



Malaria Surveillance Training Workshops Assessment of Their Effectiveness

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U.S. President's Malaria Initiative



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MEASURE Evaluation

University of North Carolina at Chapel Hill
400 Meadowmont Village Circle, 3rd Floor
Chapel Hill, NC 27517 USA
Phone: +1 919-445-9350

measure@unc.edu

www.measureevaluation.org

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ABBREVIATIONS

CHV	community health volunteer
CME	continuous medical education
DHIS	district health information software
M&E	monitoring and evaluation
MEval-PIMA	MEASURE Evaluation PIMA
NMCP	National Malaria Control Program
PMI	U.S. President's Malaria Initiative
USAID	U.S. Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

Introduction

MEASURE Evaluation, a program funded by the U.S. Agency for International Development and the U.S. President's Malaria Initiative (PMI), has provided significant support for the development of systems monitoring and evaluation tools for national malaria control programs in various African countries. The Kenya National Malaria Control Program, with support from MEASURE Evaluation, developed a curriculum package used to train healthcare workers on malaria surveillance systems. The surveillance training began in 2015 in Kenya and was conducted in two phases in eight counties (four counties in each phase) with support from the Global Fund to Fight AIDS, Tuberculosis and Malaria and PMI. Training workshop participants were data producers and users of malaria surveillance data. In October 2016, following the training, MEASURE Evaluation surveyed participants to get their views on how useful the training was and to assess how well the skills taught were being applied. The survey objectives included assessing participants' retention of information delivered during the training workshops, assessing participants' application of knowledge and skills gained at the workshops, and understanding how future training workshops can be improved. This report assesses the effectiveness of healthcare worker training workshops and highlights findings from the assessment.

Methods

The initial step of the assessment was to perform a literature review of training and assessment documents. Next, a mixed-methods approach was used to ascertain trainees' knowledge retention, perceptions of the training, and recommendations for future training. Qualitative interviews with trained healthcare workers and healthcare managers were conducted, followed by an online survey of a sampling of healthcare workers using SurveyMonkey (www.SurveyMonkey.com). The online survey had 124 respondents.

Findings

Overall, the assessment found that, following training, healthcare workers had high levels of knowledge of malaria detection and treatment in all eight Kenyan counties where malaria surveillance training was held. Significant results from the online survey indicate that a majority of healthcare workers—97 percent—think that malaria surveillance is useful, not only during outbreak investigation but always; 90 percent of participants regard case management, including the use of artemisinin-based combination therapies, to be an appropriate malaria control measure; and 95 percent of respondents feel that malaria case confirmation cannot be done by clinical diagnosis. On frequency of reporting, three out of four healthcare workers recommend that the diagnosis of malaria should be reported both weekly and quarterly. The majority of participants did not see the completeness of monthly reports as a key malaria surveillance indicator, and most respondents agreed that there are two categories of core surveillance graphs required by the World Health Organization that are used to track outbreaks of malaria.

Based on interviews with healthcare workers and managers, the malaria training workshops were considered effective. Benefits of training include improved data quality, easier reporting, proper detection of malaria and correct linkage to the relevant levels of care, improved use of rapid detection tests for malaria, development of interventions and prevention as a result of entomology training, and the ability to make epidemiological calculations unique to a catchment area.

Results from literature the review of training assessment documents found that worker training is rarely evaluated.

Recommendations

Overall, the assessment clearly indicates that the workshops are effective. As noted from the findings, respondents received high scores on most of the questions that ascertain knowledge retention. Generally, respondents reported finding the training useful and gave recommendations for improving future training, which included the following:

- Including practical exercises in addition to lecture-type training
- Having trainees reside at the training venue rather than traveling long distances from their homes
- Using different facilitators for each training topic
- Inviting local employees from lower-level facilities
- Creating a training schedule for new employees
- Including employees of all cadres (playing different roles) during training
- Incorporating more job-related practice using surveillance tools during training

INTRODUCTION

Background

The last five years in sub-Saharan Africa have seen a leap in pledges and investments to support the health sector in achieving specific sustainable development goals. One of these goals is to prevent malaria epidemics by the year 2030. Challenges such as weak or nonexistent monitoring and evaluation (M&E) systems, poor access to technology, and lack of M&E personnel capacity are common. To address these issues, MEASURE Evaluation, funded by the U.S. President's Malaria Initiative (PMI) through the U.S. Agency for International Development (USAID), has supported the development of M&E systems for national malaria control programs (NMCPs) in several African countries. One key area of support is in improving malaria M&E capacity by training malaria control healthcare workers at national, regional, and district levels, including USAID project staff and employees of nongovernmental organizations.

In Kenya, the NMCP identified the need to (1) improve malaria surveillance systems, and (2) meet World Health Organization (WHO) requirements to collect data on malaria that are used to generate nine core surveillance graphs for tracking the spread of malaria (Government of Kenya, Ministry of Public Health and Sanitation, & Division of Malaria Control, 2011). With support from MEASURE Evaluation PIMA (MEval-PIMA), a curriculum was developed to train malaria surveillance staff. The curriculum included topics such as threshold-setting for epidemic warnings in malaria epidemic-prone areas and aimed to strengthen Kenya's malaria control system by building the surveillance capabilities of healthcare workers. Workshop participants were comprised of a broad spectrum of data producers and users, including medical officers, registered nurses, health records and information officers, public health officers, community health officers, community health extension workers, information communication and technology officers, environmental health officers, health administrative officers, enrolled nurses, clinical officers, laboratory technicians, pharmacists, and pharmaceutical technologists.

In 2015, with the support of the Global Fund to Fight AIDS, Tuberculosis and Malaria and PMI, the surveillance training was rolled out in two phases. PMI targeted eight malaria-burdened counties in Kenya for malaria surveillance training. The first phase covered the Kenyan counties of Kakamega, Kisumu, Migori, and Homa Bay, where 697 healthcare workers were trained. MEval-PIMA supported the second phase in Siaya and Vihiga, where 257 healthcare workers were trained, and AIDS, Population, Health and Integrated Assistance—Zone 1 supported workshops in Busia and Bungoma. By April 2016, 313 trainers and 4,669 healthcare workers across all counties were qualified. The eight counties supported continue to use their newly gained knowledge and skills.

Training workshop participants were invited to complete a follow-up survey in October 2016 to assess the level of retention of M&E skills and concepts and to determine areas needing improvement. This report provides the results of the survey, along with results from key informant interviews with participants' supervisors and county health facility managers.

Objectives of the Evaluation

This assessment aimed to evaluate the effectiveness of healthcare worker training in improving the surveillance of malaria, with specific focus on data collection, documentation, data sharing, and the use of data in decision making. The evaluation also aimed to determine the personal views of participants on

how useful the training was and to assess how well the skills taught were applied. The evaluation had the following objectives:

- Assess participants' retention of knowledge delivered during the training workshops.
- Assess participants' application of knowledge and skills gained at the training workshops.
- Understand how the training workshops can be improved for future participants.

METHODS

The evaluation employed several methods: a literature review, qualitative interviews with trainees and county-level managers, an online survey, a review of data from DHIS 2, and data analysis.

Literature Review

The literature review found that healthcare worker training curricula are rarely evaluated, are frequently duplicated, and often are not designed to meet the specific training needs of participants (O'Malley, et. al., 2013). The growing number of poorly prepared trainers may overwhelm and weaken training systems rather than strengthen them. Ensuring that the quality of the services delivered by healthcare workers is upheld and continually strengthened is of utmost importance to the universal health coverage agenda. Training is an important contribution toward the development and maintenance of healthcare worker competencies for delivering high-quality services, and delivering training that is effective, efficient, and sustainable is key. Materials such as USAID's *Improvement Framework for Healthcare Worker In-service Training* provides benchmarks developed by other African countries (National Malaria Control Center, Ministry of Health, 2010; Haumba, et. al., 2015),

Qualitative Interviews with Trained Healthcare Workers

A multilevel sampling process was used to select participants for the qualitative interviews. Interviewees were randomly selected from the two phases of the surveillance training. To ensure the participation of all levels of facilities and to ensure that two key informants from each county were included, additional purposive selection criteria were used. Key informant interviews with a selection of trained healthcare workers were used to gain perspective about how participants viewed the training. The interviews also captured responses about how the training workshops can be improved for future participants. The qualitative survey also identified specific highlights (i.e., key messages) from the training that participants remembered as well as how participants applied knowledge gained from the workshops.

Qualitative Interviews with County-Level Managers

A purposive process was used to select six county-level managers representing the areas involved with malaria surveillance, such as health records, pharmaceuticals, healthcare providers and public health officers, for qualitative interviews. Interviews recorded managers' perspectives on how the knowledge gained by staff trained at the malaria surveillance workshops impacted the quality of their work, how staff applied their new knowledge and skills, and whether managers would recommend the course to new employees.

Online Survey

An online survey was developed using SurveyMonkey. A pilot questionnaire was administered to three training participants, and based on their responses, changes were made to the questionnaire before the survey was distributed. A total of 763 participants who had been trained received an invitation and a link to take the online survey through e-mail, and the survey was available online for two weeks. Two reminder emails were sent to participants who had not responded.

The survey questionnaire was composed of three sections. The first section contained questions on the participant's background and employment status. The second section asked questions about the

participant's knowledge of malaria and key malaria surveillance concepts that were covered during training. The third section assessed the knowledge and skills gained and the impact on the participant's work. The survey also included a question on how the training workshop could be improved. A selection of questions from pretests and posttests administered during training sessions was included in the survey, and an average score was computed for comparison. A copy of the questionnaire is available in Appendix C.

Review of District Health Information Software Data

The NMCP receives data on malaria M&E from DHIS 2, the national reporting system for all routine health data, which is named for the software that runs it. The assessment used DHIS 2 data to compare malaria reporting rates and data quality and completeness recorded before healthcare workers received the training with malaria reporting rates and data quality and completeness recorded after healthcare workers received the training.

Data Analysis

DHIS 2 data on malaria were extracted, formatted in Microsoft Excel, and transferred to Stata 10 for analysis. Descriptive statistics (percentages and frequencies) were used to analyze healthcare workers' perceptions of the malaria surveillance training workshops. Audio recordings of key informant interviews were transcribed, and transcripts were coded and analyzed thematically using NVivo.

RESULTS

Online Survey Results

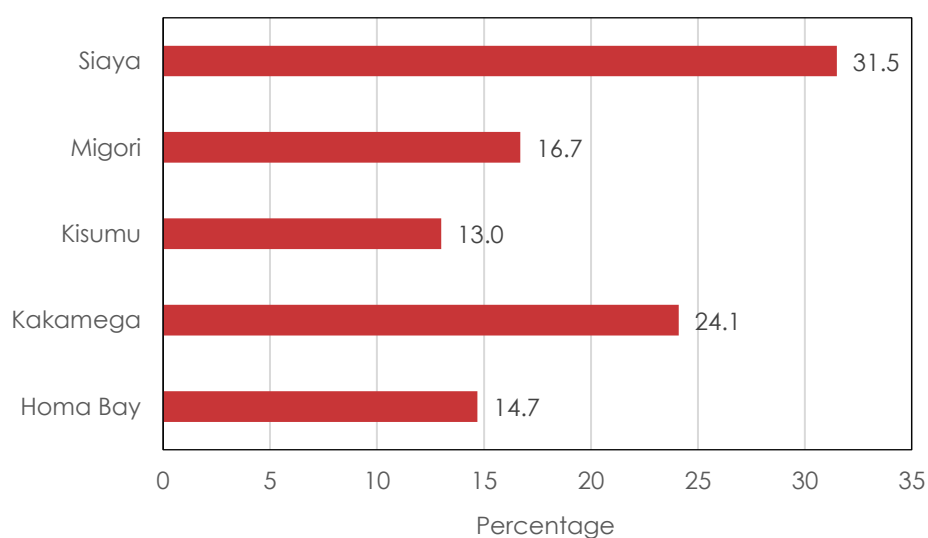
Participant Characteristics

A total of 763 participants were invited to take the online survey. Of these, 124 (16.3%) responded after a reminder was sent. The effectiveness of the reminders was limited to participants who could access their e-mail accounts within the survey period. Table 1 shows characteristics of the survey participants. Most of those who responded were female (56.9%), and 43.1 percent of participants were male. Participants mainly came from Level 2 facilities (32.4%), followed by Level 4 facilities (24.1%) and Level 3 facilities (23.1%). Level 1 facilities (2.8%) and Level 5 facilities (7.4%) had the fewest number of participants. The majority (89.9%) of participants reported that they were currently involved in malaria surveillance; only 13.6 percent had changed jobs since completing malaria surveillance training. Most respondents came from Siaya (31.5%) and Kakamega (24.1%)

Table 1. Survey participant characteristics

Characteristic	Number (%)
Sex	
Male	47 (43.1)
Female	62 (56.9)
Type of facility	
Level 1 facility	3 (2.8)
Level 2 facility	35 (32.4)
Level 3 facility	25 (23.1)
Level 4 facility	26 (24.1)
Level 5 facility	8 (7.4)
Currently involved in malaria surveillance activities	98 (89.9)
Changed jobs since completing malaria surveillance workshop	15 (13.6)

Figure 1. Percentage of participants by county



Participants' Overview of Malaria and Surveillance

Participants' overall knowledge of malaria and surveillance was good. Participants were asked whether disease surveillance is only useful during outbreak investigation, and the majority of respondents (96.9%) correctly stated that the statement was false. Participants understood that disease surveillance is not only used during outbreaks, but also before they occur so as to provide a basis for informed decision making to prevent or minimize outbreaks. In addition, 89.7 percent of respondents knew that case management, including the use of diagnostic tests and artemisinin-based combination therapy, is an appropriate malaria control measure as prescribed by Kenya malaria treatment guidelines.

Malaria Identification, Confirmation, and Reporting

Two questions assessed participants' knowledge of malaria identification, confirmation, and reporting. The first asked whether malaria should be reported both weekly and quarterly; the correct answer is "weekly," and the majority of participants (90%) said that the statement was "true." The second question asked whether malaria case confirmation is done using clinical diagnosis; 94.9 percent of respondents said that the statement was "false." The correct answer is "true" because malaria case confirmation is done using a clinical malaria parasitological diagnosis with either malaria rapid diagnostic tests or microscopy.

Core Malaria Surveillance Graphs

As a measure of whether they retained information on presenting malaria data, workshop participants were asked whether there are two core surveillance graphs and whether completeness of monthly reports is one of the malaria surveillance indicators. Out of 97 respondents who responded to the question, 85 (87.6%) agreed that there are two categories of core surveillance graphs; the correct answer is nine categories. Completeness of monthly reports was incorrectly reported *not* to be one of the malaria surveillance indicators by 92.8 percent of respondents.

Malaria Entomological Surveillance

Participants were also tested on aspects of malaria entomology. They seemed unsure whether anopheles mosquitoes are the most efficient vectors of malaria transmission, even though all mosquitoes are potential vectors. A significant percentage (37.4%) thought the statement was "true." The correct answer is "false" because only female anopheles mosquitoes are the most efficient vectors, and not all mosquitoes are potential vectors. However, for the question asking whether the WHO cone bioassay test is used to determine mosquito susceptibility to insecticides, a majority of respondents (87.9%) responded "true," which is the correct answer.

Support Supervision and Feedback

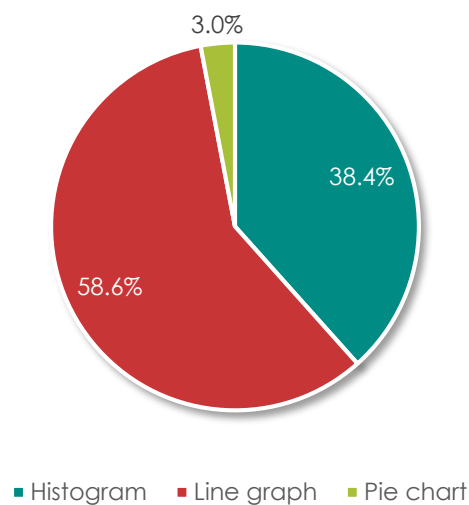
Most healthcare workers (91.9%) correctly indicated that the statement, "A good supervisor ensures that those who have not performed well are reprimanded" is false. Participants were a bit divided, however, on whether, to get a true picture of what is happening "on the ground," healthcare workers should not be informed of "an intended supervisory visit." About 30 percent answered that this was true, which is incorrect.

Attributes of Good Malaria Surveillance Data

Most respondents cited completeness and accuracy as attributes of good malaria surveillance data. Other attributes mentioned were timeliness, validity, reliability, and precision. All of these answers are correct.

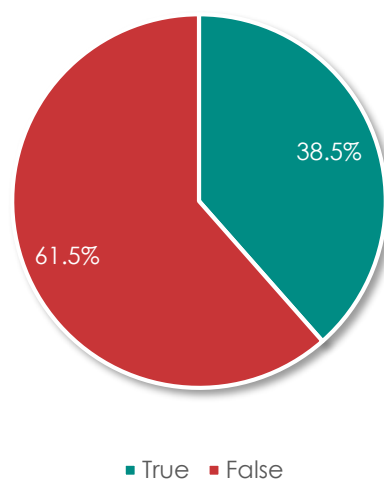
Figure 2 shows that majority correctly responded that line graphs (58.6%) should be used to display the number of malaria cases over time in a country; (38.4%) wrongly responded that a histogram should be used, and (3.0%) wrongly responded that a pie chart respectively should be used.

Figure 2. Preferred types of charts or graphs to use to display the number of malaria cases over time in a country



For the survey question that asked whether female anopheles mosquitoes can infect humans immediately after ingesting the malaria parasite, most participants answered correctly that the statement was false (61.5%) (Figure 3).

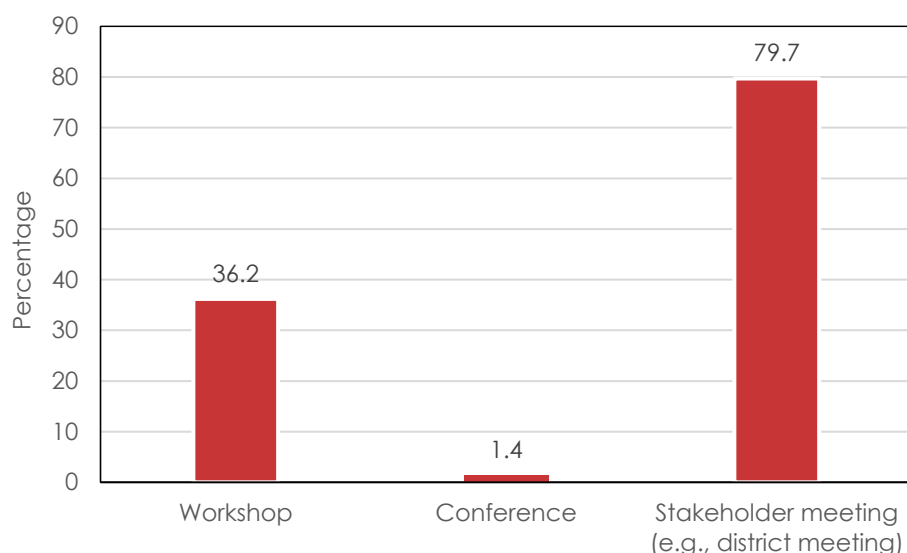
Figure 3. The female anopheles mosquito can infect humans immediately after ingesting the malaria parasite



Data Sharing

As shown in Figure 4, a majority of survey participants (81.6%) reported that in the last six months, they had shared malaria surveillance data with stakeholders or partners at stakeholder meetings (79.7%) and workshops (36.2%). A small percentage (1.4%) reported sharing data at conferences.

Figure 4. Forum where data were shared



Barriers for Implementing M&E Knowledge

Approximately half of the respondents (46.4%) reported encountering barriers to applying the skills and knowledge learned in the monitoring and evaluation workshops to their daily jobs. These barriers included stock outs or inadequate supplies; poor or suspect documentation; staff attrition and staff overwhelmed with new or additional job responsibilities; logistical challenges such as transport, lack of technical capacity or equipment, and power outages; and incomplete and late reports.

Comments on the Survey and Recommendations

Online survey participants were asked to submit general questions or comments they had about the workshops and the survey. They made several recommendations, including the extension of capacity-building activities, the need for updates on progress, the need for community meetings for net utilization, inclusion of community health volunteers (CHVs) in the workshops, and the need to organize a refresher training on how to plot indicator graphs.

Some specific challenges mentioned are the following:

Continuous data missing in DHIS even when data is keyed, confirmed and validated.

Lack of revised tools for most CUs and lack of adequate support to CHVs to motivate them to adhere to standard, constant reporting.

MoH tool 708 lacks baseline data, making it difficult to use in tracking cases.

Overall, participants noted that the workshops were very useful in improving skills in and knowledge of malaria surveillance. As noted by one of the respondents,

Generally, the malaria case management workshop has really improved my skills in malaria management and has also reduced misuse of antimalarial commodities.

Participants had various questions they wanted brought to the attention of MEval-PIMA and other stakeholders, including:

- Should a positive malaria rapid diagnostic test carried out by CHVs at the household level be retested in a hospital before the patient is given artemether-lumefantrine?
- Does MEval-PIMA hold performance review meetings?
- Can MEASURE Evaluation undertake to supply the test kits to reduce the incidences of clinical malaria which lead to misuse of antimalarials?
- When a test for malaria is positive, how should it be recorded in the reporting tool—as “confirmed malaria” or as “malaria positive”?
- How will this survey impact directly on our facility?

Qualitative Interviews with Trained Healthcare Workers

Nine healthcare workers were evaluated to understand the effectiveness of the training in improving malaria surveillance. The nine healthcare workers were drawn from health facilities in the following counties: Homa Bay (3), Kakamega (1), Migori (1), Siaya (2), and Vihiga (2). See Appendix A for a list of interview questions.

All healthcare workers interviewed reported that the training was beneficial to them and, except for one healthcare worker, that they could use the data for decision making. One healthcare worker had not used the data in decision making because a baseline graph showing the malaria trend for that area was not available for reference—these reporting tools are normally forwarded to the subcounty headquarters. The healthcare worker also had not discussed the data collected with managers. The major benefits of the training were mainly in relation to data collection, reporting, testing, and treatment of malaria.

This section provides a breakdown of findings on the usefulness of malaria surveillance training, workplace learning and mentorship, the importance of data surveillance, key messages from the training, use of materials shared during the training, application of knowledge and skills gained during the training, use of data in decision making, developing and implementing M&E plans, data presentation and analysis, data dissemination, data management and analysis, malaria surveillance capacity, recommendations and additional comments.

Usefulness of Malaria Surveillance Training

The interviews conducted with healthcare workers revealed that all nine found the malaria surveillance training beneficial and could apply the knowledge gained to their work. Four out of the nine healthcare workers found the training beneficial for improving data reporting, and three found it beneficial for malaria testing, treating, and tracing. One respondent found the training useful in making epidemiological calculations specific to that worker’s catchment area; another found the entomological part of the training to be useful. In summary, the benefits of training were improved data quality, easier reporting, proper detection of malaria and linkage to the relevant levels of care, improved rapid detection tests for malaria,

development of interventions as a result of entomology training, and the ability to make epidemiological calculations specific to a catchment area.

Workplace Learning and Mentorship

Healthcare workers suggested incentives for improving workplace learning and mentorship. The major incentives were allocating time for feedback sessions or during continuous medical education (CME) for sharing knowledge gained, ensuring that all employees undergo training providing resources to facilitate workplace learning, and having software that allows employees to easily access training materials for reference. Three out of nine healthcare workers interviewed said that allocating time for feedback sessions or during CMEs was an incentive for them to share what they had learned. Three healthcare workers said that there was need for training resources such as laptops, projectors, flip charts, and felt pens at the facility level, as well as transport to facilitate the sharing of information for those who need to move around to train others, such as disease surveillance coordinators. Two healthcare workers suggested that employees need to take turns when going for training or that all staff should be trained at the same time, and all should be prepared to share what they have learned. Other incentives include having work environments that ensure that healthcare workers have everything they need in terms of resources—whether diagnostic or treatment—to do their jobs, having software that makes it easy to access training materials just by clicking on it, having catchy posters and topics to advertise the CMEs, and providing snacks and refreshments to encourage employees to attend the sessions.

One challenge mentioned with workplace-based training is that it is often necessary for healthcare workers to keep repeating what they have learned for the benefit of those who were not in the office during the feedback sessions or CMEs. The remedy for this is having software at the facility that can allow for the storage of and easy access to reference materials.

Importance of Malaria Surveillance

The majority of healthcare workers interviewed said that malaria surveillance helps in prevention and control of malaria, with four out of nine healthcare workers listing this as the most important benefit of malaria surveillance; three out of nine interviewed said that malaria surveillance was important in monitoring malaria trends. Other reasons given for the importance of malaria surveillance included proper diagnosis; reducing drug waste as a result of correct diagnosis; teaching the community how to prevent malaria; improving service delivery; and tracking whether the interventions put in place to curb, control, or prevent malaria are working.

A healthcare worker in Migori County noted that one of the challenges of malaria surveillance is a shortage of reagents used for diagnosing malaria, which causes healthcare workers to give antimalarials without testing.

Key Messages Learned from the Training

The key messages reported by the healthcare workers interviewed regarded testing and treatment of malaria, data collection and reporting, clinical prevention of malaria, and the use of antimalarials. Five out of the nine healthcare workers interviewed recalled messages relating to testing and treatment of malaria, with two healthcare workers emphasizing that they learned to treat only those who are positive and not to treat malaria based solely on a clinical diagnosis. One healthcare worker added that malaria must be diagnosed based either on a positive rapid diagnostic test or through microscopy, and another added that

artesunate can be given for severe malaria. Two out of the nine healthcare workers interviewed recalled messages relating to data collection and reporting—one learned new ways of reporting the data, and the other noted the importance of data quality in terms of timely reporting. Other messages from training that stood out were clinical prevention of malaria using antimalarials; the four types of epidemiological malaria zones in Kenya—endemic malaria zones (the coastal and lake basin endemic zone), highland epidemic zones, seasonal malaria zones, and the arid areas; and accurate linkage of cases to provide effective treatment or care, follow-up, and rehabilitation within the community in order to ensure holistic care.

Use of Reference Materials Shared During Training

All nine healthcare workers interviewed found the materials used during training, such as manuals and books, to be useful. However, three healthcare workers admitted that reviewing the materials while in training was a challenge because they were busy and had difficulty finding time to read them. Also, some of these materials are stored away and it is easy to forget them, and sometimes those who attend the training keep the materials to themselves or leave them at home and other colleagues are not able to the materials.

One healthcare worker from Homa Bay thought that having more practical training that allowed workshop participants to put into practice what they were learning and having group discussions would be more effective than the training materials, which are stored after training. The use of posters seemed more effective to one healthcare worker from Vihiga than manuals because they could be seen by all. Another suggestion was for more information and resource centers for the facilities that do not have them, where manuals, books, and other materials can be stored for reference and accessible to all staff. Two healthcare workers preferred having materials such as manuals and books presented in soft copy format and sent via e-mail or on flash disks for easier reference, or having software at the facility to manage and access reference materials.

Application of Knowledge and Skills Gained from Training

During the interviews, healthcare workers revealed that they used the knowledge and skills they gained from the training mainly in data collection and reporting and in testing and treating malaria. Three healthcare workers explained that they had applied the knowledge gained in data collection and reporting, and in one case this information had been useful to the malaria coordinator in determining the quantity of commodities to order. Three healthcare workers reported that they had applied the knowledge and skills gained in malaria testing and treatment to ensure that tests were done before giving antimalarials to reduce wasting malaria drugs.

Use of Data in Decision Making

Five healthcare workers interviewed reported that they had used the data collected for decision making. Three of the healthcare workers had used the data collected to determine the amount of drugs or reagents to order. One healthcare worker reported using the data in monitoring malaria trends and finding the cause of an outbreak when a high number of cases are detected. Another healthcare worker could use the data to apply the malaria indicators. Another use of malaria surveillance data was to provide health education to clients for purposes of malaria prevention.

One healthcare worker reported that he and his colleagues have not used the data collected in decision making because healthcare workers at the facility have not discussed the data:

Respondent: We have not used it because we have not put up that graph to tell us the trend of malaria, maybe if you go to the reporting tools to see the trend, but every month we forward to the sub county headquarters.

Interviewer: And the data you collect, like the daily data showing, have you been able to use it?

Respondent: We have not sat down to discuss about it but we have it.

Developing and Implementing an M&E Plan

Two healthcare workers from Homa Bay and Vihiga reported that their facilities have developed and implemented an M&E plan. The M&E plans have made it possible for them to detect trends that show when cases of malaria are high and enable facilities to advise communities, for example, on the need to use mosquito nets.

Data Presentation and Analysis

Regarding data presentation and interpretation, a healthcare worker in Vihiga County pointed out that it was easier to present data in graphs, but this presented a challenge because they did not have computers and laptops. A healthcare worker in Homa Bay County reported that they do facility data quality assessment at the end of the month to see how they are doing and benchmark based on their findings.

Data Dissemination

Healthcare workers revealed that data are disseminated through meetings, such as data review meetings and meetings with department heads, and through reports. One healthcare worker in Vihiga County reported that they must go through their report as a group before presenting it to the subcounty malaria coordinator and that data review meetings are usually attended by the health records and information officer, the malaria coordinator, the clinical officer, and those dealing with patients directly. A major challenge hindering dissemination of data from county offices to the facilities in Vihiga was transport.

Data Management and Analysis

Of the health workers interviewed, 67 percent reported that they analyzed their data before submitting them to the DHIS 2 or before transmitting them to the county offices. The data are presented in graphs for easy analysis.

Malaria Surveillance Capacity

Three of the nine healthcare workers interviewed rated the malaria surveillance capacity in their facilities as “fair.” One healthcare worker gave the facility an “excellent” rating, and another rated malaria capacity as “poor.” The three healthcare workers who gave a “fair” rating felt that more needed to be done to support malaria surveillance, citing the need for more on-the-job training and M&E supervision. The healthcare worker who gave a “poor” rating also pointed out that there was a need for more trained malaria surveillance staff.

Recommendations for Improving Malaria Surveillance Training

The healthcare workers interviewed gave recommendations on how malaria surveillance training can be improved. These recommendations and comments from the healthcare workers are provided as follows.

Having enough time to cover the training materials:

I think the best thing is to prolong the training period, for example the last training was for 3 days but what we were trained on was a lot which in my view was supposed to be done in at least 5 days.

Having a variety of speakers to cover different topics:

If there are more topics then there is need for different of speakers, instead of having one person throughout the training.

Training more healthcare workers in a facility:

In my view, if you can train at least 3 people from a dispensary you will have covered at least a bigger population. For the health centers try to train at least half of them. I think you'd have captured a wider range because in dispensaries we are around 4 or 5 health workers, so if you train 3 then I think you have covered a big area.

Having facility-based training or update forums on what is trained:

It will be better if PIMA can organize one facility based training for all facilities so as to update everybody. A facility based training is better because all the healthcare workers at the facility will have a chance to hear the message. After my training, I was expected to give feedback to my colleagues but on coming back to my facility I found some of them had gone for the other training so they miss out on the information.

However, the majority of healthcare workers preferred having training outside the work environment as noted in the comment below:

Well in a workplace there can be a lot of interference but when we are in a place like a hotel, we have a conducive learning environment. Just to site an example of the situation we are in at the moment as we are having this interview people are coming in and out as they wish and interfering with our discussions.

Evaluating the effectiveness of training within a short period of time:

Well the training was good. It has taken a very long time before you came for evaluation. I don't know why you take so long then you come for an evaluation. I don't know, is this how you plan it or?

Having more training materials for technical staff:

We need some practical materials which can help improve the training, so that the technical staff can have a deeper understanding of the subject matter for example during the entomology session use of the tools would have gone a long way in ensuring participants understanding.

Training more public health officers:

Personally I think that you should train more public health officers because these are the people on the ground with the community. How I wish you'd train more public health officers because they routinely interact with the communities directly and can easily pass on these messages

Having more practical-oriented training:

Practical are very good. Power point presentations are usually monotonous and in the long run participants tend to switch off. Some end up doing their own business and using the free WIFI to access the internet and doing their own things. I strongly believe that practicum sessions engages us a lot.

I also feel that it is imperative to teach what is practical on the ground otherwise if you don't teach what is practical you make the healthcare workers get frustrated when they are expected to implement what they were trained on. I liked the approach used for the malaria surveillance training as the trainings are not time-consuming so the healthcare workers are not out of duty for too long. This gives them time to come back and implement the lessons learnt.

Having training that includes group discussions and presentations:

I think the best way to do this kind of training, which adds more value to those participant, is to minimize the number of lecture sessions. More time should be allocated for practical sessions such as group discussions, study groups and presentations. This method will help the participants remember more than actually being taught through lecturing.

General Comments

The healthcare workers also provided general comments, presenting their views and concerns with issues relating to malaria surveillance and touched on the importance of effective treatment of malaria in pregnant mothers, the importance of training in updating healthcare workers' skills, the need for supervisory support to address the issue of laxity among healthcare workers, M&E after training is done, the need for incorporating healthcare workers to assist in training within the facility, the need for training more malaria surveillance coordinators, and the importance of mentorship because it allows for feedback.

Qualitative Interviews with County-Level Managers

MEval-PIMA interviewed 10 healthcare managers to understand the effectiveness of healthcare worker training in improving the surveillance of malaria. The 10 healthcare managers were drawn from Homa Bay County (2), Kakamega County (2), Kisumu County (2), Migori County (2), Siaya County (1) and Vihiga County (1). See Appendix B for a list of interview questions.

Number of Staff Trained

During the interviews, healthcare managers were asked about the number of healthcare workers on their staff who were trained in malaria surveillance. The 10 healthcare managers interviewed reported numbers that ranged from 1 to 165, for a total of 613 staff who had been trained. The large differences in numbers of healthcare workers who had taken the malaria surveillance training are the result of the different positions held by the healthcare managers—some oversaw health facilities and others oversaw healthcare for entire counties. Also, in some instances, healthcare managers reported in terms of the number of healthcare workers in general, but others reported the number of healthcare workers whose roles were directly related to malaria. A healthcare manager from Migori County thought that the number of healthcare workers trained on malaria surveillance was small, compared to the total number of healthcare workers in all facilities; another healthcare manager from the same county pointed out that the training was attended by healthcare workers from different health professions who were sampled from all the eight subcounties, and therefore it was a representative sample.

Usefulness of Malaria Surveillance Training

Overall, there was consensus from the 10 healthcare managers interviewed that the malaria surveillance training was beneficial to the trainees. The major benefit, as mentioned by seven of the healthcare managers interviewed, was in data presentation and reporting. Improvements in data reporting included more timely submission of weekly malaria surveillance reports; an increased understanding of indicators and use of data tools, how to do simple calculations, and how to present data; an increased reporting rate; and an overall improvement in the attitude of healthcare workers regarding the need for data and for observing the guidelines for gathering and processing this information. Three healthcare managers indicated that they saw improvements in monitoring malaria trends: comparing disease and positivity rates, monitoring drugs used, setting up quality improvement teams to track progress, and using DHIS to track trends. Two healthcare managers said that the training also emphasized guidelines for diagnostic techniques and thus improved testing. One healthcare manager noted that trainees had learned how to eliminate the incidence of clinical malaria and improve the accountability of antimalaria drugs by ensuring that only those who have been confirmed to be having malaria are treated thus minimizing wastage. Other benefits mentioned included improved decision making and team work.

Application of Knowledge and Skills Gained from Training

All 10 healthcare managers interviewed reported that trainees had applied the knowledge and skills they gained from the training. Six healthcare managers cited the application of knowledge and skills in presentation and reporting of malaria data, and one healthcare manager reported the application of knowledge and skills in the administration of drugs to clients who tested positive for malaria. A healthcare manager from Homa Bay County noted the application of knowledge and skills in monitoring of malaria trends, and another from Migori County noted the application of knowledge and skills in decision making.

Notable Changes in Organization's Malaria Surveillance after Training

All 10 healthcare managers interviewed reported that there were notable changes in their organizations' malaria surveillance after trainees attended the course. The major changes noted were in the malaria reporting rate, with five healthcare managers reporting improvement in reporting rates with increases from 62–63 percent to 97–98 percent in one county, as well as a positive change in attitude by staff toward reporting. Four healthcare managers reported changes in monitoring malaria trends, and one reported improvements in testing.

Malaria Surveillance Capacity

Healthcare managers interviewed offered their opinions on malaria surveillance capacity by rating it on a scale of 1 to 5, where 1 is poor and 5 is excellent. Most of the healthcare managers rated their organizations' malaria surveillance between 3 and 4. Four healthcare managers rated their organization 4; two healthcare managers gave a rating of 3; one healthcare manager gave a rating of "either 3 or 4," and another gave a rating of 3.5. Only one healthcare manager gave a rating of 5, and one gave a rating of 1. Reasons healthcare managers gave for the lack of excellence in malaria surveillance were a lack of training for new staff, inadequate support, poor administering of antimalarials by technical staff, a lack of resources, and a need for mentorship and proper feedback systems.

Training Gaps in Malaria Surveillance

The healthcare managers interviewed said that there is a training gap in malaria surveillance. The problem is not with the malaria surveillance training curriculum; it is that more healthcare workers need training. Many had not taken malaria surveillance training because they were newly hired, or had been transferred to a new facility or role, or had not been among those who had been trained previously. A healthcare manager in Kisumu County said that out of 1,800 staff, only 150 staff had been trained on malaria surveillance. And of the 150 staff who were trained, some had retired or had been transferred to other workstations. (See “Number of Staff Trained” section above for more information on training.)

Incentives to improve workplace learning. Healthcare managers interviewed mentioned offering lunch and snacks as suitable incentives for motivating healthcare workers to take part in malaria surveillance training, particularly at work where trainees can access training information during their lunch breaks without interfering with service provision. Healthcare managers also said that recognition and certificates are other incentives for motivating healthcare workers.

Support for learning and mentorship. Although there were indications of a lack of support, generally learning and mentorship were highlighted as being important and are encouraged. It is clear, however, that healthcare managers expect mentorship programs to be supported by partners such as the county or PIMA. Healthcare managers agreed that although a healthcare worker could go through the local mentorship program, it is best to have a mentorship program with individuals from different facilities. Malaria Care was mentioned as one of the partners that successfully trained members—called Outreach Support Supervisors—externally. Ultimately, mentorship was hailed as being important in identifying and bridging the existing gaps in malaria surveillance training.

Key Messages from the Training

Healthcare managers mentioned several key messages from the malaria surveillance training during the interviews. Two included encouraging expanded monitoring of malaria trends and more information on malaria surveillance (e.g., what is malaria surveillance, what are the types of surveillance, and why is malaria surveillance important). Healthcare managers explained that, because of training, they could learn about malaria as a disease, its similarity to other infections, signs and symptoms of infection, and treatment. Another important training takeaway among healthcare managers was the importance of data to malaria surveillance, including data sourcing, processing, analysis, and use. One healthcare manager referred to malaria surveillance as a process—from data collection, analysis, and interpretation to dissemination and use in planning, budgeting, and research.

Methods Used to Provide Feedback to Trainers to Improve Future Training Programs

It was clear from some healthcare managers’ responses that feedback was not adequately disseminated: after training, most trainees did not share the information in their own facilities, and in some cases, they even forgot what the training was about, necessitating refresher programs. However, some healthcare managers reported holding data review meetings and forums that encouraged feedback, the sharing of information, and data analysis within the organization.

Usefulness of Training Resources

Healthcare managers interviewed offered different opinions about training resources—such as manuals, booklets, and brochures—used in the malaria surveillance workshops. Comments included their preferred format for data and other resources (e.g., hardcopies or electronic copies), the type of resources, and the effectiveness of each. Most healthcare managers preferred electronic copies over hard copies because this format allowed them to share the information easily; two favored hardcopies due to lack of computers. Regarding the manuals used, bulk and accessibility were mentioned as hindrances toward their effectiveness as resources. Healthcare managers felt books to be less effective because it takes time for them to be released, and once received, healthcare workers take them home for their private use. Posters and charts were frequently mentioned as the best methods for effectively reaching the highest number of people.

Data Processing after Training

Healthcare managers interviewed reported an increased use of data and its importance in decision making at the facility level, as well as increased access to information on all the different aspects of malaria and malaria surveillance. Healthcare managers also noted an improvement in data handling, and specifically a decrease in data errors.

RECOMMENDATIONS

For the assessment of malaria surveillance training, both healthcare workers and healthcare managers gave recommended ways to improve training:

- Increase the use of charts for drawing graphs during training.
- Include job-relevant practice exercises for trainees.
- Have trainees reside at the training venue rather than travelling long distances from their homes.
- Have several facilitators leading different training topics.
- Include lower level facilities.
- Create a training schedule for the new health workers joining the system.
- Include all health workers with different health professions who produce or use malaria data for the training
- Have a good proportion of trainees with different health training back grounds.

Other Comments about the Malaria Surveillance Training Course

Healthcare workers and managers thanked the PIMA team for the training and for enabling regions such as Kisumu County to develop an M&E plan. Participants pointed out the importance of off-site rather than facility-based training; the need for refresher training and training at the county level; and the need for support in M&E for malaria surveillance, not just from PIMA but also from other partners.

CONCLUSION

This report assesses the effectiveness of healthcare worker training workshops and highlights findings from the assessment. The results from the assessment of the Effectiveness of Malaria Surveillance Training Workshops provides information that is aimed at improving future trainings on Malaria surveillance. This assessment report will be useful generally to planners of similar trainings because it provides information on areas that have worked well and areas that need to be improved.

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APPENDIX A. KEY INFORMANT INTERVIEW GUIDE FOR HEALTHCARE WORKERS

Introduction and Consent: My name is _____ and I am from the Measure Evaluation, PIMA project. I would like to ask you some questions about the Malaria Surveillance Training Workshop that was organized by MEASURE Evaluation and attended in 2015/ 2016. This interview will assist us to evaluate the training and gain your views on how to improve the training in future.

Background information

Name: _____ Gender: _____

Job title: _____

Since the Malaria Surveillance Training Workshop conducted in 2015 and 2016 by MEASURE Evaluation, have you attended any other training on malaria surveillance?

1. What aspects of the training did you find most useful? What areas could be improved and how? ***Probe for what they found useful; what areas needed improvement?***
2. What roles can different stakeholders play to ensure continuum of learning between training and your day to day work activities? ***Probe for stakeholders including: trainer, manager, community, employer, GoK, county government***
3. Workplace based mentoring is one good way of learning. However, this can be a challenge for busy health professional like yourself. What incentives do you think would help improve workplace learning and mentorship?
4. Why is malaria surveillance important?
5. What are the key messages you remember from your training?
6. What methods could have been best used to provide feedback to trainers to improve future training programs?
7. Have you used any of the resources shared during the training as a reference in your day to day work?
8. Answer the following questions for each of the sessions listed in the table below:
 - a. Have you been able to **apply** the information and/or skills from the session in your work over the past 6 months?
 - b. If yes, please specify what resources you have used and how you have used them.
 - c. If yes, please explain with examples how you have applied the information/skills?
 - d. If no, please explain why you have not been able to apply the information/skills?

Session		Applied Since Training? (Y/N)	If yes, explain how you applied the information/skills: If no, explain why you have not been able to apply the information/skills:
1	Using Data for Decision-Making		
2	Developing and Implementing an M&E Plan		
3	Data Management and Analysis		
4	Data Presentation and Interpretation		
5	Data Dissemination and Use		

9. Is there anything you would have wished me to ask you but we have not talked about? Do you have any questions or suggestions?

Thank respondent and end interview

APPENDIX B. KEY INFORMANT INTERVIEW GUIDE FOR HEALTHCARE MANAGERS

Introduction and Consent: My name is _____ and I am from the Measure Evaluation, PIMA project. I would like to ask you some questions about the Malaria Surveillance Training Workshop that was organized by MEASURE Evaluation and attended in 2015/ 2016. This interview will assist us to evaluate the training and gain your views on how to improve the training in future.

Background information

Name: _____ Sex: Male _____ Female _____

Job title: _____

Facility: _____

1. How many of your staff attended the training on malaria surveillance?

2. In your opinion was the course beneficial to the trainees

a) Yes b) No c) Don't know

Please explain _____

3. In your opinion did the trainees apply knowledge and skill learnt to carry out the duties?

a) Yes b) No c) Don't know

Please explain _____

4. In your opinion has any change occurred in the organizations malaria surveillance after the trainee attended the course

a) Yes b) No c) Don't know

Please explain _____

5. Please rate your organizations malaria surveillance capacity

Poor				Excellent
1	2	3	4	5

6. Looking at your organization, are there still training gaps in malaria surveillance capacity?

a) Yes b) No c) Don't know

Please explain _____

7. Do you have any recommendation to improve the training?

8. Do you have other comments on the malaria surveillance training course?

Thank respondent and end interview

APPENDIX C. ONLINE QUESTIONNAIRE

SECTION 1

Contact Information

Name: _____

Sex: Male _____ Female _____

Telephone: _____

Position Title: _____

Name of facility: _____ Level of Facility _____

Name of Department: _____

Are you currently involved in malaria surveillance activities in your current job?

1. Yes 2. No

Have you changed jobs since completing the malaria surveillance workshop or program?

1. Yes 2. No

SECTION 2

1. Answer True (T) or False (F) in the boxes provided

Module 1: Introduction and overview of disease surveillance

a) 1. Disease surveillance is useful only during outbreak investigation.	
b) 2. Case management, including use of diagnostic tests and artemisinin-based combination therapy (ACTs), is an appropriate malaria control strategy for all epidemiological zones in Kenya.	

Module 2: Malaria identification, confirmation and reporting

a) 1. Malaria should be reported both weekly and quarterly	
b) Malaria case confirmation is done using clinical diagnosis	

Module 3: Malaria surveillance data management

a) Data presentation is the process of turning raw data into useful information.	
b) Lack of quality data is one the barriers to Data Demand and Use	

Module 4: Core malaria surveillance graphs

a) The core surveillance graphs are grouped into two categories	
b) Completeness of monthly reports is not one of the malaria surveillance indicators	

Module 5: Malaria entomological surveillance

a) Anopheles mosquitoes are the most efficient vectors of malaria transmission even though all mosquitoes are potential vectors (of malaria? All 400+ Anophelines? And even Cules and Aedes?)	
b) The WHO cone bioassay tests are used to determine mosquito susceptibility to insecticides.	

Module 6: Support supervision and feedback

a) A good supervisor ensures that those who have not performed well are reprimanded.	
b) In order to get a true picture of what is happening on the ground health care workers should not be informed of an intended supervisory visit.	

2. Name 2 components/elements of a malaria surveillance plan.

- a. _____
- b. _____

3. Which type of chart or graph should be used to display the number of malaria cases over time in one country?

- a. Histogram
- b. Line graph
- c. Pie Chart

4. True or False: The female anopheles mosquito can infect humans immediately after ingesting the malaria parasite.

- a. True
- b. False

5. In the past six months, have you shared any of your data with any stakeholders or partners?

- a. Yes
- b. No

If yes:

In what forum(s) were the data shared (Check all that apply)?

- a. Workshop
- b. Conference
- c. Stakeholder meeting e.g. district meeting
- d. Other (specify): _____

6. Have you encountered any barriers in applying/implementing the knowledge and/or skills learned from the M&E workshop?

If yes, please describe what barriers you have encountered:

I authorize MEASURE Evaluation to contact me to follow-up regarding any of the information I have provided in this questionnaire.

- YES, MEASURE Evaluation may contact me
- NO, I do not wish for MEASURE Evaluation to contact me

MEASURE Evaluation

University of North Carolina at Chapel Hill

400 Meadowmont Village Circle, 3rd Floor

Chapel Hill, North Carolina 27517

Phone: +1-919-445-9359 • measure@unc.edu

www.measureevaluation.org

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