

LEARNING & ANALYSIS BRIEF



REDUCING MISDIAGNOSIS OF MALARIA IN TANZANIA THROUGH REGULAR TRAINING OF LAB STAFF



This brief describes how intense training of laboratory staff in reading blood films needed to test for malaria has sharply reduced the number of misdiagnoses and prevented unnecessary and expensive treatment within a PharmAccess program in Tanzania's Kilimanjaro region.

Malaria is among the top ten diagnoses in most parts of Tanzania. As mosquitos do not like cold temperatures, the number of malaria cases in the highlands should be significantly lower than in the rest of the country. However, PharmAccess and its implementing partners noticed an unusually high incidence of malaria cases being reported by numerous health facilities in the KNCU health insurance program in rural parts of the Kilimanjaro region.

The main symptoms of malaria are fever, chills and muscle aches. Because these symptoms are often found with other diseases, laboratory testing is needed to rule in or rule out acute malaria. Malaria Rapid Diagnostic Tests (mRDTs) are relatively expensive compared to using a microscope to examine a blood film. Because mRDTs are not always readily available in rural health facilities, the most common method of testing for malaria is microscopic examination of blood films. This method requires a well-trained laboratory staff.

During routine quality improvement support through the SafeCare program, we found that the lab attendants at many rural dispensaries and health centers in the Kilimanjaro region had never received formal laboratory training. This fact, combined with the high rates of positive malaria tests and the unlikelihood of such high incidence of the disease in the highlands, led us to suspect these lab attendants were misinterpreting their patients' blood films.

Initiating regular onsite training

To address this issue, laboratory experts from one of our quality improvement partners, Mission for Essential Medical Supplies (MEMS), visited each

dispensary and health center contracted under the insurance program. Every three months, these facilities received a full day of onsite training on malaria microscopy.

The training involved:

- Preparation and quality control of Field stain A & B or Giemsa stain
- Preparation of thick and thin blood films
- Staining thick and thin blood films using Field stain or Giemsa stain
- Examination of stained blood films for parasites
- Counting and reporting malaria parasites in blood films
- Interpretation of results of malaria microscopy
- Determining sources of errors in malaria microscopy
- Training in Standard Operating Procedures (SOPs) for each key component of the malaria testing and examination process.

Training materials included reference photomicrographs from reliable organizations such as the US Centers for Disease Control and Prevention. These materials could be accessed through the mobile phone network on tablets provided by PharmAccess. Each dispensary and health center laboratory also received slides with stained thick and thin malaria positive blood films they could use as a reference.

Over a period of about a year, quality officers collected monthly data on rates of positive malaria blood films from each dispensary and health center. They also recorded information on the laboratory staff, including level of training, staff turnover and leave periods.

KEY COUNTRY FACTS

49.3 m

Population (70% is rural)

73%

of people live on less than USD 2 /day

33.2%

of people's spending on healthcare is out-of-pocket

11.2%

general government expenditures on health (compared to 15% Abuja norm)

8.3 m

estimated annual malaria cases

21,000

estimated annual malaria deaths

— Based on 2012 and 2013 World Bank and World Health Organization data.

PROGRAM FACTS

42

clinics

8,482

enrollees

TOP 5 DIAGNOSES

- 1) Hypertension
- 2) Upper respiratory tract infections
- 3) Lower respiratory tract infections
- 4) Malaria
- 5) Muscle pain

— Based on Feb 2015 data.

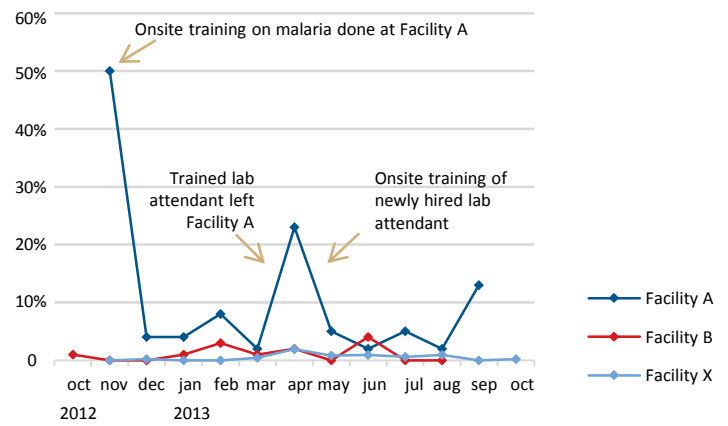
During the research period, the KNCU program was a health insurance program for coffee farmers in the Kilimanjaro Native Cooperative Union and their dependents.

In late 2014, this PharmAccess program was merged with the national Community Health Insurance Fund (CHF) to form the "improved CHF" (iCHF).

Table 1 Comparison of 3 health facilities.

	Facility A	Facility B	Facility X
Level of (formal) training of laboratory staff	Untrained	2-year trained	2-year trained
Total blood films examined	1,263	1,404	5,149
Monthly average and range of blood films examined	115; 42-170	128; 0-414	429; 0-837
Total number of reported positive blood films over the period, %	128; 10%	18, 1.3%	22, 0.4%

Graph 1 Percentage of lab results tested positive for malaria.



Collecting data to measure impact

This brief compares data from three anonymized facilities in the KNCU program. The objective was to test our hypothesis that the high malaria positivity rates were linked to the level of laboratory staff training.

Facility A and B are less than 5km apart, while facility X is a larger dispensary about 30 km away.

While the laboratory staff at facility A has had no formal training, facility B and X employ lab technicians that completed the recommended two years of training for this position. All three facilities received regular onsite malaria microscopy training over the course of a year.

Data collection experienced several difficulties. At facility B and X, no blood films for malaria were

examined in the months of November 2012 and January 2013 while the lab staff was on leave. Due to frequent power cuts in August 2013, facility A and B were able to examine only a small number of blood films. There is no standby or alternative power supply at these health centers.

Main findings

At facility B and X, the number of reported positive blood films remained consistently low, suggesting that the onsite training had provided little added benefit for formally trained staff.

At facility A, however, the proportion of reported positive slides reduced significantly from 50% of the total number of tests in November 2012 to 2% in March 2013. However, the trained lab attendant left and was replaced by a new, untrained attendant. This had an immediate effect on malaria test results: positive blood films went up to 23% of reported tests in April 2013. Once the newly employed lab attendant was trained, positive malaria slides reduced to 5% of reported tests.

Lessons learned

Given the resources required to train competent technical laboratory staff, many small rural clinics will continue to struggle to hire lab technicians who have been formally trained for the job. They will have no choice but to employ staff with limited skills to carry out lab tests, especially at lower-level health facilities. As RDTs for malaria are expensive, these clinics will continue to use microscopy in an attempt to provide prompt malaria treatment for community members. Clinics also struggle with high staff turnover, finding themselves having to replace staff every few months. Therefore, to best address this situation, regular onsite training can result in a significant decrease in misdiagnoses of malaria and unnecessary malaria treatment.

TAKE HOME MESSAGES

- Regular quality training can be very effective in teaching unqualified staff to correctly read microscopy blood samples.
- Quality assurance systems involving ongoing supportive coaching/mentoring and onsite training and supervision, as well as access to reference and practical training materials, can achieve marked reductions in malaria misdiagnoses.
- An alternative power source is crucial to ensure continuous service provision (including microscopic testing).

Authors Dr. Heri Marwa, Dr. Johnson Yokoyama and Orgenes Lema



Contact info@pharmaccess.org | www.pharmaccess.org
 PharmAccess mobilizes public and private resources for the benefits of patients and doctors through quality improvements and clinical standards, loans for healthcare providers, health insurance, health infrastructure consultancy, HIV/AIDS corporate programs, mHealth and impact research.