1.1	Activity/ Training Reports	No PY4 target set	106%	37	35			<p>In the Mozambique PY4 work plan PMP, no PMP target was set for this indicator.</p> <p>However, in the PY4 work plan, MalariaCare planned to train approximately 35 participants during bMDRT; 37 participants (106% of the number proposed in the work plan) attended the bMDRT. (aMDRT participants are not included in this result since all participated in bMDRT.)</p>
11	Percentage of targeted clinical providers trained in RDTs.	Number of clinical providers trained in RDTs/Total number of targeted clinical providers.	2.1	Activity/ Training Reports	95%	179%	700	390			<p>Target exceeded.</p> <p>During OTSS visits conducted in PY4 MalariaCare conducted specialized RDT QA trainings for all facility staff. In the PY4 work plan, MalariaCare planned to train 390 total health providers from 134 facilities (approximately 3 staff per facility) in malaria RDTs. MalariaCare did not have specific targets for clinicians and laboratory personnel. As we do not have a breakdown by cadre, this target is replicated for indicator #12.</p> <p>While we do not have a breakdown of staff by cadre, a total of 700 (179%) health workers were trained, an average of 5 staff per facility.</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
12	Percentage of targeted laboratory technicians trained in RDTs.	Number of laboratory technicians trained in RDTs/Total number of targeted laboratory technicians.	2.1	Activity/ Training Reports	95%	179%	700	390			<p>Target exceeded.</p> <p>During OTSS visits conducted in PY4 MalariaCare conducted specialized RDT QA trainings for all facility staff. In the PY4 work plan, MalariaCare planned to train 390 total health providers from 134 facilities (approximately 3 staff per facility) in malaria RDTs. MalariaCare did not have specific targets for clinicians and laboratory personnel. As we do not have a breakdown by cadre, this target is replicated for indicator #11.</p> <p>While we do not have a breakdown of staff by cadre, a total of 700 (179%) health workers were trained, an average of 5 staff per facility.</p>
14	Percentage of targeted laboratory technicians participating in MDRT.	Number of laboratory technicians participating in malaria diagnostics refresher trainings/Total number of targeted laboratory technicians.	1.1	Activity/ Training Reports	No PY4 target set	106%	37	35			<p>In the Mozambique PY4 work plan PMP, no PMP target was set for this indicator.</p> <p>However, in the PY4 work plan, MalariaCare planned to train approximately 35 participants during bMDRT. 37 participants attended the bMDRT.</p>
16	Percentage of targeted clinical supervisors trained in supervision of malaria diagnostics.	Number of clinical supervisors trained in supervision of malaria diagnostics/Total number of targeted clinical supervisors.	3.1	Activity/ Training Reports	95%	103%	36	35			<p>Target exceeded.</p> <p>In the PY4 work plan, MalariaCare planned to train 35 clinical supervisors in supervision of malaria diagnostics and 36 (103%) were trained.</p>
17	Percentage of targeted laboratory supervisors trained in	Number of supervisors trained in supervision for laboratory	3.2	Activity/ Training Reports	95%	106%	37	35			<p>Target exceeded.</p> <p>In the PY4 work plan MalariaCare</p>

	supervision for laboratory diagnosis of malaria.	diagnosis of malaria/Total number of targeted laboratory supervisors.										planned to train 35 laboratory supervisors in supervision of malaria diagnostics and 37 (106%) were trained.
Objective 2: Increase percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test for malaria												
Description: Increased percentage of patients suspected to have malaria or febrile illnesses who receive a diagnostic test for malaria. These activities relate to addressing health care provider performance in the use of diagnostic tools after appropriate training. Emphasis is on supervision and use of performance monitoring tools.												
Intermediate Objectives												
Providers demonstrate competence in detecting suspected malaria cases												
Providers demonstrate competence in ordering/conducting malaria diagnostic tests for suspected cases												
Private facilities are linked with the public sector												
Intermediate Outcomes												
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment	
						%	Num.	Den.	Mean	Median		
19	Country has full national guidelines for determining suspected malaria cases.	Country has full national guidelines for determining suspected malaria cases (including age, duration of fever, fever history) that meet global standards.	None	National Guidelines	No PY4 target set		1	1			In the Mozambique PY4 work plan PMP, no PMP target was set for this indicator. However, the Government of Mozambique recently updated its national guidelines for malaria case management which includes guidelines for determining suspected malaria cases that meet global standards.	
20	Percentage of providers demonstrating competence in identifying suspected malaria cases according to global standards.	Number of providers who demonstrate correct procedures for differential diagnosis of possible malarial symptoms according to global standards during team supervision observation/Total number of providers targeted for team supervision during the reporting period.	3.3	OTSS checklist data	95%	94%	261	279			Target exceeded. Of the 279 clinical observations conducted at each OTSS facility's most recent visit, 261 providers (94%) asked about history of fever or checked for temperature.	

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
21	Percentage of providers demonstrating competence in testing suspected patients for malaria.	Number of providers who appropriately order or perform testing of suspected malaria patients according to global standards during team supervision observations/Total number of providers targeted for team supervision observations during the reporting period.	3.3	OTSS checklist data	No PY4 target set	88%	246	279			In the Mozambique PY4 work plan PMP, no PMP target was set. However, supervisors agreed with the health provider on whether to order a malaria test in 246 out of 279 clinical observations conducted (88%).
22	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for determining possible malaria cases.	Number of targeted countries whose national clinical supervision tools adhere to global standards for determining possible malaria cases/Total number of targeted countries.	None	National Supervision Tools	No PY4 target set	1/1	1	1			In the Mozambique PY4 work plan PMP, no PMP target was set. However, MalariaCare's clinical supervision tools adhere to global standards; and in Mozambique this tool is endorsed by the national government and used by the government and partners as the national supervision tool.
Objective 3: Increase percentage of patients who receive appropriate treatment for malaria or other febrile illnesses - consistent with the result of the diagnostic test											
Description: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses—consistent with the result of the diagnostic test. The activities described in this section relate to addressing health care provider performance in delivering appropriate treatment after training has occurred. Emphasis is on supervision and ongoing use of performance monitoring tools.											
Intermediate Objectives											
Country has full national policies for malaria treatment											
Service providers demonstrate competence in malaria treatment											
Facilities are able to provide high quality case management services for malaria and other febrile illness											
Country has supervisory structures and implementation of supervision of malaria case management practices											
Intermediate Outcomes											

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
24	Country has full national guidelines for malaria treatment.	Country has full national guidelines for malaria treatment, incl.QA/QC procedures, training of informal health providers, and recommendations for home treatment of febrile illness, suspected malaria, and recognition of the common danger signs that meet global standards.	None	National Guidelines	No PY4 target set	1/1	1	1			In the Mozambique PY4 work plan PMP, no PMP target was set. However, the Government of Mozambique recently updated its national guidelines for malaria case management and they adhere to global standards.
25	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for malaria treatment .	Number of targeted countries whose national clinical supervision tools adhere to global standards for malaria treatment/Total number of targeted countries.	3.3	National Supervision Tools	No PY4 target set	1/1	1	1			In the Mozambique PY4 work plan PMP, no PMP target was set for this indicator. However, MalariaCare's clinical supervision tools adhere to global standards; and in Mozambique, this tool is endorsed by the national government and used by the government and partners as the national supervision tool.
26	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality treatment of malaria.	Number of targeted clinics that meet 90% or greater on facility checklists during supervisory visits /Total number of targeted facilities who received a supervisory visit during the reporting period.	3.3	OTSS checklist data	40%	6%	8	1398			Target not reached. In PY4, OTSS data was available for 139(86%) out of 161 facilities at their most recent visit for this indicator. Facilities must meet all conditions below to reach 90%. Of the 139 facilities with data, 8 (8%) met all conditions required for quality treatment of malaria. Among the 139 facilities with data the following

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
											<p>percentage met each of the standards:</p> <p>1) Most recent malaria case management guidelines available (59%)</p> <p>2) At least 1 staff trained in case management of malaria (75%)</p> <p>3) First-line antimalarial in stock (86%)</p> <p>4) Paracetamol cap/tab in stock (39%)</p> <p>MalariaCare, per its mandate and the Mozambique work plan, has a limited role in improving this indicator. MalariaCare is sharing this information with the national malaria program for future action that may be needed.</p>
27	Percentage of targeted providers demonstrating compliance to treatment with WHO-recommended ACT for cases with positive malaria test results.	Number of providers who comply to treatment with a WHO-recommended anti-malarial for cases with positive malaria test results during clinical assessment visits measured through direct observation during team supervision visits/Total number of providers that received team supervision during the reporting period.	3.3	OTSS checklist data	85%	99%	1139	1155			<p>Target exceeded.</p> <p>Of the 1155 positive test records sampled by supervisors during OTSS visits, 1139 (99%) were found to have a corresponding ACT prescription recorded.</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
28	Percentage of providers demonstrating adherence to negative test results according to global standards.	Number of providers demonstrating adherence to negative test results according to global standards during team supervision measured through direct observation during team supervision visits/Total number of providers that received team supervision during reporting period.	3.3	OTSS checklist data	60%	95%	1077	1135			Target exceeded. Of the 1135 negative test records sampled by supervisors during OTSS visits, 1077 (95%) were not found to have a corresponding ACT prescription.
i2 9	Percentage of supervisors demonstrating competence in malaria treatment.	Number of supervisors who score greater than 80% on a treatment post-test during TOTs/Total number of supervisors who completed a post-test during a TOT.	3.2	Activity/ Training Reports	75%	40%	28	70	74%	75%	Target not reached. Of the 70 supervisors who took the post-test during the OTSS supervisor training, 28 (40%) obtained a score of 80% or above. MalariaCare staff will continue to work with supervisors during OTSS visits to strengthen their skills.
Outputs											
30	Percentage of targeted facilities receiving at least two clinical supervisory visits per annum for malaria treatment.	Number of facilities receiving at least two clinical supervisory visits per annum for malaria treatment with WHO-recommended ACTs/Total number of targeted facilities.	3.3	OTSS checklist data	95%	66%	88	134			Target not reached. According to the Mozambique PY4 work plan, 3 rounds of both provincial and peripheral OTSS in 134 facilities were planned (92 facilities in the provincial OTSS and 42 during provincial). Although 3 rounds of provincial OTSS were completed, only one round of peripheral OTSS was completed. Thus, during PY4, 88 (66%) of targeted facilities were visited at least two times.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
31	Percentage of targeted providers trained in malaria treatment.	Number of providers trained in malaria treatment with WHO-recommended ACTs/Total number of targeted providers.	n/a	n/a	n/a	n/a	n/a	n/a			No applicable activity was conducted in PY4.
32	Percentage of targeted providers that received training in malaria treatment by supervisors during the reporting period.	Number of providers that received training in malaria treatment by supervisors based on documented errors during the reporting period/Total number of providers that had documented errors during team supervision during the reporting period.	3.3	OTSS checklist data	95%	93%	250	270			Target not reached. During 270 observations of unique providers, feedback was provided for 250 of the observations (93%).
33	Percentage of targeted clinical supervisors trained in supervision for treatment of malaria.	Number of clinical supervisors trained in supervision for treatment of malaria with WHO-recommended ACTs/Total number of targeted clinical supervisors.	3.1	Activity/ Training Reports	95%	103%	36	35			Target exceeded. In PY4 MalariaCare planned to train 35 clinical supervisors in supervision of malaria treatment; 36 (103%) were trained.

Objective 4: Strengthen laboratory systems at the country level for detecting malaria and other infectious diseases

Description: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases. These activities relate to addressing the health systems issues that are a barrier to achieving universal access to malaria diagnostics and appropriate case management practices such as physical health facilities, human and financial resources, and support systems required to deliver quality diagnosis and treatment services.

Intermediate Objectives

Reference laboratories and facilities able to provide high quality diagnostics for malaria and other febrile illnesses

Private sector laboratories are integrated into national QA/QC and supervision strategies

Reporting and monitoring information for malaria is integrated, complete and accurate

Intermediate Outcomes

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
35	Percentage of targeted countries with national laboratory supervision tools whose indicators adhere to global standards for laboratory system analysis.	Number of targeted countries whose national laboratory supervision tools adhere to global standards for laboratory system analysis/Total number of targeted countries.	3.3	National Supervision Tools	No PY4 target set	1/1	1	1			In the Mozambique PY4 PMP, no target was set. However, MalariaCare's diagnostic supervision tools adhere to global standards; and in Mozambique, this tool is endorsed by the national government and used by the government and partners as the national supervision tool.
Outputs											
36	Percentage of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards.	Number of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards/Total number of targeted facilities.	3.3	OTSS checklist data	No PY4 target set	76%	58	76			In the Mozambique PY4 work plan PMP, no PMP target was set for this indicator. OTSS data was available for 76 (92%) out of the 83 facilities with labs, visited during OTSS in PY4. Of those 82 facilities, 58 (76%) had complete updated malaria microscopy guidelines at the most recent visit.
37	Percentage of targeted laboratories that meet global standards for quality malaria diagnostics	Number of targeted laboratories that meet 90% or greater on re-checking of malaria slides during supervisory visits/Total number of targeted who received a supervisory visit during the reporting period.	3.3	OTSS checklist data	No PY4 target set	75%	58	77	88%	100%	In the Mozambique PY4 work plan PMP, no PMP target was set. OTSS data was available for 77 (93%) out of the 83 facilities with labs visited in PY4 for this indicator. Of those 77 facilities, 58 (75%) scored 90% or greater on slide rechecking at the most recent visit.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
38	Percentage of targeted laboratory facilities with all the required materials to confirm malaria diagnosis according to global standards.	Number of targeted facilities with all the required materials to confirm malaria diagnosis according to the global standards (including functioning microscope, slides, giemsa stain, and a trained lab technician)/Total number of targeted facilities with labs.	3.3	OTSS checklist data	No PY4 target set	0%	0	81			<p>In the Mozambique PY4 work plan PMP, no PMP target was set.</p> <p>OTSS data was available for 81 (99%) out of the 82 facilities with labs visited in PY4 for this indicator. Of these 81 facilities, 0 (0%) had all required materials available.</p> <p>The main limitations to meeting this target are pH paper/meter and buffer solution/tabs which only 12% and 19% of facilities had in stock, respectively. MalariaCare, per the Mozambique work plan, has a limited role in improving performance on this indicator. MalariaCare is sharing this information with the national malaria program for future action needed.</p>
39	Percentage of targeted facilities receiving at least two laboratory supervisory visits per annum.	Number of facilities receiving at least two laboratory supervisory visits per annum/Total number of targeted facilities.	3.3	OTSS checklist data	95%	96%	88	92			<p>Target reached.</p> <p>According to the Mozambique PY4 work plan, 3 rounds of provincial OTSS in 92 facilities were planned. During PY4, 88 facilities were visited at least twice during PY4.</p>

Tanzania Performance Monitoring Plan

GOAL: Contribute to PMI's overall goal 50% reduction in the burden of malaria in 70% of the at-risk population in PMI focus countries.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Objective 2: Increased percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test.											
Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses-consistent with the diagnostic test.											
Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Description: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent. The activities described in this section relate to addressing the laboratory technician and health care provider competency related to providing quality diagnostic services.											
Intermediate Objectives											
Clear and disseminated laboratory guidelines, procurement policies, supervision structures											
Clear and functioning quality assurance procedures for regulation of diagnostics for malaria and other IDs											
Reporting on malaria indicators is complete and accurate											
Country has complete national guidelines for the diagnosis of malaria											
Providers demonstrate competence in RDTs and/or microscopy											
Intermediate Outcomes											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
1	Percentage of targeted countries with national malaria diagnostics supervision tools whose indicators adhere to global standards.	Number of targeted countries whose national malaria diagnostics supervision tools adhere to global standards/Total number of targeted countries.	None	National Supervision Tools	No PY4 target set	1/1	1	1			In the Tanzania PY4 work plan PMP, no PMP target was set. Please see the paragraph at the beginning of the country PMPs for a full explanation of the change in the PMP from PY4 to PY5 and why targets are not available for some indicators. MalariaCare's diagnostic supervision tools adhere to global standards. In Tanzania this tool is endorsed by the national government as the national supervision tool and used in MalariaCare supported areas. MalariaCare is working with the NMCP to institutionalize these supervision tools as part of a supervision package in PY5.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
2	Percentage of targeted laboratory technicians demonstrating competence in RDTs.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of lab staff who received a supervisory visit during the reporting period.	3.4	OTSS checklist data	70%	83%	272	327	94%	96%	<p>Target exceeded.</p> <p>The PMP target in the PY4 work plan was set based on performance among all health care workers. In the revised global PMP, this indicator is disaggregated by cadre. We have maintained the PY4 work plan PMP overall target for this indicator.</p> <p>Out of the 327 laboratory staff observed preparing, staining, and reading slides, 272 (83%) scored 90% or higher.</p> <p>Laboratory staff performed better than clinical staff, and exceeded the target for this area.</p>
3	Percentage of targeted laboratory technicians demonstrating competence in malaria microscopy.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklist measuring slide preparation and parasite detection/Total number of laboratory technicians who received a supervisory visit during the reporting period.	3.4	OTSS checklist data	70%	72%	203	281	92%	99%	<p>Target exceeded.</p> <p>203 out of 281 lab staff observed by OTSS supervisors obtained a microscopy competency score of at least 90%.</p>
4	Percentage of targeted clinical providers that demonstrate competence in RDTs.	Number of targeted clinical providers who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria	3.4	OTSS checklist data	70%	70%	820	1166	92%	96%	<p>Target reached.</p> <p>The PMP target in the PY4 work plan was set based on performance among all health care workers. In the revised global PMP, this indicator is disaggregated by cadre. We have maintained the PY4 work plan PMP</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
5	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality diagnosis of malaria.	RDTs/Total number of clinical providers who received a supervisory visit during the reporting period. Number of targeted clinics that meet 90% or greater on facility checklists for diagnosis during supervisory visits /Total number of targeted facilities who received a supervisory visit during the reporting period.	3.4	OTSS checklist data	No PY4 target set	45%	419	923			<p>overall target for this indicator.</p> <p>Clinical staff did not perform as well as laboratory staff for this indicator, but still met the target.</p> <p>In the Tanzania PY4 work plan PMP, no PMP target was set.</p> <p>OTSS data for this indicator was available for 923 (93%) of the 993 facilities visited.</p> <p>419 (45%) of the 923 facilities with data available met all standards for the quality diagnosis of malaria.</p> <p>Of the 419 facilities with OTSS data available: - 640 (69%) reported no stock-outs of RDTs of seven days or more over the past three months - 612 (66%) reported availability of RDT bench aids, - 482 (52%) reported availability of RDT SOPs, and - 882 (69%) reported at least on person trained in RDTs in the past two years.</p> <p>Aside from conducting RDT QA trainings, MalariaCare, per its mandate and the Madagascar work plan, has a limited role in improving performance on this indicator. MalariaCare is sharing this information with the national malaria program for future action as needed.</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
6	Percentage of supervisors demonstrating competence in malaria microscopy.	Percentage of supervisors who score 90% or greater in slide preparation and parasite detection during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers. Note: Must score at least L1 or L2 on parasite detection (>=80%) and parasite quantification (>=40%)	1.2	Activity/ Training Reports	70%	9%	1	11			Target not reached. Of the 22 trainees trained in the MDRT, 11 were supervisors. Of these 11 supervisors, 1 (10%) participant scored at a WHO L1 or L2 (>=80%) for parasite detection. 5 out of 10 (50%) participants scored at a WHO L1 or L2 for parasite quantification (>=40%).
7	Percentage of supervisors demonstrating competence in RDTs.	Percentage of supervisors who score 90% or greater in preparation and reading of RDTs during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers.	1.1	Activity/ Training Reports	85%	51%	46	90	85%	90%	Target not reached. While only half of the supervisors trained met the 90% target, many of their scores fell just under the target, as shown by the 85% average. In Tanzania, a pre- and post-test of knowledge questions on RDT performance, as well as evaluation on supervisor's ability to read RDTs, is conducted, but supervisors are not scored on preparing RDTs.
Outputs											
8	Percentage of targeted facilities with at least one provider trained in RDTs.	Number of targeted facilities with one or more providers trained in RDT/Total number of targeted facilities.	3.4	OTSS checklist data	95%	95%	905	954			Target reached. OTSS data was available for this indicator for 954 (96%) of the 993 facilities visited in PY4. Of these 954 facilities, 905 (95%) reported having

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
											at least one provider formally trained in RDTs in the previous 2 years.
9	Percentage of targeted facilities with at least one provider trained in malaria microscopy.	Number of target facilities with one or more providers trained in malaria microscopy/Total number of targeted facilities	3.4	OTSS checklist data	25%	29%	66	230			<p>Target reached.</p> <p>MalariaCare conducted only one microscopy training for 22 facility staff in PY4. While this indicator is very low, MalariaCare, per the Tanzania work plan, has a limited role in improving this indicator. MalariaCare is sharing this information with the national malaria program for any future action as needed.</p>
10	Percentage of targeted facilities with at least one provider who received malaria diagnostic refresher training (MDRT) in the last two years.	Number of targeted facilities with one or more providers who received MDRT in the last two years/Total number of targeted facilities.	1.2	Activity/ Training Reports	No PY4 target set	110%	22	20			<p>In the Tanzania PY4 work plan PMP, no PMP target was set.</p> <p>However, in the PY4 work plan, MalariaCare planned to train 20 laboratory staff from unique facilities in malaria microscopy; 22 (110%) laboratory workers were actually trained.</p>
11	Percentage of targeted clinical providers trained in RDTs.	Number of clinical providers trained in RDTs/Total number of targeted clinical providers.	2.1	Activity/ Training Reports	No PY4 target set	180%	917	510			<p>In the Tanzania PY4 work plan PMP, no PMP target was set for this indicator.</p> <p>In PY4 MalariaCare planned to train 510 health providers from the Eastern Zone (activity 2.1) and 266 parastatal, FBO, and other public sector facilities in the Lake Zone (activity 2.3) in malaria RDTs. There were no specific targets for clinicians vs. laboratory personnel. A total of 917 staff in the Eastern Zone and 206 in the Lake Zone were trained and all cadres are reported for this indicator. Among those trained 342 (37%) had a designation listed: 54% were clinicians, 26% were lab and 20%</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
12	Percentage of targeted laboratory technicians trained in RDTs.	Number of laboratory technicians trained in RDTs/Total number of targeted laboratory technicians.	2.1	Activity/ Training Reports	No PY4 target set	180%	917	510			<p>were other.</p> <p>After submission of the work plan, the NMCP requested that we train 2 providers per facility in Morogoro.</p> <p>In the Tanzania PY4 work plan PMP, no PMP target was set for this indicator.</p> <p>In PY4 MalariaCare planned to train 510 total health providers from the Eastern Zone (activity 2.1) and 266 parastatal, FBO, and other public sector facilities in the Lake Zone (activity 2.3) in malaria RDTs. There were no specific targets for clinicians vs. laboratory personnel. A total of 917 staff in the Eastern Zone and 206 in the Lake Zone were trained and all cadres are reported for this indicator. Among those trained 342 (37%) had a designation listed: 54% were clinicians, 26% were lab and 20% were other.</p> <p>After submission of the work plan, the NMCP requested that we train 2 providers per facility in Morogoro.</p>
14	Percentage of targeted laboratory technicians participating in MDRT.	Number of laboratory technicians participating in malaria diagnostics refresher trainings/Total number of targeted laboratory technicians.	1.2	Activity/ Training Reports	No PY4 target set	110%	22	20			<p>In the Tanzania PY4 work plan PMP, no PMP target was set.</p> <p>However, per the PY4 work plan MalariaCare planned to conduct on basic MDRT session for 20 participants; 22 (110%) laboratory workers were actually trained.</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
16	Percentage of targeted clinical supervisors trained in supervision of malaria diagnostics.	Number of clinical supervisors trained in supervision of malaria diagnostics/Total number of targeted clinical supervisors.	3.2	Activity/ Training Reports	95%	156%	89	57			Target exceeded. In PY4 MalariaCare planned to train, at a minimum, one clinician for each of the 49 districts and 8 regions Where the district malaria focal person was not a clinician, an additional clinician was trained, so some districts had two people trained as clinical supervisors. In total, 89 people were actually trained as clinical supervisors.
17	Percentage of targeted laboratory supervisors trained in supervision for laboratory diagnosis of malaria.	Number of supervisors trained in supervision for laboratory diagnosis of malaria/Total number of targeted laboratory supervisors.	3.2	Activity/ Training Reports	95%	104%	59	57			Target exceeded. In PY4 MalariaCare planned to train one lab supervisor for each of the 49 districts and 8 regions where MalariaCare works, for a total of 57. A total of 59 lab supervisors were actually trained.
Objective 2: Increase percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test for malaria											
Description: Increased percentage of patients suspected to have malaria or febrile illnesses who receive a diagnostic test for malaria. These activities relate to addressing health care provider performance in the use of diagnostic tools after appropriate training. Emphasis is on supervision and use of performance monitoring tools.											
Intermediate Objectives											
Providers demonstrate competence in detecting suspected malaria cases											
Providers demonstrate competence in ordering/conducting malaria diagnostic tests for suspected cases											
Private facilities are linked with the public sector											
Intermediate Outcomes											

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
19	Country has full national guidelines for determining suspected malaria cases.	Country has full national guidelines for determining suspected malaria cases (including age, duration of fever, fever history) that meet global standards.	None	National Guidelines	No PY4 target set		1	1			In the Tanzania PY4 work plan PMP, no target was set for this indicator. However, the Government of Tanzania recently updated its national guidelines for malaria case management which includes guidelines for determining suspected malaria cases that meet global standards.
20	Percentage of providers demonstrating competence in identifying suspected malaria cases according to global standards.	Number of providers who demonstrate correct procedures for differential diagnosis of possible malarial symptoms according to global standards during team supervision observation/Total number of providers targeted for team supervision during the reporting period.	3.2, 3.4	OTSS checklist data	65%	97%	998	1024			Target exceeded. In 998 out of 1024 clinical observations with complete scores, providers asked the patient about history of fever or checked for temperature.
21	Percentage of providers demonstrating competence in testing suspected patients for malaria.	Number of providers who appropriately order or perform testing of suspected malaria patients according to global standards during team supervision observations/Total number of providers targeted for team supervision observations during the reporting period.	3.2, 3.4	OTSS checklist data	90%	99%	1009	1024			Target exceeded. OTSS supervisors agreed with the health provider observed on whether to order a malaria test in 1009 out of 1024 clinical observations conducted.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
22	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for determining possible malaria cases.	Number of targeted countries whose national clinical supervision tools adhere to global standards for determining possible malaria cases/Total number of targeted countries.	None	National Supervision Tools	No PY4 target set	1/1	1	1			In the Tanzania PY4 work plan PMP, no target was set for this indicator. MalariaCare's diagnostic supervision tools adhere to global standards. In Tanzania this tool is endorsed by the national government as the national supervision tool and used in MalariaCare supported areas. MalariaCare is working with the NMCP to institutionalize these supervision tools as part of a supervision package in PY5.
Objective 3: Increase percentage of patients who receive appropriate treatment for malaria or other febrile illnesses - consistent with the result of the diagnostic test											
Description: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses—consistent with the result of the diagnostic test. The activities described in this section relate to addressing health care provider performance in delivering appropriate treatment after training has occurred. Emphasis is on supervision and ongoing use of performance monitoring tools.											
Intermediate Objectives											
Country has full national policies for malaria treatment											
Service providers demonstrate competence in malaria treatment											
Facilities are able to provide high quality case management services for malaria and other febrile illness											
Country has supervisory structures and implementation of supervision of malaria case management practices											
Intermediate Outcomes											
24	Country has full national guidelines for malaria treatment.	Country has full national guidelines for malaria treatment, incl.QA/QC procedures, training of informal health providers, and recommendations for home treatment of febrile illness, suspected malaria, and recognition of the common danger signs that meet global standards.	None	National Guidelines	No PY4 target set	1/1	1	1			In the Tanzania PY4 work plan PMP, no target was set for this indicator. However, the Government of Tanzania recently updated its national guidelines for malaria case management and they adhere to global standards.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
25	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for malaria treatment .	Number of targeted countries whose national clinical supervision tools adhere to global standards for malaria treatment/Total number of targeted countries.	2.2, 3.4	National Supervision Tools	No PY4 target set	1/1	1	1			In the Tanzania PY4 work plan PMP, no target was set for this indicator. MalariaCare's clinical supervision tools adhere to global standards for malaria treatment standards. In Tanzania this tool is endorsed by the national government as the national supervision tool and used in MalariaCare supported areas. During PY5, we will be transitioning these for use by the NMCP and partners.
26	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality treatment of malaria.	Number of targeted clinics that meet 90% or greater on facility checklists during supervisory visits /Total number of targeted facilities who received a supervisory visit during the reporting period.	2.2, 3.4	OTSS checklist data	No PY4 target set	44%	412	945			In the Tanzania PY4 work plan PMP, no PMP target was set for this indicator. OTSS data for this indicator was available for 945 (95%) of the 993 facilities visited. Of the 945 facilities with data, 412 (44%) met all conditions required for quality treatment of malaria. Among the 945 facilities with data the following percentage met each of the standards: 1) Most recent malaria case management guidelines available (78%) 2) Most recent malaria case algorithms available (78%) 3) At least 1 staff trained in case management of malaria (64%) 4) First-line antimalarial in stock (86%) 5) Paracetamol cap/tab in stock (64%) MalariaCare distributed 5,000 copies of malaria case management

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
27	Percentage of targeted providers demonstrating compliance to treatment with WHO-recommended ACT for cases with positive malaria test results.	Number of providers who comply to treatment with a WHO-recommended anti-malarial for cases with positive malaria test results during clinical assessment visits measured through direct observation during team supervision visits/Total number of providers that received team supervision during the reporting period.	3.2, 3.4	OTSS checklist data	95%	95%	5049	5297			<p>algorithms to facilities and conducted a clinical refresher training for 60 clinicians in the Lake Zone. Beyond these activities, MalariaCare has a limited role in improving this indicator. MalariaCare is sharing this information with the national malaria program for future action that may be needed.</p> <p>Target reached.</p> <p>Of the 5297 positive test records sampled by supervisors during OTSS visits, 5049 were found to have a corresponding ACT prescription recorded.</p>
28	Percentage of providers demonstrating adherence to negative test results according to global standards.	Number of providers demonstrating adherence to negative test results according to global standards during team supervision measured through direct observation during team supervision visits/Total number of providers that received team supervision during	3.2, 3.4	OTSS checklist data	95%	94%	5003	5295			<p>Target not reached.</p> <p>Of the 5295 negative test records sampled by supervisors during OTSS visits, 5003 (94%) were not found to have a corresponding ACT prescription.</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
29	Percentage of supervisors demonstrating competence in malaria treatment.	Number of supervisors who score greater than 80% on a treatment post-test during TOTs/Total number of supervisors who completed a post-test during a TOT.	N/A	n/a	N/A	N/A	N/A	N/A			No supervisors were trained in clinical treatment in PY4.
Outputs											
30	Percentage of targeted facilities receiving at least two clinical supervisory visits per annum for malaria treatment.	Number of facilities receiving at least two clinical supervisory visits per annum for malaria treatment with WHO-recommended ACTs/Total number of targeted facilities.	3.2, 3.4	OTSS checklist data	No PY4 target set	33%	473	1418			In the Tanzania PY4 work plan PMP, no PMP target was set. In PY4, MalariaCare planned to visit the estimated 1,418 facilities across both Lake and Eastern Zones once, and then target 1/3 of those found to be low performers (n=473) for a follow-up visit. We visited exactly 473 facilities twice during OTSS.
31	Percentage of targeted providers trained in malaria treatment.	Number of providers trained in malaria treatment with WHO-recommended ACTs/Total number of targeted providers.	3.1	Activity/ Training Reports	No PY4 target set	103%	62	60			In the Tanzania PY4 work plan PMP, no PMP target was set. However, the PY4 work plan proposed to train 60 clinical providers in malaria treatment; 62 (103%) were trained.
32	Percentage of targeted providers that received training in malaria treatment by supervisors during the reporting period.	Number of providers that received training in malaria treatment by supervisors based on documented errors during the reporting period/Total number of providers that had documented errors during team supervision during the reporting period.	3.2, 3.4	OTSS checklist data	95%	90%	897	993			Target not reached. During 993 observations of unique providers, feedback was provided for 897 of the observations (90%).

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
33	Percentage of targeted clinical supervisors trained in supervision for treatment of malaria.	Number of clinical supervisors trained in supervision for treatment of malaria with WHO-recommended ACTs/Total number of targeted clinical supervisors.	3.2	Activity/ Training Reports	95%	156%	89	57			Target exceeded In PY4 MalariaCare planned to train, at a minimum, one clinician for each of the 49 districts and 8 regions Where the district malaria focal person was not a clinician, an additional clinician was trained, so some districts had two people trained as clinical supervisors. In total, 89 people were actually trained as clinical supervisors.
Objective 4: Strengthen laboratory systems at the country level for detecting malaria and other infectious diseases											
Description: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases. These activities relate to addressing the health systems issues that are a barrier to achieving universal access to malaria diagnostics and appropriate case management practices such as physical health facilities, human and financial resources, and support systems required to deliver quality diagnosis and treatment services.											
Intermediate Objectives											
Reference laboratories and facilities able to provide high quality diagnostics for malaria and other febrile illnesses											
Private sector laboratories are integrated into national QA/QC and supervision strategies											
Reporting and monitoring information for malaria is integrated, complete and accurate											
Intermediate Outcomes											
35	Percentage of targeted countries with national laboratory supervision tools whose indicators adhere to global standards for laboratory system analysis.	Number of targeted countries whose national laboratory supervision tools adhere to global standards for laboratory system analysis/Total number of targeted countries.	3.2, 3.4	National Supervision Tools	No PY4 target set	1/1	1	1			In the Tanzania PY4 work plan PMP, no PMP target was set for this indicator. MalariaCare's diagnostic supervision tools adhere to global standards. In Tanzania this tool is endorsed by the national government as the national supervision tool and used in MalariaCare supported areas. MalariaCare is working with the NMCP to institutionalize these supervision tools as part of a supervision package in PY5.
Outputs											

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
36	Percentage of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards.	Number of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards/Total number of targeted facilities.	3.2, 3.4	OTSS checklist data	No PY4 target set	36%	85	234			In the Tanzania PY4 work plan PMP, no PMP target was set for this indicator. Other than routine OTSS, which may help to improve guideline distribution, MalariaCare, per its mandate and the Tanzania work plan, has a limited role in improving this indicator. MalariaCare is sharing this information with the national malaria program for future action that may be needed.
37	Percentage of targeted laboratories that meet global standards for quality malaria diagnostics	Number of targeted laboratories that meet 90% or greater on re-checking of malaria slides during supervisory visits/Total number of targeted who received a supervisory visit during the reporting period.	3.2, 3.4	OTSS checklist data	No PY4 target set	74%	144	194	88%	100%	In the Tanzania PY4 work plan PMP, no PMP target was set. OTSS data was available for 194 (65%) out of the 298 facilities with labs visited in PY4 for this indicator. Of those 194 facilities, 144 (74%) scored 90% or greater on slide rechecking at the most recent visit.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
38	Percentage of targeted laboratory facilities with all the required materials to confirm malaria diagnosis according to global standards.	Number of targeted facilities with all the required materials to confirm malaria diagnosis according to the global standards (including functioning microscope, slides, giemsa stain, and a trained lab technician)/Total number of targeted facilities with labs.	3.2, 3.4	OTSS checklist data	No PY4 target set	1%	3	224			<p>In the Tanzania PY4 work plan PMP, no PMP target was set.</p> <p>OTSS data was available for 224 (75%) out of the 298 facilities with labs visited in PY4 for this indicator. Of these 224 facilities, 3 (1%) had all required materials available.</p> <p>The main limitations to meeting this target are buffer solution/tabs and pH paper/meter which only 26% and 21% of facilities had in stock, respectively.</p> <p>Other than routine OTSS, which may help to improve guideline distribution, MalariaCare activities have a limited role in improving this indicator. MalariaCare is sharing this information with the national malaria program for future action that may be needed.</p>
39	Percentage of targeted facilities receiving at least two laboratory supervisory visits per annum.	Number of facilities receiving at least two laboratory supervisory visits per annum/Total number of targeted facilities.	3.2, 3.4	OTSS checklist data	No PY4 target set	33%	473	1418			<p>In the Tanzania PY4 work plan PMP, no PMP target was set for this indicator.</p> <p>In PY4, MalariaCare planned to visit the estimated 1,418 facilities across both Lake and Eastern Zones once, and then target 1/3 of those found to be low performers (n=473) for a follow-up visit.</p> <p>At the start of PY4, it was not clear how many of the planned facilities would conduct microscopy, thus the target was based on all planned facilities. Of the 473 visited twice, 56 offer microscopy services.</p>

Zambia Performance Monitoring Plan

GOAL: Contribute to PMI's overall goal 50% reduction in the burden of malaria in 70% of the at-risk population in PMI focus countries.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Objective 2: Increased percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test.											
Objective 3: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses-consistent with the diagnostic test.											
Objective 4: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases.											
Objective 1: The accuracy of diagnostic testing for malaria is improved to greater than 90%.											
Description: The accuracy of diagnostic testing for malaria is improved to greater than 90 percent. The activities described in this section relate to addressing the laboratory technician and health care provider competency related to providing quality diagnostic services.											
Intermediate Objectives											
Clear and disseminated laboratory guidelines, procurement policies, supervision structures											
Clear and functioning quality assurance procedures for regulation of diagnostics for malaria and other IDs											
Reporting on malaria indicators is complete and accurate											
Country has complete national guidelines for the diagnosis of malaria											
Providers demonstrate competence in RDTs and/or microscopy											
Intermediate Outcomes											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
1	Percentage of targeted countries with national malaria diagnostics supervision tools whose indicators adhere to global standards.	Number of targeted countries whose national malaria diagnostics supervision tools adhere to global standards/Total number of targeted countries.	None	National Supervision Tools	No PY4 target set	1/1	1	1			In the Zambia PY4 work plan PMP, no PMP target was set. Please see the paragraph at the beginning of the country PMPs for a full explanation of the change in the PMP from PY4 to PY5 and why targets are not available for some indicators. MalariaCare's diagnostic supervision tools adhere to global standards; and in Zambia, this tool is endorsed by the national government as the national supervision tool and used in MalariaCare-supported areas.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
2	Percentage of targeted laboratory technicians demonstrating competence in RDTs.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of lab staff who received a supervisory visit during the reporting period.	3.1, 3.2	OTSS checklist data	70%	Provincial : 80%; District: 89%	Provincial: 16; District: 8	Provincial: 20; District: 9	Provincial : 92%; District: 98%	Provincial: 96%; District: 100%	<p>Target exceeded. The PMP target in the PY4 work plan was based on performance among all health care workers. In the revised global PMP, this indicator is disaggregated by cadre. We have maintained the PY4 work plan PMP overall target for this indicator.</p> <p>Laboratory staff performed better than clinical staff, and exceeded the target for this area.</p>
3	Percentage of targeted laboratory technicians demonstrating competence in malaria microscopy.	Number of targeted laboratory technicians who score 90% or greater on supervisory checklist measuring slide preparation and parasite detection/Total number of laboratory technicians who received a supervisory visit during the reporting period.	3.1	OTSS checklist data	55%	83%	50	60	96%	98%	<p>Target exceeded. 50 out of 60 laboratory staff observed by OTSS supervisors obtained a microscopy score of at least 90%.</p>

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
4	Percentage of targeted clinical providers that demonstrate competence in RDTs.	Number of targeted clinical providers who score 90% or greater on supervisory checklists measuring the preparation and reading of the malaria RDTs/Total number of clinical providers who received a supervisory visit during the reporting period.	3.1, 3.2	OTSS checklist data	70%	Provincial : 56%; District: 63%	Provincial: 40; District: 104	Provincial: 72; District: 166	Provincial : 88%; District: 89%	Provincial: 92%; District: 92%	Target not reached. The most commonly missed steps were labeling the cassette and waiting for an appropriate amount of time for results. In PY5 we plan to focus on these areas during OTSS.
5	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality diagnosis of malaria.	Number of targeted clinics that meet 90% or greater on facility checklists for diagnosis during supervisory visits /Total number of targeted facilities who received a supervisory visit during the reporting period.	3.1, 3.2	OTSS checklist data	35%	Provincial : 60%; District: 21%	Provincial: 26; District: 21	Provincial: 43; District: 99			Provincial: target exceeded; District: target not reached. 43 out of 44 provincial OTSS facilities (98%) and 99 out of 104 district OTSS facilities (95%) reported all variables required for a quality diagnosis assessment. 26 of the 43 (60%) provincial OTSS facilities with data met all standards, whereas 21 out of 99 (21%) district OTSS facilities did so. Of the facilities with data available: - 79% of provincial OTSS facilities and 39% of District OTSS facilities reported no stock-outs of RDTs of seven

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
											<p>days or more over the past three months;</p> <ul style="list-style-type: none"> - 72% of provincial OTSS and 74% of District OTSS facilities reported availability of RDT bench aids and/or SOPs, and - 88% of provincial OTSS facilities and 63% of District OTSS facilities reported at least one person trained in RDTs in the past two years. <p>MalariaCare, per the DRC work plan, has a limited role in improving performance on this indicator. MalariaCare is sharing this information with the national malaria program for future action as needed.</p>
6	Percentage of supervisors demonstrating competence in malaria microscopy.	Percentage of supervisors who score 90% or greater in slide preparation and parasite detection during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers.Note: Must score at least L1 or L2 on parasite detection (>=80%) and parasite quantification (>=40%)	2.1	Activity/ Training Reports	No PY4 target set	Results not available					<p>In the Zambia PY4 work plan PMP, no target was set for this indicator.</p> <p>MDRT scores on parasite detection and quantification are not available for PY4, but the average post-test score on diagnostics theory was 81% (range: 63-97%).</p>

7	Percentage of supervisors demonstrating competence in RDTs.	Percentage of supervisors who score 90% or greater in preparation and reading of RDTs during the training of trainers post-test/Total number of supervisors who completed a post-test during a training of trainers.	2.1	Activity/ Training Reports	No PY4 target set	Results not available					Because this indicator was not included in the PY4 work plan PMP, testing supervisors on RDT knowledge was not included as a standard part of supervisor training; instead, additional time was devoted to strengthening general mentoring and supervisory skills. However, pre- and post-tests will be administered during supervisor trainings in PY5.
Outputs											
#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
8	Percentage of targeted facilities with at least one provider trained in RDTs.	Number of targeted facilities with one or more providers trained in RDT/Total number of targeted facilities.	3.1, 3.2	OTSS checklist data	No PY4 target set	Provincial : 88%; District: 61%	Provincial: 38; District: 62	Provincial: 43; District: 101			In the Zambia PY4 work plan PMP, no target was set for this indicator. Of the 148 facilities visited that conduct RDTs, 146 (97%) reported on whether staff were trained in RDTs. Of these 146 facilities, 100 (68%) reported having at least one provider formally trained in RDTs in the previous 2 years.
9	Percentage of targeted facilities with at least one provider trained in malaria microscopy.	Number of target facilities with one or more providers trained in malaria microscopy/Total number of targeted facilities	3.1	OTSS checklist data	No PY4 target set	51%	18	35			In the Zambia PY4 work plan PMP, no previous target was set for this indicator. Of the 36 facilities visited that conduct microscopy, 35 (97%) had data for this indicator. Of these 35 facilities, 18 (51%) reported having at least one provider formally trained in malaria microscopy in the previous two years.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
10	Percentage of targeted facilities with at least one provider who received malaria diagnostic refresher training (MDRT) in the last two years.	Number of targeted facilities with one or more providers who received MDRT in the last two years/Total number of targeted facilities.	2.1n/a	Activity/ Training Reports	No PY4 target set	75% n/a	15 n/a	20 n/a			Due to the change in the PMP, no previous target was set for this indicator. However, in the PY4 work plan, MalariaCare planned to train 20 laboratory supervisors in MDRT and 15 (75%) were trained.
11	Percentage of targeted clinical providers trained in RDTs.	Number of clinical providers trained in RDTs/Total number of targeted clinical providers.	n/a	n/a	n/a	n/a	n/a	n/a			No applicable activity was conducted in PY4.
12	Percentage of targeted laboratory technicians trained in RDTs.	Number of laboratory technicians trained in RDTs/Total number of targeted laboratory technicians.	n/a	n/a	n/a	n/a	n/a	n/a			No applicable activity was conducted in PY4.
14	Percentage of targeted laboratory technicians participating in MDRT.	Number of laboratory technicians participating in malaria diagnostics refresher trainings/Total number of targeted laboratory technicians.	n/a	n/a	n/a	n/a	n/a	n/a			No MDRT training for health facility workers was conducted in PY4. For supervisor MDRT training, see indicator 17.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
16	Percentage of targeted clinical supervisors trained in supervision of malaria diagnostics.	Number of clinical supervisors trained in supervision of malaria diagnostics/Total number of targeted clinical supervisors.	2.1, 2.2	Activity/ Training Reports	No PY4 target set	83%	50	60			<p>In the Zambia PY4 work plan PMP, no previous target was set for this indicator.</p> <p>In PY4 MalariaCare's work plan proposed training 20 provincial OTSS and 40 District OTSS clinical supervisors. 10 provincial OTSS and 40 District OTSS supervisors were actually trained.</p>
17	Percentage of targeted laboratory supervisors trained in supervision for laboratory diagnosis of malaria.	Number of supervisors trained in supervision for laboratory diagnosis of malaria/Total number of targeted laboratory supervisors.	2.1	Activity/ Training Reports	No PY4 target set	75%	15	20			<p>In the Zambia PY4 work plan PMP, no previous target was set for this indicator.</p> <p>However, in the PY4 work plan, MalariaCare planned to train 20 laboratory supervisors in supervision of malaria diagnostics and 15 (75%) were trained.</p>

Objective 2: Increase percentage of patients suspected to have malaria or febrile illness who receive a diagnostic test for malaria

Description: Increased percentage of patients suspected to have malaria or febrile illnesses who receive a diagnostic test for malaria. These activities relate to addressing health care provider performance in the use of diagnostic tools after appropriate training. Emphasis is on supervision and use of performance monitoring tools.

Intermediate Objectives

Providers demonstrate competence in detecting suspected malaria cases

Providers demonstrate competence in ordering/conducting malaria diagnostic tests for suspected cases

Private facilities are linked with the public sector

Intermediate Outcomes

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
19	Country has full national guidelines for determining suspected malaria cases.	Country has full national guidelines for determining suspected malaria cases (including age, duration of fever, fever history) that meet global standards.	None	National Guidelines	No PY4 target set	1/1	1	1			In the Zambia PY4 work plan PMP, no previous target was set for this indicator. However, the Government of Zambia recently updated its national guidelines for malaria case management, which includes guidelines for determining suspected malaria cases that meet global standards.
20	Percentage of providers demonstrating competence in identifying suspected malaria cases according to global standards.	Number of providers who demonstrate correct procedures for differential diagnosis of possible malarial symptoms according to global standards during team supervision observation/Total number of providers targeted for team supervision during the reporting period.	3.1, 3.2	OTSS checklist data	60%	Provincial : 100%; District: 95%	Provincial: 65; District: 158	Provincial: 65; District: 166			Target exceeded. 223 out of 231 providers observed during clinical observations (97%) about history of fever or checked for temperature.

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
21	Percentage of providers demonstrating competence in testing suspected patients for malaria.	Number of providers who appropriately order or perform testing of suspected malaria patients according to global standards during team supervision observations/Total number of providers targeted for team supervision observations during the reporting period.	3.1, 3.2	OTSS checklist data	85%	Provincial : 92%; District: 93%	Provincial: 60; District: 154	Provincial: 65; District: 165			Target exceeded. In 214 out of 230 observations (93%), supervisors agreed with the provider on whether to order a malaria test.
22	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for determining possible malaria cases.	Number of targeted countries whose national clinical supervision tools adhere to global standards for determining possible malaria cases/Total number of targeted countries.	None	National Supervision Tools	No PY4 target set	1/1	1	1			In the Zambia PY4 work plan PMP, no previous target was set for this indicator. However, MalariaCare's clinical supervision tools adhere to global standards; and in Zambia, this tool is endorsed by the national government as the national supervision tool and used in MalariaCare-supported areas.

Objective 3: Increase percentage of patients who receive appropriate treatment for malaria or other febrile illnesses - consistent with the result of the diagnostic test

Description: Increased percentage of patients who receive appropriate treatment for malaria or other febrile illnesses—consistent with the result of the diagnostic test. The activities described in this section relate to addressing health care provider performance in delivering appropriate treatment after training has occurred. Emphasis is on supervision and ongoing use of performance monitoring tools.

Intermediate Objectives

Country has full national policies for malaria treatment

Service providers demonstrate competence in malaria treatment

Facilities are able to provide high quality case management services for malaria and other febrile illness

Country has supervisory structures and implementation of supervision of malaria case management practices

Intermediate Outcomes

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
24	Country has full national guidelines for malaria treatment.	Country has full national guidelines for malaria treatment, incl. QA/QC procedures, training of informal health providers, and recommendations for home treatment of febrile illness, suspected malaria, and recognition of the common danger signs that meet global standards.	None	National Guidelines	No PY4 target set	1/1	1	1			In the Zambia PY4 work plan PMP, no previous target was set for this indicator. However, the Government of Zambia recently updated its national guidelines for malaria case management and they adhere to global standards.
25	Percentage of targeted countries with national clinical supervision tools whose indicators adhere to global standards for malaria	Number of targeted countries whose national clinical supervision tools adhere to global standards for malaria treatment/Total number of	n/a3.1, 3.2	National Supervision Tools	No PY4 target set	1/1	1	1			In the Zambia PY4 work plan PMP, no previous target was set for this indicator. However, MalariaCare's clinical supervision tools adhere to global standards; and in Zambia, this tool is endorsed by the national

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
26	Percentage of targeted clinics that meet standards (including appropriate materials, documentation, and qualified staff) for quality treatment of malaria.	Number of targeted clinics that meet 90% or greater on facility checklists during supervisory visits /Total number of targeted facilities who received a supervisory visit during the reporting period.	3.1, 3.2	OTSS checklist data	35%	Provincial : 44%; District: 23%	Provincial: 19; District: 22	Provincial: 43; District: 94			<p>Provincial: target exceeded; District: Target not reached.</p> <p>In PY4, 43 out of 44 provincial OTSS facilities (98%) visited and 94 out of 146 District facilities (or 90%) had data on all criteria required at their most recent visit. Facilities must meet all conditions below to reach 90%.</p> <p>Among these facilities the following percentage met each of the standards:</p> <ol style="list-style-type: none"> 1) Most recent malaria case management guidelines available (100% provincial; 72% District); 2) At least 1 staff trained in case management of malaria (70% provincial; 60% District); 3) First-line antimalarial in stock (93% provincial; 60% District); 4) Paracetamol cap/tab in stock (74% provincial; 54% District). <p>MalariaCare, per its mandate and the Zambia work plan, has a limited role in improving this indicator. MalariaCare is sharing this information with the national malaria program for future action that may be needed.</p>

#											
27	Percentage of targeted providers demonstrating compliance to treatment with WHO-recommended ACT for cases with positive malaria test results.	Number of providers who comply to treatment with a WHO-recommended anti-malarial for cases with positive malaria test results during clinical assessment visits measured through direct observation during team supervision visits/Total number of providers that received team supervision during the reporting period.	3.1, 3.2	OTSS checklist data	90%	Provincial : 99%; District: 97%	Provincial: 325; District: 516	Provincial: 328; District: 530			Target exceeded. Of the 858 records of positive test results reviewed by OTSS supervisors, ACT prescriptions were found for 841 (98%).
28	Percentage of providers demonstrating adherence to negative test results according to global standards.	Number of providers demonstrating adherence to negative test results according to global standards during team supervision measured through direct observation during team supervision visits/Total number of providers that	3.1, 3.2	OTSS checklist data	85%	Provincial : 92%; District: 94%	Provincial: 312; District: 493	Provincial: 338; District: 527			Target exceeded. Of the 865 records of negative test results reviewed by OTSS supervisors, 805 were not found to have a corresponding ACT prescription.

		received team supervision during reporting period.										
29	Percentage of supervisors demonstrating competence in malaria treatment.	Number of supervisors who score greater than 80% on a treatment post-test during TOTs/Total number of supervisors who completed a post-test during a TOT.	2.1	Activity/ Training Reports	No PY4 target set	100%	10	10	91%	93%		In the Zambia PY4 work plan PMP, no previous target was set for this indicator. However, all 10 clinical supervisors trained for Activity 2.1 received a post-test score of 80% or higher.
30	Percentage of targeted facilities receiving at least two clinical supervisory visits per annum for malaria treatment.	Number of facilities receiving at least two clinical supervisory visits per annum for malaria treatment with WHO-recommended ACTs/Total number of targeted facilities.	3.1, 3.2	OTSS checklist data	No PY4 target set	Provincial : 98%; District: 0%	Provincial: 39; District: 0	Provincial: 40; District: 80				In the Zambia PY4 work plan PMP, no previous target was set for this indicator. Of the 40 provincial OTSS facilities planned for visit in PY4, 39 facilities were visited twice. The second round of District OTSS was delayed and will conclude in early PY5.
31	Percentage of targeted providers trained in malaria treatment.	Number of providers trained in malaria treatment with WHO-recommended ACTs/Total number of targeted providers.	n/a	n/a	n/a	n/a	n/a	n/a				No applicable activity was conducted in PY4.

#											
32	Percentage of targeted providers that received training in malaria treatment by supervisors during the reporting period.	Number of providers that received training in malaria treatment by supervisors based on documented errors during the reporting period/Total number of providers that had documented errors during team supervision during the reporting period.	3.1, 3.2	OTSS checklist data	No PY4 target set	Provincial : 97%; District: 97%	Provincial: 63; District: 160	Provincial: 65; District: 164			Target exceeded. Supervisors reported providing feedback to 223 out of 229 (97%) of the health providers observed.
33	Percentage of targeted clinical supervisors trained in supervision for treatment of malaria.	Number of clinical supervisors trained in supervision for treatment of malaria with WHO-recommended ACTs/Total number of targeted clinical supervisors.	2.1, 2.2	Activity/ Training Reports	No PY4 target set	83%	50	60			In the Zambia PY4 work plan PMP no previous target was set for this indicator. However, in the PY4 work plan, MalariaCare proposed to train 20 provincial OTSS and 40 District OTSS clinical supervisors. 10 provincial OTSS and 40 District OTSS supervisors were actually trained.

Objective 4: Strengthen laboratory systems at the country level for detecting malaria and other infectious diseases

Description: Strengthened laboratory systems at the country level for detecting malaria and other infectious diseases. These activities relate to addressing the health systems issues that are a barrier to achieving universal access to malaria diagnostics and appropriate case management practices such as physical health facilities, human and financial resources, and support systems required to deliver quality diagnosis and treatment services.

Intermediate Objectives

Reference laboratories and facilities able to provide high quality diagnostics for malaria and other febrile illnesses

Private sector laboratories are integrated into national QA/QC and supervision strategies

Reporting and monitoring information for malaria is integrated, complete and accurate

Intermediate Outcomes

#	Indicator	Definition	Relevant Activity #	Data source	Target	PY4 AR Results					Comment
						%	Num.	Den.	Mean	Median	
35	Percentage of targeted countries with national laboratory supervision tools whose indicators adhere to global standards for laboratory system analysis.	Number of targeted countries whose national laboratory supervision tools adhere to global standards for laboratory system analysis/Total number of targeted countries.	n/a	National Supervision Tools	No PY4 target set	1/1	1	1			In the Zambia PY4 work plan PMP, no previous target was set for this indicator. However, MalariaCare's diagnostic supervision tools adhere to global standards; and in Zambia, this tool is endorsed by the national government as the national supervision tool and used in MalariaCare-supported areas.

Outputs

36	Percentage of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards.	Number of targeted facilities with complete and updated guidelines for malaria diagnosis that meet global standards/Total number of targeted facilities.	3.1	OTSS checklist data	No PY4 target set	45%	14	31			In the Zambia PY4 work plan PMP, no previous target was set for this indicator. Of the 36 facilities performing malaria microscopy that were visited during OTSS in PY4, 31 (86 percent) had data on the presence of malaria guidelines at their most recent visit. Other than routine OTSS, which may help to improve guideline distribution,
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												MalariaCare, per its mandate and the Zambia work plan, has a limited role in improving this indicator. MalariaCare is sharing this information with the national malaria program for future action that may be needed.
37	Percentage of targeted laboratories that meet global standards for quality malaria diagnostics	Number of targeted laboratories that meet 90% or greater on re-checking of malaria slides during supervisory visits/Total number of targeted who received a supervisory visit during the reporting period.	3.1	OTSS checklist data	No PY4 target set	89%	31	35	96%	100%		<p>Target exceeded.</p> <p>Of the 36 facilities with labs visited during OTSS in PY4, 35 (97%) had data on slide rechecking at their most recent visit. Of these 35 facilities, 31 (89%) received a score of 90% or higher on slide rechecking.</p>

#											
38	Percentage of targeted laboratory facilities with all the required materials to confirm malaria diagnosis according to global standards.	Number of targeted facilities with all the required materials to confirm malaria diagnosis according to the global standards (including functioning microscope, slides, giemsa stain, and a trained lab technician)/Total number of targeted facilities with labs.	3.1	OTSS checklist data	25%	3%	1	35			<p>Target not reached.</p> <p>Of the 36 facilities with labs visited during OTSS in PY4, 35 (97%) had data on had data on all required materials at their most recent visit.</p> <p>The main limitations to meeting this target are pH paper/meter and buffer solution/tabs which only 60% and 49% of facilities reported significant stock-outs of, respectively.</p> <p>Other than routine OTSS, which may help to improve guideline distribution, MalariaCare activities have a limited role in improving this indicator. MalariaCare is sharing this information with the national malaria program for future action that may be needed.</p>
39	Percentage of targeted facilities receiving at least two laboratory supervisory visits per annum.	Number of facilities receiving at least two laboratory supervisory visits per annum/Total number of targeted facilities.	3.1	OTSS checklist data	No PY4 target set	80%	32	40			<p>In the Zambia PY4 work plan PMP, no previous target was set for this indicator.</p> <p>2 rounds of provincial OTSS in 40 facilities were planned for PY4. Among the 39 facilities that received 2 visits, 32 facilities had malaria microscopy. In PY5, MalariaCare and NMCC will work together to ensure that all provincial OTSS facilities visited perform malaria microscopy.</p>

Appendix B: Environmental mitigation and monitoring

In PY4, MalariaCare organized malaria diagnostic, clinical, and supervisor training. During these training sessions, small amounts of biomedical waste were generated: sharps materials, non-sharps-contaminated medical waste (blood-exposed tubes and devices), and chemical waste (standard laboratory reagents) used for preparation of malaria microscopy slides. Consequently, MalariaCare has been working with in-country teams and NMCPs to assure that all sponsored training and onsite supervision activities discuss and adhere to the following three principles of medical waste management:

1. Safe collection of potentially infected body fluids or tissue samples.
2. Proper disposal of sharps and potentially infected body fluids/tissues into collection receptacles.
3. Appropriate disposal and/destruction of these infectious waste materials.

This section describes the current status of these environmental mitigation measures across MalariaCare-supported countries. It also describes the ongoing measures MalariaCare has put into place to assure 100% compliance with the measures during project intervention, so that all medical waste is monitored and accounted for.

In PY4, laboratory training was held in nationally accredited laboratories with appropriate safety measures in place. When clinical and supervisor training occurred outside of a health facility, and RDT demonstration and role-play are part of the training, it is standard practice for facilitators to bring RDT kits with appropriate waste-collection equipment and to transport any waste generated from the training sites back to the nearest health facility for appropriate disposal. Table 39 below describes key results for generation and management of biohazardous waste during the course of MalariaCare-sponsored training activities.

Table 39. Environmental impact indicators for MalariaCare-sponsored training.

Describe specific environmental threats of your organization's activities (based on analysis in Section 3 of IEE)						
<p>Training activities will generate small-scale medical waste (the mitigation of which is described below under "2. Management of medical waste").</p>	<p>MalariaCare includes in its training curriculum procedures to handle, label, treat, store, transport, and properly dispose of medical waste.</p>	<p>MalariaCare Country Coordinator (or country technical lead) in collaboration with trainers.</p>	<p>Training materials include appropriate references to management of medical waste.</p> <p>Proportion of countries conducting MalariaCare training with curriculum on proper medical waste management.</p>	<p>Review training materials; training reports</p>	<p>DRC Ghana Kenya Liberia Madagascar Malawi Mali Mozambique Tanzania Zambia</p>	<p>MalariaCare reviewed training materials for all 44 clinical, diagnostic, and supervisor trainings for 10 countries. Seven of these countries (Ghana, Kenya, Liberia, Madagascar, Malawi, Mali and Zambia) adequately addressed all three principles in all of their training, and three countries (DRC, Mozambique and Tanzania) addressed components, but not all three key principles, in all of their training. During 40 (91 percent) of these 44 trainings, addressed all three principles were addressed, while four addressed some but not all principles. MalariaCare will continue to work with country teams to assure that all countries meet 100% compliance to education on the three waste management principles by the next reporting period.</p>

2. Management of medical waste						
In most MalariaCare-supported countries, the project procures materials and reagents used for small-scale malaria microscopy slide preparation. The slides are generated for training purposes only—to improve diagnostic provider skills on slide preparation and reading. Biohazard waste materials generated during training include: contaminated latex gloves and plastic packaging, some hazardous chemicals (excess methanol and Giemsa solution), and blood-contaminated items (test tubes, needles, syringes, and rapid diagnostic tests).	MalariaCare will use availability of appropriate waste management structures as a criterion for choice of training sites. MalariaCare will inspect medical waste disposal procedures and processes at facilities where training will occur to ensure that they meet national guidelines and WHO best practices ("WHO's Safe Management of Waste from Healthcare Activities"). MalariaCare will institute processes to ensure that waste materials generated from MalariaCare training are in compliance with this international standard.	MalariaCare National Coordinator (or country technical lead); MalariaCare training expert.	Completed training report that endorses appropriate collection and disposal of medical waste compliant with the three principles outlined above; copy of medical waste management procedures provided to project staff.	Training reports; site inspections	DRC Ghana Kenya Liberia Madagascar Malawi Mali Mozambique Tanzania Zambia	For the 44 trainings conducted, MalariaCare received and reviewed 43 (98 percent) of the expected training reports for the relevant diagnostic, clinical and supervisor training sessions. All ten countries (DRC, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Tanzania and Zambia) include a section focused on waste management in all training reports Of the 43 activity reports reviewed, all 43 included a section focused on waste management. MalariaCare also assesses medical waste management during OTSS visits through facility waste disposal techniques, as well as during RDT and microscopy observations. (See Table 40 below showing analysis of the data from these sections of checklists)

Describe specific environmental threats of your organization's activities (based on analysis in Section 3 of IEE)						
<p>MalariaCare procures and develops slides for the national archive of malaria slides (NAMS) for national quality assurance programs.</p>	<p>As part of all training, MalariaCare will provide procedures on the handling of medical waste and make the procedures available to staff as needed.</p> <p>As part of all training, MalariaCare will train project staff on medical waste protocols.</p>	<p>MalariaCare National Coordinator; MalariaCare training expert.</p>	<p>Completed training report that includes information determining proper disposal and management of medical waste; copy of medical waste management procedures provided to project staff.</p>	<p>Training reports; site inspections</p>	<p>DRC Madagascar Malawi Zambia</p>	<p>Of the four countries in which NAMS training occurred in PY4, all four countries adequately addressed all three principles in all of their training.</p>

Table 40. Summary of waste management indicators picked up from site inspections during most recent outreach training and supportive supervision (OTSS) visit.

Competency Area	DRC	Ghana	Kenya	Madagascar	Malawi	Mali	Mozambique	Tanzania	Zambia	Overall
Microscopy	N=107	Not included in checklist*	N=233	N=23	N=66	N=31	N=120	N=271	N=59	N=910
Waste management: Sharps waste segregated and safely disposed in a safety box	90%		100%	96%	100%	100%	98%	97%	100%	97%
Waste management: Infectious waste disposed of in appropriate waste containers	86%		89%	96%	98%	84%	91%	86%	100%	89%
Waste management: Liquid waste appropriately washed off/disinfected	85%		88%	91%	97%	16%	99%	89%	100%	88%
RDT	N=105	N=2671	N=571	N=26	N=616	N=175	N=291	N=1667	N=311	N=3762
Used tests, transfer devices, and other blood-contaminated material disposed of	86%	93%	82%	100%	77%	70%	87%	78%	96%	80%
Used lancet disposed in sharps container	87%	91%	95%	96%	79%	83%	92%	94%	96%	91%

*In PY2, when first planning Ghana's laboratory OTSS, the Ghana Clinical Laboratory Unit adopted the IMaD checklist. When Laboratory OTSS began in PY4, the Clinical Laboratory Unit opted to use this checklist, rather than the more recent version which includes more detail on include microscopy waste management procedures.

Appendix C: MalariaCare OTSS scoring guide

MalariaCare Key Indicators

This document describes the key indicators that MalariaCare monitors to track progress towards its program objectives. This data is collected during Outreach Training and Supportive Supervision (OTSS) visits, using the OTSS checklist. In most MalariaCare countries, the data is collected electronically using MalariaCare’s Electronic Data System (EDS) – a custom built tablet application which sends information to a DHIS2 platform for data storage and visualization.

There are six key performance indicators. Three of them are based on individual health/lab worker observations:

1. Microscopy Observation
2. RDT Observation
3. Clinical Observation

The other three are based on review of health facility registers for testing and treatment behavior:

4. Testing Before Treatment
5. Positive Test Adherence
6. Negative Test Adherence

MalariaCare’s overall performance target is contractually set at 90 percent. However, in light of the relatively low baseline performance of many OTSS facilities, the project team has set a minimum performance target of 75 percent for diagnostic and clinical observations. This target demonstrates intermediate progress towards the overall target, and is a measure of facilities that are meeting minimally acceptable case management standards as defined by MalariaCare. A description of how these minimum and overall performance targets are calculated is described below.

Observation-based Key Indicators

Supervisors are instructed to conduct three observations of individual health facility staff carrying out malaria microscopy, malaria RDTs, and clinical care of febrile cases. Each observation includes several checklist items that cover key quality of care steps for these diagnostic and clinical procedures. Within each of the observations, four to six items are deemed *minimum standard* items, and count for two-thirds of the score. The remaining items are worth one-third of the score. Thus, observation scores are calculated as:

$$\frac{2 * (\% \text{ of minimum standard items performed correctly}) + (\% \text{ of other items performed correctly})}{3}$$

3

For microscopy, the indicator is further split into three stages of conducting a thick smear: slide preparation, slide staining, and slide reading (parasite detection), with each stage including at least one minimum standard. Each of these three stages counts as one-third of the overall microscopy score.

Minimum standard items for each observation are listed below.

Microscopy
1. Preparation: Spreads thick film into 1-2 cm diameter circle; can read print under slide
2. Preparation: Slide air dried before staining
3. Staining Standard 1
3a. (If Giemsa stain): Uses standard 10% Giemsa solution
3b. (If Field stain): Immerses thick slide in field stain A for 3 seconds
4. Staining Standard 2
4a. (If Giemsa stain): Immerses thick slide in Giemsa stain for 10-15 minutes
4b. (If Field stain): Immerses thick slide in field stain B for 5 seconds
5. Clinician/Supervisor agreement on slide positivity
RDTs
1. Collects an adequate amount of blood
2. Dispenses blood in correct well
3. Applies buffer to correct well
4. If the test result is negative, waits for correct incubation time
5. Reads test result correctly
6. Records results correctly
Clinical
1. Checks for at least one sign of severe malaria
2. Supervisor agrees with whether a malaria test should be ordered*
3. Supervisor agrees with final diagnosis and severity assessment
4. Correct prescription per test result (if available) & diagnosis

In the annual report, we report the proportion of facilities meeting the minimum performance target of 75 percent, for both ‘trends’ as well as ‘most recent visit’. At the most recent visit, we also include the proportion of facilities that met the overall performance target of 90 percent.

The annual report also describes average facility performance on minimum standard steps and other steps in need of improvement. For each step an average score is calculated for each facility based on the number of observations in which the step was done correctly, out of the 1-3 observations conducted. Each facility could have a score of 0%, 33%, 50%, 66%, or 100% depending on the number of observations completed and the number of times the step was done correctly. These individual facility scores are then averaged together to produce the average facility performance score for each item. For example, if average facility performance is reported as 66 percent, this indicates that across all facilities with scores, an average of two out of three observed providers did the step correctly.

Register Review Key Indicators

For the three register review indicators, MalariaCare has only one performance target – that facilities should reach 90% compliance for all three measures: testing prior to treatment, adhering to positive test results and adherence to negative test results. Health facility registers that contain information on lab results and prescriptions act as the data sources for these three measures.

To estimate whether patients who get antimalarial treatment receive a diagnostic test beforehand, supervisors are instructed to sample 20 records of patients who received ACTs using the clinical or pharmacy registers, and assesses whether these patients have received a prior diagnostic test, through reviewing results recorded in the laboratory registers. Testing prior to treatment is then measured as the proportion of patients who received a diagnostic test, among the sample of 20 records of patients who received an ACT. Although this method does not capture patients who are suspected of malaria but do not receive an ACT, this measure allows for a larger sample of patients than the clinical observations and, therefore, presents complementary data that allows us to present a more representative picture of malaria test ordering behavior than based on observations of health workers' performance alone.

To estimate whether health workers adhere to the diagnostic test results, supervisors carry out a reverse process in which they start with the laboratory registers and then link them with clinical or pharmacy registers. Up to 10 patient records (5 RDT and 5 microscopy) of negative test results are collected from laboratory registers, and compared with the clinical/pharmacy registers to see whether the patient received an ACT. Adherence to negative test results is measured as the proportion of patients who did not receive an ACT, among the sample of 5-10 records of patients who received a negative diagnostic test result. Similarly, up to 10 patient records (5 RDT and 5 microscopy) of positive test results are collected from laboratory registers, and compared with the clinical/pharmacy registers to see whether the patient received an ACT. Adherence to positive test results is measured as the proportion of patients who received an ACT, among the sample of 5-10 records of patients who received a positive or diagnostic test result.

In the annual report, we report the proportion of facilities meeting the overall performance target of 90 percent for each of the register review indicators, for both trends as well as the most recent visit.

Annex to the Cambodia narrative

Figure 89. HNQIS application



Plan Module: This module automatically schedules future assessments based on where support is needed most (quality score), and where it will have most impact (client load). Furthermore, the planning module prioritizes planning of support visits by segmenting all outlets into: (i) those that have never been assessed; (ii) those with overdue assessments; (iii) those scheduled to be assessed in the current month; and (iv) those scheduled to be assessed in future months. Each health area has independent planning variables (quality score/client load), but the planning report is integrated across all areas that the QA officer is responsible for supporting.



Assess Module: This module enables QA officers to assess clinical procedures in each health area catered for by network providers through case observation or simulation.

The assessment checklist is aligned with national supervision checklists for malaria and other health areas. An assessment score is automatically generated onsite, and performance is subsequently benchmarked (e.g., Good/Satisfactory/Poor). The module contains a consistent approach to scoring and benchmarking all health areas to allow comparability within and across network providers. Information collected from this module is used in the three other modules.



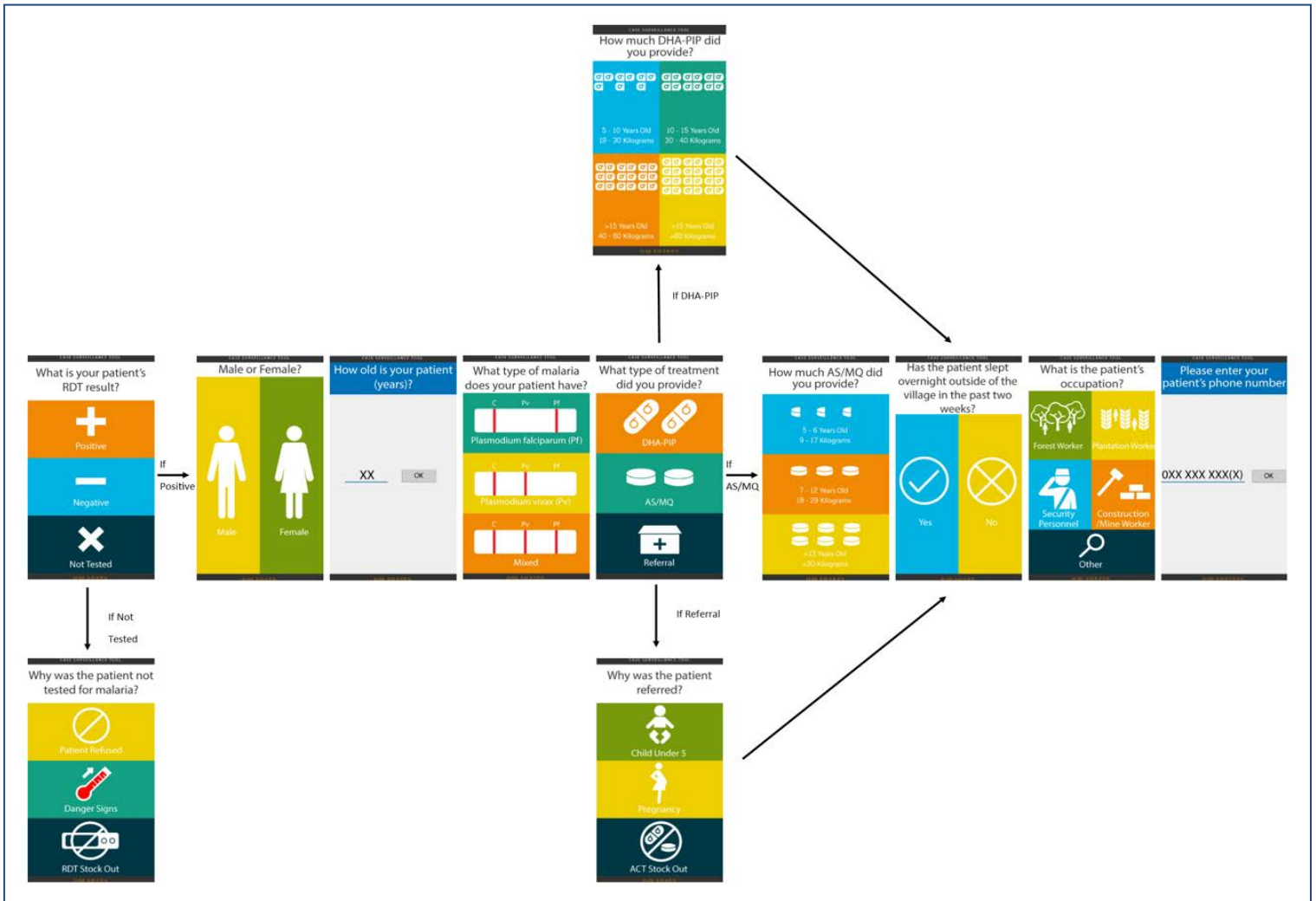
Improve Module: This module ensures that provider feedback following a quality assessment is undertaken in a robust and consistent manner, rather than based on the subjectivity and technical expertise of the QA officers. The module: (i) highlights the key areas of weakness identified during the assessment, and (ii) displays tailored feedback scripts that take into account both how the procedure should be undertaken (as per protocols), as well as why it is important to do so. This places all the relevant information required to improve the performance of the provider in one place. The module facilitates a consistent approach to provision of feedback, eliminating subjectivity regarding the areas of focus or the actual feedback provided.



Monitor Module: This module consists of a performance monitoring dashboard tailored to meet the needs of the QA officer. The dashboard contains a range of charts, graphs, maps, and tables highlighting trends and overall performance of all the providers that the QA officer is responsible for supporting. Dashboards can also be used to visualize data collected through other channels that are relevant to quality improvement, such as availability and sales of health commodities. The main purpose of this module is to facilitate the use of data in decision-making at the QA-officer level. It offers the QA officer an opportunity to track the return on their support visit efforts over time, so as to give them insight on where they need to apply a different approach. The system also allows the QA officer an opportunity to develop tailored interfaces to meet the need in terms of data of different users of HNQIS (i.e., project managers, medical detailers, etc.), and therefore enable midcourse correction (e.g., conducting a refresher course in a particular low-performing health area).

Figure 90. MCS application schematic

Demonstrates the flow of the MCS application, highlighting the simplicity of the app and the split logic that applies as providers move through the clinical assessment.





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