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U.S. President's Malaria Initiative

USAID *Okoa Maisha Dhibiti* *Malaria* (OMDM) Activity

QUARTERLY PERFORMANCE REPORT: YEAR 2, QUARTER 3

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USAID *Okoa Maisha Dhibiti Malaria* (OMDM) Activity

QUARTERLY PERFORMANCE REPORT

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Abbreviations and Acronyms

ACD	active case detection
ANC	antenatal care
APHFTA	Association of Private Health Facilities in Tanzania
API	application programming interface
ASTMH	American Society of Tropical Medicine and Hygiene
bti	Bacillus thuringiensis var. israelensis
CBR	CDC light traps with collection bottle rotators
CDC	U.S. Centers for Disease Control and Prevention
CHMT	Council Health Management Team
CMSO	Council Malaria Surveillance Officer
CSSC	Christian Social Services Commission
CUHAS	Catholic University of Health and Allied Sciences
DC	district council
DEC	Development Experience Clearinghouse
DHIS2	District Health Information System 2
DLT	District Laboratory Technician
DMSO	District Malaria Surveillance Officer
DQA	data quality analysis
DVCO	District Vector Control Officer
EDS	electronic data system
eIDSR	electronic Integrated Disease Surveillance and Response
EIR	entomological inoculation rate
eLMIS	electronic Logistics Management Information System
FAA	fixed amount award
FBO	faith-based organization
FELTP	Field Epidemiology and Laboratory Training Program
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
GHSC	Global Health Supply Chain Technical Assistance project
GOT	Government of Tanzania
GPSA	Government Procurement Service Agency
HF	health facility
HIS	health information system
HLC	human landing catch

HMIS	health management information system
HSaT	household screening and testing
ICT	information and communication technology
IHI	Ifakara Health Institute
IMVC	Integrated Malaria Vector Control Unit
ITN	insecticide-treated nets
IPD	inpatient department
IPTp2	intermittent preventive treatment in pregnancy 2
IPTp3	intermittent preventive treatment in pregnancy 3
IQR	interquartile range
IRS	indoor residual spraying
JPPM	Joint Partner Planning Meeting
KCMC	Kilimanjaro Christian Medical Centre
kdr	knockdown resistance
LISA	local indicators of spatial association
LLIN	long-lasting insecticidal net
LSM	larval source management
LTC	CDC-light trap collection
MDA	mass drug administration
MCN	malaria case notification
MEEDS	Malaria Epidemic Early Detecting System
MERLA	monitoring, evaluation, research, learning, and adapting
MOHZ	Ministry of Health (Zanzibar)
MoHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children
MPR	malaria program review
mRDT	malaria rapid diagnostic test
MSaT	mass screening and treatment
MSD	Medical Stores Department
MSDQI	malaria services and data quality improvement
MSP	malaria strategic plan
MTR	Malaria Mid-term Review
MUHAS	Muhimbili University of Health and Allied Sciences
MVS	malaria vector surveillance
MVES	malaria vector entomological surveillance

NIMR	National Institute for Medical Research
NMCP	National Malaria Control Program
OMDM	Okoa Maisha Dhibiti Malaria Activity (Save Lives, End Malaria)
OPD	outpatient department
OR	operational research
PBO	piperonyl butoxide
PCR	polymerase chain reaction
PMI	U.S. President’s Malaria Initiative
PPE	personal protective equipment
PO-RALG	President’s Office—Regional Administration and Local Government
PSA	public service announcement
PSC	pyrethrum spray catch
PTC	pit trap catch
Q1/2/3/4	quarter 1/2/3/4
QA	quality assurance
RCH	reproductive and child health
RF	results framework
RHMT	Regional Health Management Team
RLT	Regional Laboratory Technician
RMIFP	Regional Malaria/IMCI Focal Persons
RR	report and request
SBCC	social behavior change communication
s.l.	sensu lato
SME	surveillance, monitoring, and evaluation
SOP	standard operating procedure
SOTA	state of the art
SP	sulfadoxine-pyrimethamine
s.s.	sensu stricto
STTA	short-term technical assistance
Swiss TPH	Swiss Tropical and Public Health Institute
TA	technical assistance
TAPAMA	Tanzania Parliamentarians Against Malaria
TBD	to be determined
TES	therapeutic efficacy studies

ToC	theory of change
ToR	terms of reference
ToT	training of trainers
TVCSP	USAID Tanzania Vector Control Scale-up Project
TWG	technical working group
UDSM	University of Dar es Salaam
USAID	U.S. Agency for International Development
WHO	World Health Organization
w/v	weight per unit volume
Y1/2/3/4	Year 1/2/3/4
ZAMEP	Zanzibar Malaria Elimination Program
ZILS	Zanzibar Integrated Logistic System

USAID *Okoa Maisha Dhibiti Malaria (OMDM)* Activity

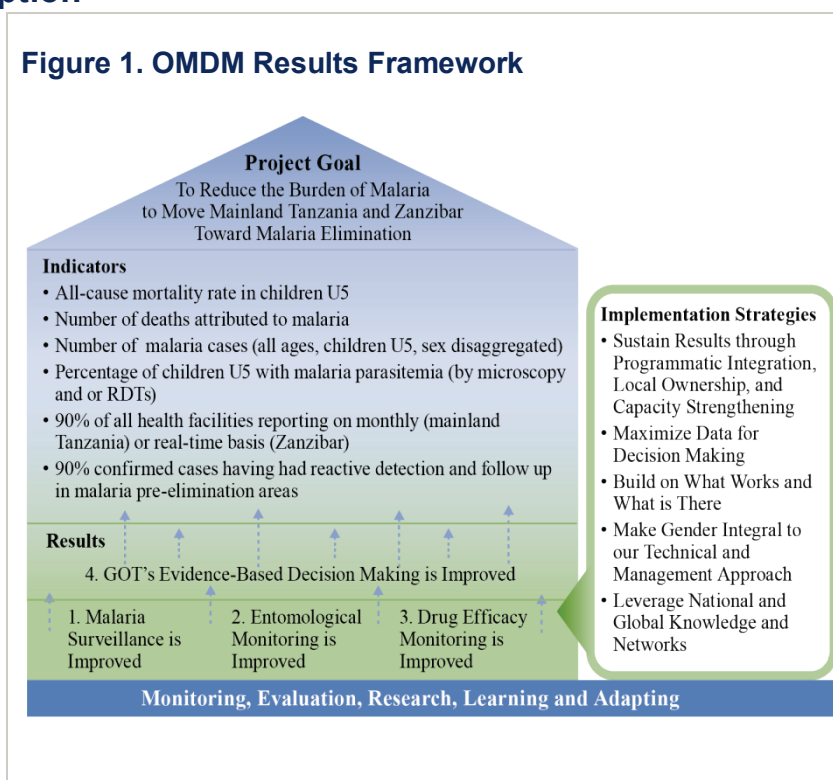
1. Program Overview

Program Name:	<i>Okoa Maisha Dhibiti Malaria (OMDM)</i> Activity
Activity Start and End Dates:	August 7, 2018 to August 6, 2023
Prime Implementing Partner:	RTI International
Cooperative Agreement Number:	72062118CA00002
Geographic Coverage:	Mainland Tanzania and Zanzibar
Reporting Period:	Year 2, Quarter 3: April 1–June 30, 2020

1.1 Program Description

As part of the United States Government’s continued commitment to reduce the burden of malaria in Tanzania, the U.S. Agency for International Development (USAID) awarded RTI International a five-year cooperative agreement aimed at supporting the Government of Tanzania (GOT) in strengthening malaria surveillance and monitoring and moving the country toward malaria elimination. USAID’s *Okoa Maisha Dhibiti Malaria (OMDM; Save Lives, End Malaria)*

Figure 1. OMDM Results Framework



Activity seeks to institutionalize malaria surveillance and monitoring at all government levels, maximizing the epidemiological impact of implemented malaria interventions by improving the targeting and implementation of interventions, refining approaches to manage transmission foci and respond to outbreaks, and providing key data to the GOT and stakeholders for policy development and programmatic decision making. **Figure 1** shows OMDM’s results framework underpinning the Activity’s programs.

OMDM’s Year (Y) 2 work plan, approved in December 2019, was developed in coordination with mainland Tanzania’s National Malaria Control Program (NMCP) and the Zanzibar Malaria Elimination Program (ZAMEP). This quarterly performance report focuses on Y2 quarter (Q) 3 OMDM activities conducted between April 1 and June 30, 2020.

1.2 Y2, Q3 Achievements

Table 1 summarizes OMDM’s progress toward achieving results during Q3. Please see Section 2 and Annex 1 for additional detailed information regarding progress under each activity.

Table 1. Summary of progress during OMDM’s Y2, Q3

OMDM result areas	Y2, Q3 achievements
Result 1: Malaria surveillance is improved	
MAINLAND TANZANIA	
<p>Activity 1A.1: Provide technical support to Surveillance, Monitoring, and Evaluation (SME) community</p>	<ul style="list-style-type: none"> The NMCP began developing the 2021–2023 concept note for the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) on April 20, 2020, in Dodoma. OMDM participated in virtual discussions organized by the NMCP to engage in dialogue around specific thematic areas; on April 28–29, 2020, we participated in the NMCP-facilitated discussions around the SME component of the concept note. Other sessions in which OMDM participated included discussions around the Case Management and Vector Control components.
<p>Activity 1A.2: Support Health Information Management System (HMIS)/District Health Information System 2 (DHIS2), electronic Integrated Disease Surveillance and Response (eIDSR), and malaria surveillance implementation</p>	<ul style="list-style-type: none"> As a follow-on activity from Q2, [REDACTED] OMDM’s Information and Communication Technology (ICT) Specialist, continued providing system support to the NMCP. In Q3, OMDM focused on improving the malaria services and data quality improvement (MSDQI) Dashboard and Mobile Application, focusing on data harmonization, resolving the MSDQI mobile application issues, and finalizing the MSDQI Dashboard as part of the DHIS2 version 2 Malaria Dashboard. Two virtual meetings were conducted on April 3 and 12, 2020, to track the progress on system upgrades. The second meeting was a follow-up on action items identified in the first meeting. 34 participants from the NMCP, University of Dar es Salaam (UDSM), OMDM, Boresha Afya, and the Swiss Tropical and Public Health Institute (Swiss TPH) participated in both meetings. OMDM continued to engage with the NMCP and the President’s Office–Regional Administration and Local Government (PO-RALG) in two data review virtual meetings, primarily using data from the DHIS2 Version 2 Malaria Dashboard. It was the first time that the Activity used Zoom to conduct this meeting due to slight concerns on participant engagement. However, the NMCP showed great commitment in not only fully participating in the Zoom sessions but encouraging the Activity to continue facilitating these virtual data review sessions, acknowledging the important role they play in informing the Program on the current malaria situation and addressing identified bottlenecks through the review of malaria indicators. OMDM conducted a virtual data review meeting with Boresha Afya Southern Highland and Lake Zone on May 14, 2020. This meeting was the first of its kind between two President’s Malaria Initiative (PMI) implementing partners. Boresha Afya is actively involved in MSDQI supervision; therefore, data review meetings focused on trends and the areas needed to improve malaria services and data quality in the regions it supports. 12 participants, including the malaria focal person from the Southern Highland and Lake Zone participated in the meeting. The indicators “overall Malaria by type diagnosis (indicator from outpatient department [OPD]),” “test ratio: OPD visit,” and “intermittent preventive treatment in pregnancy (IPTp) 2/3 coverage” were reviewed. Data quality analysis (DQA) scoring for MSDQI was also reviewed. MSDQI results were downloaded and analyzed at regional and district levels. However, Boresha Afya recommended that MSDQI results should be reviewed at the health facility (HF) level as well to allow supervision teams to follow-up with specific HFs that are underperforming in malaria services related to OPD, in-patient department (IPD), and other checklists.

OMDM result areas	Y2, Q3 achievements
<p>Activity 1A.3: Strengthen Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC) and NMCP outbreak response capacity</p>	<ul style="list-style-type: none"> OMDM is currently working on two publications focused on the eIDSR. 1) The first examines the history and scale-up of eIDSR and will be developed into its own manuscript. 2) The second is a continuation from an assessment conducted in year 1, reviewing the reporting and case comparison between eIDSR and DHIS2 at different strata. In this quarter, the Activity focused on improving the background, introduction and methodology sections. The analysis was also updated to reflect the new districts that began reporting through eIDSR in 2020. We will provide updated drafts to PMI for their review by August 10, 2020, before continuing to improve and finalize the manuscripts.
ZANZIBAR	
<p>Activity 1B.1: Support ZAMEP to update and implement malaria surveillance strategy</p>	<ul style="list-style-type: none"> In Q3, OMDM coordinated biweekly virtual stakeholders' meetings involving ZAMEP and partners supporting vector control, case management, and SME activities in Zanzibar. In response to the COVID-19 pandemic, it was deemed important for partners to closely support the Program to implement and adapt key malaria interventions according to the COVID-19 restrictions and recommendations outlined by the Ministry of Health Zanzibar (MOHZ) and the World Health Organization (WHO). The meetings were chaired by ZAMEP's Deputy Program Manager and included program staff from the SME, Vector Control, Case Management and Social and Behavior Change Communication (SBCC) units, along with PMI and implementing partners including VectorLink, OMDM, Global Health Supply Chain Technical Assistance project (GHSC), Boresha Afya, and others.
<p>Activity 1B.2: Develop interoperability between key health information systems (HIS)</p>	<ul style="list-style-type: none"> In Q3, OMDM continued with integration efforts by migrating data in Coconut Surveillance—from 2012—to DHIS2. The process involved aligning parameters between the two systems, a critical step as organization units for the 2012-2018 period such as names of districts and shehias were different than the existing organization units in DHIS2. Current organization in DHIS2 reflect the administrative boundaries in Zanzibar updated by the National Bureau of Statistics in 2019. The process was ~90% completed by the end of Q3 and was presented to ZAMEP, HMIS Unit, and other stakeholders on July 2, 2020, for feedback and input before completion. On May 11, 2020, OMDM met with HMIS Unit and GHSC representatives to discuss how malaria commodity data (antimalarial drugs, malaria rapid diagnostic tests [mRDTs] and long-lasting insecticidal nets [LLINs]) available in Zanzibar's Integrated Logistic System (ZILS) could be integrated into the DHIS2. The meeting resulted in recommendations provided to the ZILS team to revise the quarterly Report and Request (RR) approach to a monthly report within DHIS2, but also maintain quarterly reporting in ZILS. A specific request was made to the GHSC representative to share the status of the revived ZILS/DHIS2 integration process that will allow access to commodities distribution data and other reports via the DHIS2. Once the integration is complete, data will be included in the Malaria Dashboards to allow for easy visualization of the data.
<p>Activity 1B.3: Enhance and strengthen malaria case notification (MCN) information and ICT architecture and sustainability</p>	<ul style="list-style-type: none"> On March 6, 2020, four participants from the ICT and HMIS units of MOHZ and one from ZAMEP's ICT Unit were enrolled in online training courses on the MCN system architecture. Participants are continuing with the online courses and assignments. ██████████ and ██████████, RTI's Mobile Applications Developers based in the Nairobi Regional Office, engage weekly with participants via Skype Group Chat and Google Meet. Trainees are assigned activities and exercises specifically related to improving their MCN knowledge and to practice their skills in managing the system to equip them with adequate skills to maintain, troubleshoot, and enhance key features as they progress through their training. Throughout Q3, several communications have been exchanged amongst the OMDM team, ZAMEP, and RTI colleagues in Nairobi on the required efforts to increase data use for decision making within Coconut. Please see Section 2 for additional details related to the results of those discussions.

OMDM result areas	Y2, Q3 achievements
Activity 1B.4: Support MCN implementation	<ul style="list-style-type: none"> The Activity continues to engage with ZAMEP and District Malaria Surveillance Officers (DMSOs) to ensure that the MCN is functional. Data generated by the MCN are reviewed at least weekly—if not daily—by OMDM. Anomalies observed in the data are raised with ZAMEP, and any action required to correct the data or the procedures for collection are discussed and implemented. In Q3, OMDM provided updates on the malaria situation in Zanzibar to PMI and partners through stakeholder meetings and weekly reports. Data were also reviewed and analyzed with ZAMEP’s SME Unit through formal monthly data review meetings. On May 11 and June 10, 2020, OMDM conducted two virtual data review meetings with ZAMEP’s SME Unit in Q3. The first meeting reviewed malaria case classification data for the period of January–April 2020. The second data review meeting aimed at orienting ZAMEP’s SME Unit on the updated features within Coconut. District Malaria Surveillance Officer (DMSO) performance was also assessed including discussions on some of the challenges faced by the officers that hampered timely investigations.
Activity 1B.5: Refine operational thresholds and triggers as MCN data are analyzed	<ul style="list-style-type: none"> OMDM continued with the analysis of active case detection (ACD) in Zanzibar in Q3. Reactive case detection through Household Screening and Testing (HSaT) by DMSOs has been ongoing since 2013; ZAMEP also conducts proactive case detection through Mass Screening and Treatment (MSaT) in high incidence shehias to find and treat additional asymptomatic cases. MSaT is done periodically and targets shehias with ongoing transmission.
Activity 1B.6: Develop strategy and implementation plan to minimize malaria importation	<ul style="list-style-type: none"> On June 12, 2020, OMDM conducted a virtual meeting to disseminate preliminary analysis of the “Effect of change in rainfall patterns on spatial and temporal occurrence of malaria cases in Zanzibar” study to ZAMEP. [REDACTED], OMDM’s Surveillance & Monitoring Director led the discussion with support from [REDACTED], RTI’s Epidemiologist and Modeler.
Result 2: Entomological monitoring is improved	
Activity 2.1: Compile and review entomological monitoring data	<ul style="list-style-type: none"> OMDM facilitated a virtual meeting with entomology teams from ZAMEP, the National Institute for Medical Research (NIMR) Amani, NIMR Mwanza, PMI, the Centers for Disease Control and Prevention (CDC), WHO and VectorLink project on June 9, 2020. In Q3, OMDM continued to develop a protocol initiated in Q1 to assess the impact of indoor residual spraying (IRS) in Tanzania’s Lake Zone and Zanzibar. The protocol is in the final stages of development and will be shared with PMI, NMCP, and ZAMEP in Q4.
Activity 2.2: Conduct entomological monitoring planning and implementation	<ul style="list-style-type: none"> OMDM continued to support NIMR Amani, NIMR Mwanza, and ZAMEP to conduct entomological monitoring in Mainland Tanzania and Zanzibar. Please see Section 2 for additional details.
Activity 2.4: Provide equipment and supplies for entomological monitoring	<ul style="list-style-type: none"> In Q3, OMDM continued to facilitate the procurement, shipment, and custom clearance of the procured materials and supplies needed by NIMR Mwanza, NIMR Amani, NIMR Tanga, and ZAMEP for Y2 activities. Unfortunately, the shipments continue to be delayed due to COVID-19.
Activity 2.5: Entomological investigation and response in hot spot areas/active foci (Zanzibar only)	<ul style="list-style-type: none"> Please see Annex 2 to review Q3 updates from ZAMEP.
Activity 2.6: Capacity building of new entomological field team in new emerging hot spot (Zanzibar only)	<ul style="list-style-type: none"> OMDM worked with ZAMEP to initiate the development of standard operating procedures (SOPs) for foci investigation. No field activities were conducted during the reporting period due to COVID-19.

OMDM result areas	Y2, Q3 achievements
<p>Activity 2.7: Strengthen national malaria vector control strategies, policies, and guidelines</p>	<ul style="list-style-type: none"> • OMDM initiated discussions with ZAMEP to create a vector control technical working group (TWG) in Zanzibar in Q2; discussions continued in Q3 and will continue in Q4. The process has been slow due to COVID-19's impact on in-person meetings. As an interim measure, all vector control updates were shared in the bi-weekly virtual stakeholders' meeting coordinated by OMDM. • OMDM participated in meetings to support the NMCP to develop a new strategic plan and GFATM concept note on April 19 and May 20, 2020. Activity staff also participated in virtual meetings on April 29 and May 22, 2020 to discuss the Integrated Management of Vector Control Strategies (IMVC) thematic area .
<p>Result 3: Drug efficacy monitoring is improved</p>	
<p>Activity 3.2: Plan, monitor, and implement therapeutic efficacy studies (TES)</p>	<ul style="list-style-type: none"> • OMDM continued to support the Catholic University of Health and Allied Sciences (CUHAS) to plan for TES 2020, which was initially delayed because of the COVID-19 pandemic. Training and site initiation started on June 27, 2020, in Mlimba, a site led by Ifakara Health Institute (IHI). • OMDM continued to support NIMR Tanga to conduct molecular analysis of TES 2018 and 2019 samples. However, this activity was halted due to the delayed arrival of reagents and supplies as a result of the COVID-19 pandemic. OMDM is working with NIMR Tanga to reschedule the analysis pending clearance of the reagents.
<p>Activity 3.3: Provide equipment and supplies for TES</p>	<ul style="list-style-type: none"> • In Q3, OMDM continued to facilitate the shipment of procured reagents and supplies for NIMR Tanga's molecular analysis activities, including samples from TES 2018, 2019, and 2020. Some reagents and supplies that were delayed because of a ban on international transportation and shipping resulting from COVID-19 have arrived; delivery has been delayed in country pending customs clearance.
<p>Activity 3.5: Strengthen national malaria case management strategies, policies, and guidelines</p>	<ul style="list-style-type: none"> • In Q3, OMDM supported virtually TES TWG meetings on April 23, June 1 and June 23, 2020, during which the preparations for TES 2020 were discussed. These meetings brought together representatives from OMDM, NMCP, Muhimbili University of Health and Allied Sciences (MUHAS), IHI, NIMR Tanga, CUHAS, Kilimanjaro Christian Medical Centre (KCMC), PMI/USAID, and CDC/PMI and focused on TES 2020 planning in light of the COVID-19 pandemic and decisions made by the National Research Ethical Committee about human subject research. On June 23, 2020 clearance was received to continue with TES. Participants emphasized the importance of ensuring all safety precautions are taken during training and implementation to ensure research staff and client safety are prioritized.
<p>Result 4: GOT's evidence-based decision making is improved</p>	
<p>Activity 4.1: Strengthen Tanzania's capacity for state-of-the-art (SOTA) analysis and interpretation of surveillance, entomological, and drug efficacy data</p>	<ul style="list-style-type: none"> • Capacity building activities were cancelled because of limitations imposed on in-person meetings as a result of the COVID-19 pandemic in Tanzania. OMDM aims to reschedule planned workshops and trainings—e.g., scientific stature workshops and the Ghana Monitoring and Evaluation course—as Tanzania begins to reopen in Q4.
<p>Activity 4.2: Conduct SOTA analysis and interpretation of surveillance, entomological, and drug efficacy data</p>	<ul style="list-style-type: none"> • OMDM continued to support ZAMEP review and compile entomological surveillance data. A report was developed to highlight key analysis and results from the review of this data and shared with ZAMEP for their review and feedback. Additionally, findings from this report have been converted into a publishable article and will be shared with ZAMEP and PMI for review in Q4.
<p>Activity 4.3: Disseminate OMDM results through various channels</p>	<ul style="list-style-type: none"> • In celebration of PMI's 15th anniversary, OMDM prepared messages highlighting OMDM's achievements to be shared via USAID's and RTI's twitter handles. Messages focused on OMDM's successes integrating data for improved decision making, specifically highlighting Coconut and DHIS2 integration activities and our capacity building support to ZAMEP counterparts on both systems.

OMDM result areas	Y2, Q3 achievements
Activity 4.5: Implement Learning Agenda	<ul style="list-style-type: none"> On April 27, 2020, OMDM presented to PMI, an operational research (OR) study entitled “Measuring the programmatic impact of Reactive Case Detection vs. focal Mass Drug Administration to control malaria in Zanzibar” for review and comment.

2. Activity Implementation Progress

2.1 Result 1: Malaria surveillance is improved

MAINLAND TANZANIA

2.1.1 Activity 1A.1: Provide technical support to the SME community

Serve as members of and participate in relevant HMIS/DHIS2 coordinating bodies

Progress in Y2, Q3

No activities were conducted during the reporting period.

Planned for Q4

OMDM will participate in and provide support to SME coordinating bodies, including TWGs.

Support the NMCP in future review and updates of health sector strategic, policy, and technical documents

Progress in Y2, Q3

In April 2020, the NMCP initiated development of its 2021–2023 concept note to the GFATM. To ensure safety of stakeholders during COVID-19, the writing team in Dodoma was small and comprised key participants from the NMCP and PO-RALG; other key stakeholders were engaged virtually through Zoom. The inception meeting was conducted on April 20, 2020 during which the NMCP shared the concept note road map with partners and received guidance from key stakeholders and the external consultant on the key issues important for consideration.

After the inception meeting, NMCP periodically invited partners to continue the dialogue on specific thematic areas for inclusion in the concept note. On April 28, 2020, the NMCP facilitated a discussion on the SME component, focused on three strategic approaches:

- Strengthen comprehensive **malaria surveillance and response** for improved programmatic performance
- Strengthen malaria framework for collecting, processing and storing essential indicators from **periodic service delivery and programmatic surveys**
- Strengthen a comprehensive malaria strategic information system to **generate knowledge** for evidence-based planning and decision making at all levels

OMDM reviewed documents sent by the NMCP in advance and provided feedback during the virtual session.

Additionally, OMDM participated in other sessions held on April 29, 2020, related to the concept note development, including the Case Management and Vector Control components.

Planned for Q4

OMDM and other implementing partners will continue to engage in the implementation of the new Malaria Strategic Plan (MSP) 2021–2025.

2.1.2 Activity 1A.2: Support HMIS/DHIS2, eDSR, and malaria surveillance implementation

Continuously engage with MoHCDGEC, NMCP, and other stakeholders to ensure that HMIS/DHIS2 and eDSR are functional and that data flow is adhered to in terms of timely collection and transfer of data, data completeness, and quality

Progress in Y2, Q3

As a follow-on activity from Q2, [REDACTED], OMDM's ICT Specialist, continued providing system support to the NMCP. In Q3, OMDM focused on improving the MSDQI Dashboard and Mobile Application, specifically in data harmonization, resolving the MSDQI Mobile Application, and finalizing the MSDQI dashboard that is part of the DHIS2 Version 2 Malaria Dashboard. Two virtual meetings were conducted to track progress on system upgrades. During the first meeting on April 3, 2020, discussions focused on HF-based MSDQI data that was not visible in the DHIS2-based MSDQI Dashboard because several supervisors still had their tablets synced to the training server rather than the main DHIS2 server. The training server was initially used during testing of the MSDQI Mobile Application before moving to the main server once training and testing of the Mobile Application was complete. Because those supervisor tablets synced to the training server, any data they entered during supervision did not link to the Dashboard, which uses the live server as a data source. To resolve this issue, supervisors agreed to share the list of HFs where MSDQI was conducted and with missing data to UDSM so that it could migrate data from the training to the main server. UDSM received the list of facilities and extracted the data from the training to DHIS2 server. During data extraction, it was noted that some supervisors were entering data on the tablet but not pressing the sync button which enables the transmission of the data to the main server. For this reason, data for MSDQI supervision visits conducted at some HFs was still missing. The issue has since been resolved.

The second meeting on April 12, 2020 followed up on the action points from the first meeting (**Table 2**). Overall, 34 participants from NMCP, UDSM, OMDM, Boresha Afya, and Swiss TPH attended both meetings.

Recommendations

- UDSM will identify the facilities where supervision was done but their data did not sync, then communicate with the respective users to re-sync their data
- Users who still cannot sync their data should send their tablets to UDSM; UDSM will investigate the problem in more detail

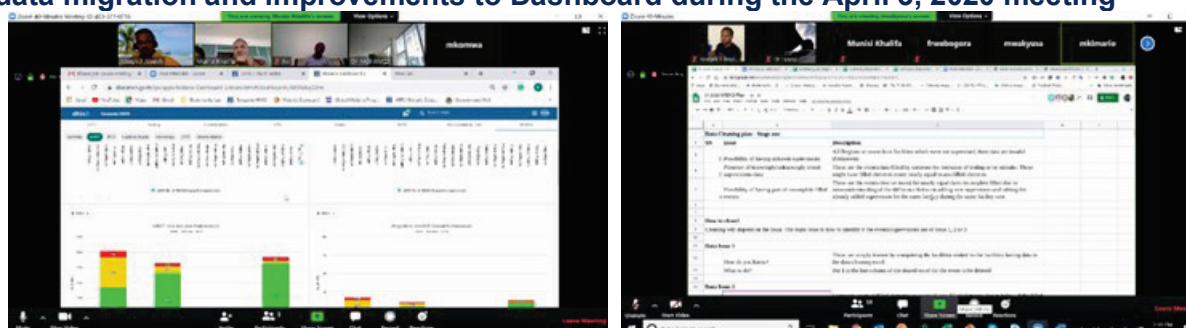
Table 2. Status and follow up of MSDQI system issues

No.	Item	Status	Action required	Deadline
1	MSDQI Dashboard	<ol style="list-style-type: none"> 1. Dashboard is still under maintenance; data changes from time to time due to feedback and findings from users and partners 2. Most of the charts in the Dashboard are functional 3. The MSDQI Dashboard is more interactive and various charts can be properly downloaded 4. Graphs showing number of supportive supervisions conducted have been added 5. mRDT and reproductive and child health (RCH) dashboards have been improved in DHIS2 	Finalize pending core and auxiliary indicators which are still not functional	Completed
2	Data migration	<ol style="list-style-type: none"> 1. All MSDQI data from pilot/testing server and Electronic Data System (EDS) data (dhis.hisp.tz.org/msdqi) migrated to live server (dhis.moh.go.tz) 2. Based on submitted data, it was observed that most supervisors had very little knowledge—possibly because many were not oriented—on how to operate and use the MSDQI Mobile Application. It appears that instead of editing already created reports for the same supervision periods, most users created/added new reports hence the significant number of duplicate entries, while also leaving the original one empty 	<p>Verify imported data and identify those that need to be removed or corrected to avoid data analysis quality issues in outputs in the MSDQI Dashboard</p> <p>Orient national and subnational users on the MSDQI Dashboard</p>	<p>Completed</p> <p>to be determined (TBD)</p>
3	Data Cleaning	<ol style="list-style-type: none"> 1. UDSM prepared an Excel sheet listing data element that need to be cleaned and procedures to follow during cleaning, including three phases: <ul style="list-style-type: none"> – Phase 1: Clean modules with autofill elements (completed) – Phase 2: Clean unknown supervision records, most of which were created during testing (completed) – Phase 3: Clean duplicate records from known supervision visits with a significant number of completed data elements (ongoing) 	<p>Boresha Afya to update the Excel sheet by highlighting data to be removed; share results with UDSM (completed)</p> <p>UDSM to delete identified duplicates</p>	<p>Completed</p> <p>Ongoing</p>

No.	Item	Status	Action required	Deadline
4	Indicator definitions	1. Due to the complexity of some calculations not supported by DHIS2, indicator definitions should be created in a standard report listing indicators and their calculations (in progress; UDSM currently developing the standard report)	UDSM to share standard report	July 2020
5	MSDQI Mobile Application	1. Resolve synchronization problem (completed) 2. Reduced number of metadata to be updated once application is launched (completed) 3. Create validation that prevents users from entering duplicate events/data (ongoing)	Finalize validations	July 2020

It was also recommended that the NMCP and UDSM should test the tablets with the MSDQI mobile applications installed prior to their use in the field and to automate the syncing of tablets to minimize data transfer delays.

Figure 2. Participants discussing via Zoom, the progress of MSDQI issues such as data migration and improvements to Dashboard during the April 3, 2020 meeting



Planned for Q4

OMDM will continue to support the NMCP by working with the ICT and Epidemiology Units and UDSM on DHIS2 system maintenance and additional enhancement features, such as rectification of eIDSR data and finalization of the Version 2 Malaria Dashboard, among others. Using the Malaria Dashboard, OMDM will also continue to monitor monthly DHIS2 data to monitor trends on key indicators and communicate with the NMCP in case further action or follow-up is required.

Facilitate monthly MoHCDGEC/NMCP data use workshops to review, analyze, and interpret epidemiological and programmatic data reported through the HMIS/DHIS2 and eIDSR, including Pause and Reflect sessions to identify trends, bottlenecks, and action items

Progress in Y2, Q3

Data review meetings with NMCP

OMDM continued to engage with the NMCP and PO-RALG through two data review meetings in Q3, primarily using data from the DHIS2 Version 2 Malaria Dashboard. Because of COVID-19 restrictions, it was not possible to conduct in-person meetings; therefore,

OMDM transitioned to virtual meetings using Zoom. These meetings represented the first time the Activity used virtual means to conduct a data review meeting. Despite OMDM's concerns on how engaged the participants would be using Zoom for these meetings, the NMCP showed great commitment in not only fully participating, but also encouraging the Activity to continue facilitating the virtual data review sessions, acknowledging the key role they play to inform the Program on the current malaria situation and address identified bottlenecks through the review of malaria indicators.

The first data review meeting was held on April 15, 2020 including participants from the NMCP, PO-RALG and Boresha Afya. During this meeting, the indicator “**Proportion of all malaria cases among all OPD visits**” was reviewed (Figures 2–4). Participants used the Malaria Dashboard to discuss national, regional, district, and facility-level data for the selected indicators to assess their performance, identify areas and possible reasons for low performance, and develop strategies for their mitigation (Table 3).

Figure 3. Monthly proportion of all malaria out of total OPD visits, January 2019–February 2020

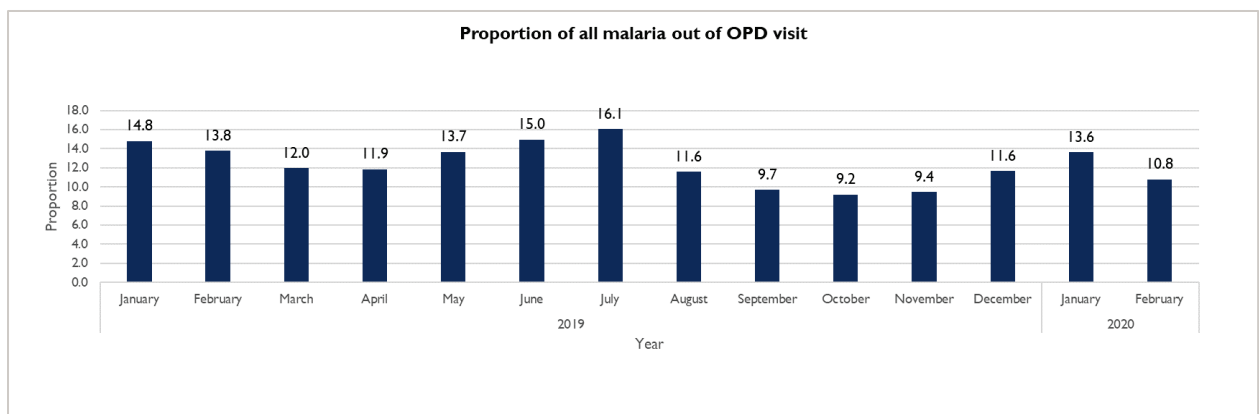


Figure 4. Proportion of all malaria out of total OPD visits by region for February 2020

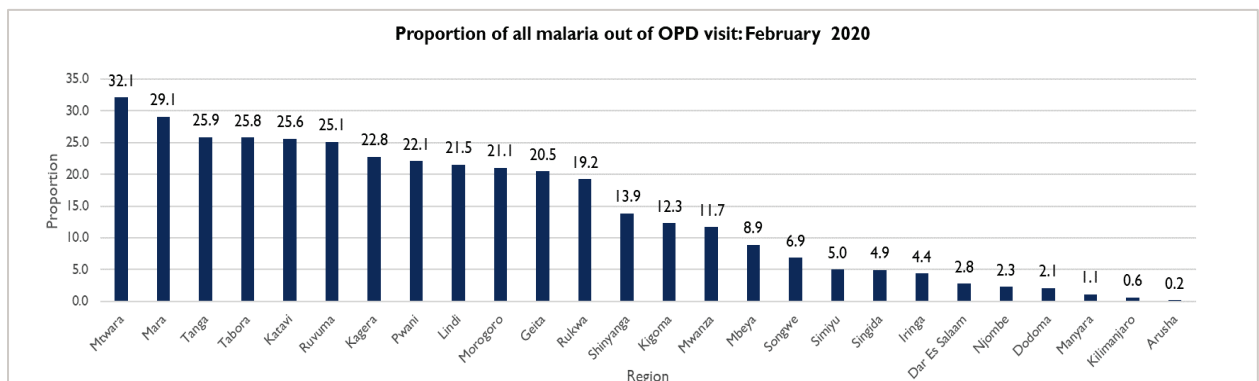
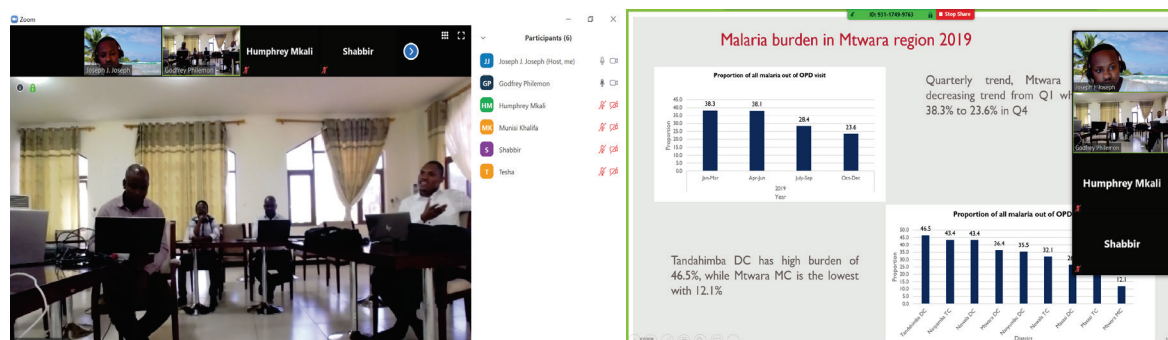


Table 3. Recommendations, follow-up and way forward from April 15, 2020 meeting

No	Key follow-up actions	Responsible	Timeline
1	Monthly data review to identify facilities observed to have over 100% of all malaria cases recorded through total OPD visits, and plan for follow up with the respective malaria focal persons to check data entry from their registers	Regional Health Management Team (RHMT), Council Health Management Team (CHMT), PO-RALG and NMCP	Monthly and ongoing
2	Improve MSDQI supervision visits to ensure HF workers improve malaria services, including data quality	RHMT and CHMT	Monthly and ongoing
3	Effective implementation of malaria control interventions at the community level to reduce elevated malaria cases (malaria burden)	RHMT and CHMT	Monthly and ongoing
4	Increase platforms to share malaria data by developing WhatsApp group to include Regional Medical Officers (RMOs), Regional Malaria/IMCI Focal Persons (RMIFPs), NMCP, PO-RALG and implementing partners	RHMT and CHMT	Ongoing
5	Follow-up with PO-RALG about outstanding issues from monthly data review meetings that need to be addressed	NMCP	TBD
6	Provide targeted supervision to regions and councils observed to have multiple and/or persistent issues	NMCP, PO-RALG and implementing partners	TBD

Figure 5. Participants from NMCP engaging via Zoom during data review meetings



The second data review meeting was held via Zoom on May 26, 2020, and included 19 participants from the NMCP, PO-RALG, and Boresha Afya. During this meeting, the indicator **“Number of clinical malaria cases in OPD”** was reviewed (Figures 5 and 6). Using the DHIS2 Version 2 Malaria Dashboard, data from the national through HF levels were used to assess performance. The Activity and NMCP continue to develop an action plan to address under-performance (**Table 4**).

Figure 6. Number and proportion of clinical malaria cases at the national level, comparing Jan–Apr 2020 data with the same period in 2019

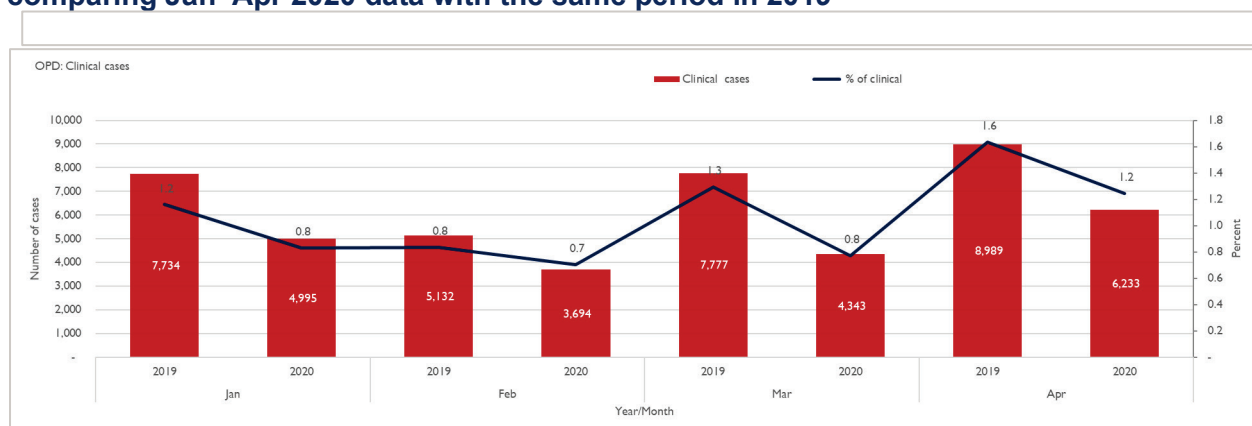


Table 4. Recommendations from May 26, 2020 meeting

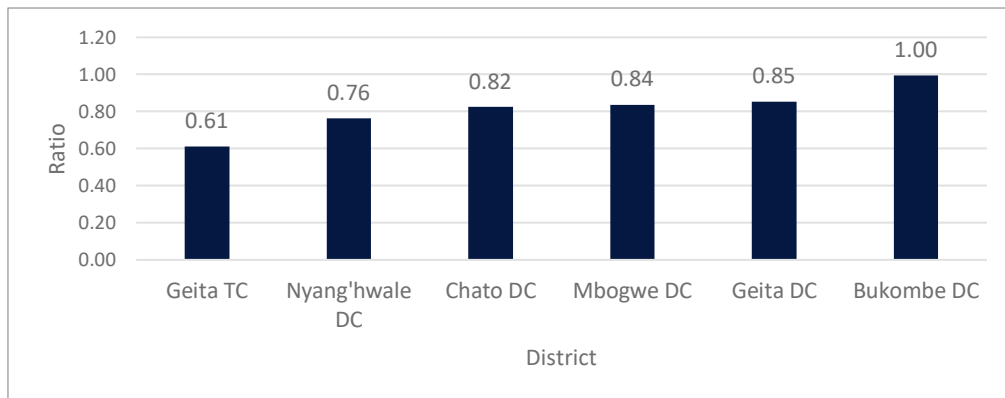
No	Key follow-up actions	Responsible	Timeline
Number of clinical malaria cases in OPD			
1	Identify under-performing regions and include malaria focal person in next review meeting	RTI, NMCP	TBD
2	Conduct supportive supervision to HFs reporting high proportion of clinical cases to understand the problems/gaps	NMCP, implementing partners	Not specified
3	Meet to discuss the challenges faced by private HFs on microscope use. The meeting will include the Board of Private Laboratories, District Laboratory Technicians (DLT), Regional Laboratory Technicians (RLT), PO-RALG, Association of Private Health Facilities in Tanzania (APHFTA) and Christian Social Services Commission (CSSC) (Supervisors of Faith Based Organizations (FBOs))	NMCP Case Management Unit	Complete
	Communicate with Medical Stores Department (MSD) to find out why they did not provide enough commodities to HFs while the commodities are free	NMCP	Complete

Data review meeting with Boresha Afya

OMDM conducted a virtual data review meeting with the two Boresha Afya projects for the Southern Highlands and Western and Lake Zone on May 14, 2020. This meeting was the first of its kind between two PMI implementing partners. Boresha Afya is actively involved in MSDQI supervision; the focus of the meeting was to discuss in detail trends and areas of improvement for malaria services and data quality in the regions being supervised. The meeting was conducted via Zoom and included 12 participants and the malaria focal person from selected regions of the Southern Highland and Lake Zone. The indicators “overall Malaria by type diagnosis (OPD),” “test ratio: OPD visit”, and “IPTp 2/3 coverage” were reviewed. DQA scoring for MSDQI was also reviewed. Between January and March 2020, we observed that Bukombe district council (DC) in Geita region reported high ratio of the OPD visit test (Figure 7). Further review of HFs within Bukombe DC was also conducted to identify which health service providers were reporting a high ratio of testing to OPD visits. It was unusual for such high reporting since the data suggest that everyone who visited the OPD department was tested for malaria representing two times the national average (0.50).

This analysis helped Boresha Afya Western and Lake Zone pinpoint the facilities and investigate reasons for the abnormal reporting.

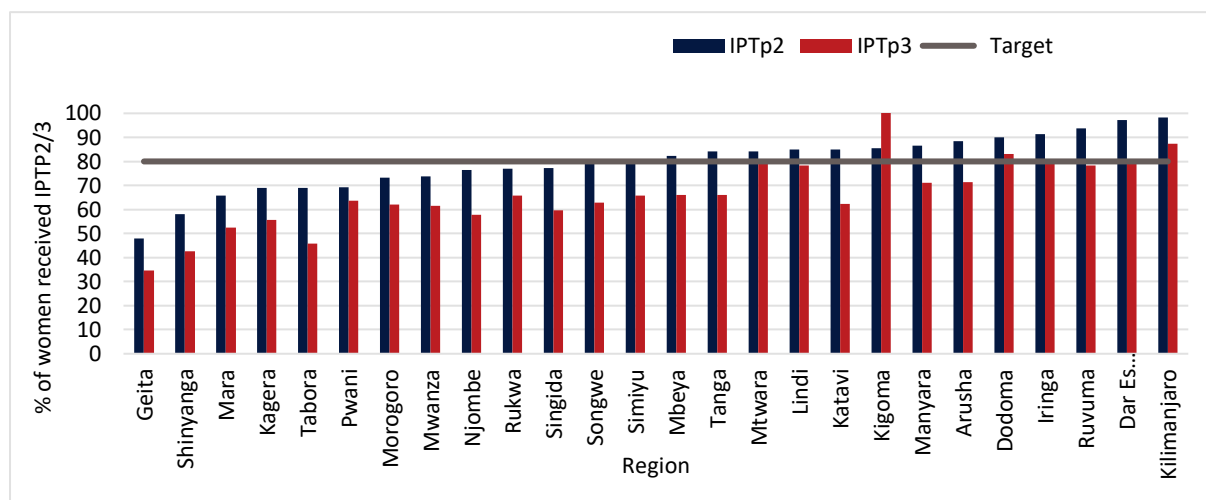
Figure 7. Ratio of malaria test: OPD visit in Geita Region period, January– March 2020



For IPTp 2/3, it was noted that some of regions (Figure 8) did not reach the target of 80% IPTp coverage for two main reasons:

- Lack of sulfadoxine-pyrimethamine (SP) in HFs
- Calculation of the indicator, whereby the denominator includes all antenatal care (ANC) visits, thus underestimating the actual coverage. However, this is how the NMCP is measuring IPTp coverage in Mainland Tanzania. Additional dialogue is needed with the NMCP to improve the way this indicator could be captured to reflect more accurate coverage of IPTp in HFs.

Figure 8. IPTp 2 and IPTp 3 coverage by regions for the period January–March 2020



OMDM will continue engaging directly with Boresha Afya through regular data review sessions as part of improving data demand and use amongst PMI partners and across implementing regions.

Support to NMCP’s SME staff

Due to COVID-19 restrictions, the OMDM team was unable to travel to Dodoma in Q3 to lend onsite support and coaching and mentoring to the NMCP’s SME staff. We hope to revive these trips once the situation normalizes in Tanzania.

Planned for Q4

OMDM will continue supporting the NMCP to conduct data review meetings in Q4. We also hope to revive short-term technical assistance (STTA) trips to Dodoma given the normalizing situation in Tanzania following the pandemic. Additionally, OMDM will be advertising a new position in July for a Surveillance and Monitoring, Evaluating, Research, Learning, Adapting (MERLA) Advisor to be permanently located at the NMCP in Dodoma to provide onsite support to the SME team there.

Maximize the use of the malaria interaction dashboard within DHIS2 and promote its use at all levels

Progress in Y2, Q3

No activities were conducted during the reporting period.

Planned for Q4

In Q4, OMDM will continue to engage with the NMCP and relevant stakeholders to build capacity around using DHIS2 to institutionalize data review and use by key staff.

Support the NMCP and other stakeholders in the implementation of the MSDQI framework by facilitating the interpretation and utilization of the outcomes of the routine supportive supervision activities

Progress in Y2, Q3

In addition to providing system support to improve the MSDQI Mobile Application and Dashboards, OMDM continued facilitating the use and interpretation of MSDQI data in Q3. On May 14, 2020, OMDM conducted a meeting with Boresha Afya to review MSDQI results from Q2 (January–March 2020) within the regions where they implement. MSDQI results were downloaded and analyzed at regional and district levels; Boresha Afya recommended that MSDQI results be additionally reviewed at the HF level. This would allow supervision teams to follow up with specific HFs that are underperforming in malaria services related to OPD, in-patient departments (IPD) and other checklists. Based on the feedback, OMDM will explore how to visualize HF data which are based more on events rather than aggregated data, thus making it more challenging to create charts and tables to interpret the results.

Planned for Q4

OMDM will continue updating and sharing results as part of data use and decision making with PMI and implementing partners including Boresha Afya, the NMCP and PO-RALG.

2.1.3 Activity 1A.3: Support MoHCDGEC and NMCP outbreak response capacity

Support the MoHCDGEC/NMCP to define thresholds and triggers indicating malaria outbreak, including implementing them as predictors and automated notifications in eIDSR and DHIS2 and continuously monitoring and analyzing malaria data in the national DHIS2 system

Progress in Y2, Q3

OMDM is currently working on two publications focused on the eIDSR. The first examines the history and scale-up of eIDSR and will be developed into its own manuscript. The second is a continuation from an assessment conducted in Y1, reviewing the reporting and case comparison between eIDSR and DHIS2 at different strata. We will provide updated drafts to PMI for review and feedback, before continuing improving on and finalizing the manuscripts.

Planned for Q4

OMDM will share the updated drafts of the eIDSR manuscripts with PMI by August 10, 2020 and continue working on them as we receive feedback.

ZANZIBAR

2.1.4 Activity 1B.1: Support ZAMEP to update and implement the malaria surveillance strategy

Coordinate malaria surveillance and response system strengthening efforts through the Malaria Surveillance TWG

Progress in Y2, Q3

In Q3, OMDM coordinated biweekly virtual stakeholder meetings chaired by ZAMEP's Deputy Program Manager involving ZAMEP partners supporting vector control, case management, SBCC, logistics, and SME activities in Zanzibar, in addition to PMI and implementing partners from VectorLink, OMDM, GHSC, Boresha Afya, WHO, and Swiss TPH. In response to the COVID-19 pandemic, it was important for partners to closely support the Program to implement key malaria interventions and adapt according to COVID-19 restrictions and recommendations defined by the Ministry of Health and WHO. During the meetings, participants also provided updates on the implementation of different malaria interventions and how best they could be accomplished during COVID-19. The first meeting was conducted on April 30, 2020.

SME Unit. OMDM supported the SME Unit to analyze and present key malaria updates. ZAMEP and partners reviewed the weekly malaria situation, HF testing and OPD trends, as well as DMSO performance in terms of household visits, which were impacted due to the officers also sharing responsibilities to follow-up on suspected COVID-19 cases. Rainfall and transmission patterns were also analyzed for the period of 2017–2020. Additional analysis on case classification to indicate the change in local versus imported cases in relation to changing travel habits during the pandemic, LLIN use, and access based on data collected by DMSO household follow-up, also helped ZAMEP understand changes in travel-related malaria as well as to identify gaps in terms of net usage and availability in both Unguja and Pemba.

The **Malaria Case Management Unit** provided updates on activities implemented by ZAMEP, including support from Boresha Afya to prepare and print case management guidelines and training on EDS/MSDQI. Boresha Afya also supported ZAMEP develop SOPs for health workers when providing care and treatment during COVID-19. Other areas of support included the procurement of slide cabinets for the blood slide bank, conducting feedback meetings, and engaging a consultant to help develop the interactive MSDQI Dashboard.

Vector Control Unit. ZAMEP, with support from VectorLink and FHI 360's Tulonga Afya project continued to plan and distribute LLINs during the mini-mass distribution campaign designed to distribute more than 220,000 LLINs across 52 shehias in the Urban and West districts of Zanzibar. Because of the ongoing COVID-19 pandemic, door-to-door distribution was conducted. Due to the change in modalities, some challenges were encountered, such as the need for additional resources (increase in transportation costs, engaging more volunteers, and procuring additional masks and hand sanitizer) for them to deliver nets to the registered households. Additionally, various SBCC strategies had to be implemented such as focused Public Service Announcements (PSAs) in the targeted shehias.

The meetings were much appreciated as they allowed the Program and partners to regularly share key information and help adapt strategies to implement important activities such as the mini-mass distribution of LLINs.

Planned for Q4

OMDM will continue working with ZAMEP and partners to organize stakeholder meetings in Q4.

Strengthen public and private sector facility malaria diagnosis and treatment capacity

Progress in Y2, Q3

Annex 2 provides Q3 updates from ZAMEP.

Strengthen health facility- and community-level SBCC capacity

Progress in Y2, Q3

Please see **Annex 2** to review Q2 updates from ZAMEP.

2.1.5 Activity 1B.2: Develop interoperability between key HIS

Complete ongoing electronic interoperability efforts between MCN and DHIS2 to enable ZAMEP to compare, analyze, and visualize data from multiple sources in DHIS2, including the ability to automatically generate necessary program and data elements in DHIS2

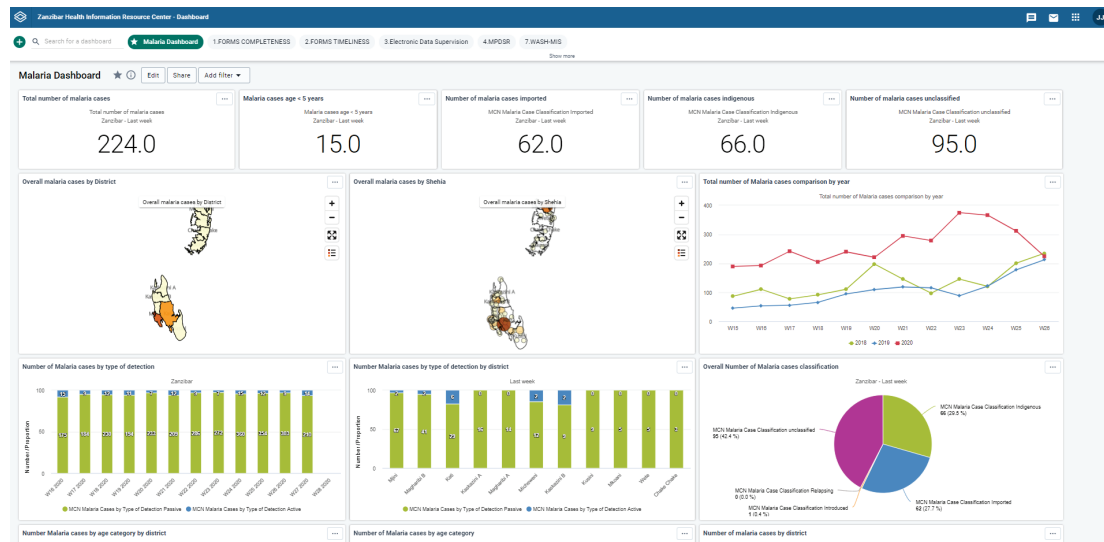
Progress in Y2, Q3

Beginning in Q2, integration between Coconut and DHIS2 focused on the following:

- harmonizing the shehias in DHIS2 and Coconut
- developing indicators in DHIS2 and linked in Coconut
- configuring scripts in Coconut to push data to DHIS2
- migrating data from Coconut to DHIS2 using a web-based application programming interface (API)
- creating the dashboard in DHIS2 to visualize the data
- testing the integration process and replication to the live DHIS2 system.

All of the above tasks were completed, including migration of data for the period April 2019 to 2020; what remained was the migration of data from previous years. In Q3, OMDM continued integrating efforts by migrating data dating back to 2012 that was in Coconut into DHIS2. This migration required some effort, particularly since organizational units for the 2012–2018 period—such as names of districts and shehias—were different from the current organizational units in DHIS2 reflecting the current administrative boundaries in Zanzibar updated by the National Bureau of Statistics in 2019. Therefore, it was important to match previous years' district and shehia names to the most recent list. As of June 2020, all data have been migrated. However, there are still a few organizational units requiring verification between the two platforms; this is ongoing. DHIS2 dashboards have also been completed. Malaria data from Coconut automatically syncs with the DHIS2 server every day, uploading the most current information that can then be visualized through the malaria dashboards (Figure 9).

Figure 9. Screenshot of DHIS2 interactive dashboard visualizing malaria data from Coconut



Planned for Q4

In Q4, OMDM will continue the process of migrating data from Coconut to DHIS2 and improving data visualizations in DHIS2. OMDM will also orient the ZAMEP SME team on how to use the dashboard and will organize a dissemination meeting involving ZAMEP, ICT Unit, HMIS Unit, and PMI staff, to orient them on the integration activities and completed dashboards. We will also invite Boresha Afya and GHSC who are working with ZAMEP and HMIS to develop interactive DHIS2 dashboards related to MSDQI and Chandarua Kliniki, respectively. The dissemination meeting will allow (1) the Program and relevant stakeholders to provide feedback on the work currently done by OMDM, and (2) allow partners to reach consensus about coordinating efforts to streamline the development of multiple dashboards within DHIS2.

Link Zanzibar’s Integrated Logistic System (ZILS) to DHIS2 to improve ZAMEP’s ability to monitor and manage the supply of antimalarial drugs, RDTs and insecticide-treated nets (ITNs) to health care facilities and districts

Progress in Y2, Q3

OMDM met with the HMIS Unit on May 11, 2020, to discuss issues and next steps to integrate ZILS and DHIS2 in an effort to share commodity data within DHIS2. The meeting produced the following resolutions:

- Revising the implementation of Quarterly Report and Request (RR), where HFs report and request on health commodities, including malaria commodities, on a quarterly basis. Because HF data are reported to DHIS2 monthly, it was suggested by the HMIS Unit to revise the RR to include monthly reporting and quarterly requests for data shown in DHIS2.
- Revisit the integration of ZILS—built in support of GHSC—and DHIS2 to identify appropriate solutions for its revival.
- A second meeting to discuss progress on the “chandarua kliniki” dashboard was organized by GHSC on June 30, 2020, where OMDM was among the participants. It was agreed that since there are at least three dashboards, all of them reflecting some aspects of malaria interest (e.g., LLIN distribution, malaria epidemiological and entomological data from MCN and supervision data, etc.), greater coordination is

needed to identify areas of possible collaboration or overlap and agree to develop a comprehensive malaria dashboard. The dashboard will cover all critical data visualization needs including LLIN distribution, malaria epidemiological data (cases from MCN and deaths), supervision data, and commodities data.

Planned for Q4

OMDM will follow-up with both the GHSC representative in Zanzibar and HMIS Unit on the integration process that will involve mapping HFs, harmonizing the hierarchy, developing a script, and testing.

Once data start flowing to the DHIS2, OMDM will coordinate a meeting in collaboration with ZAMEP and other malaria stakeholders to agree on what combined analysis outputs (commodity data, service delivery data and supervisory data) should be included in the DHIS2 malaria dashboard. This will be followed by multiple technical meetings in an effort to ensure the development of a comprehensive malaria dashboard that removes duplications and redundancies while ensuring high-quality data visualizations. Upon agreement of data to be included in the malaria dashboard, OMDM will support its development.

2.1.6 Activity 1B.3: Enhance and strengthen MCN ICT architecture and sustainability

Improve MCN documentation for technical support and SOPs, transfer routine MCN technology support responsibilities to ZAMEP through mentoring, develop local MCN software development and support capacity, and transfer Tier 1 MCN software development and support responsibility to an identity identified by ZAMEP

Progress in Y2, Q3

On March 6, 2020, four participants from the ICT and HMIS Units of MOHZ and one from ZAMEP's ICT Unit enrolled in online training courses on the MCN system; in Q3, participants continued with the online courses and assignments. [REDACTED] and [REDACTED], RTI's Mobile Applications Developers based in the Nairobi Regional Office, engage weekly with participants via Skype Group Chat and Google Meet. Trainees are assigned activities and exercises specifically related to improving their MCN knowledge and to practice their skills in managing the system to equip them with adequate skills to maintain, troubleshoot, and enhance key features as they progress through their training.

Planned for Q4

Online MCN systems training and mentoring will continue through Q4. Additionally, OMDM is planning to conduct MCN overview training for seven ZAMEP SME staff and the five participants currently enrolled in the online training courses. Refresher trainings for DMSOs to cover new MCN features will also be conducted in Q4.

Add threshold settings and associated data visualizations and alerts to the MCN and new focal area screen-and-treat data collection forms and reports to improve ZAMEP's ability to implement, monitor, and adjust this protocol

Progress in Y2, Q3

In Q3, OMDM reviewed data outputs that should be developed and/or updated and included within Coconut. Based on this review, OMDM will:

- Review existing thresholds developed in 2015 using HF data to fit the shehia level to include updated operational thresholds.

- Clean shehia-level data representing more than 65% of all cases. This data is used for foci classification which triggers the need to collect HF data for each notified case to achieve 100% coverage and forms a basis for calculating shehia-level thresholds.

Planned for Q4

OMDM has committed to recalculate the thresholds to include shehia-level custom thresholds in Q4. We will also review HF records for all cases that were not investigated to populate the existing database with additional shehia-level data.

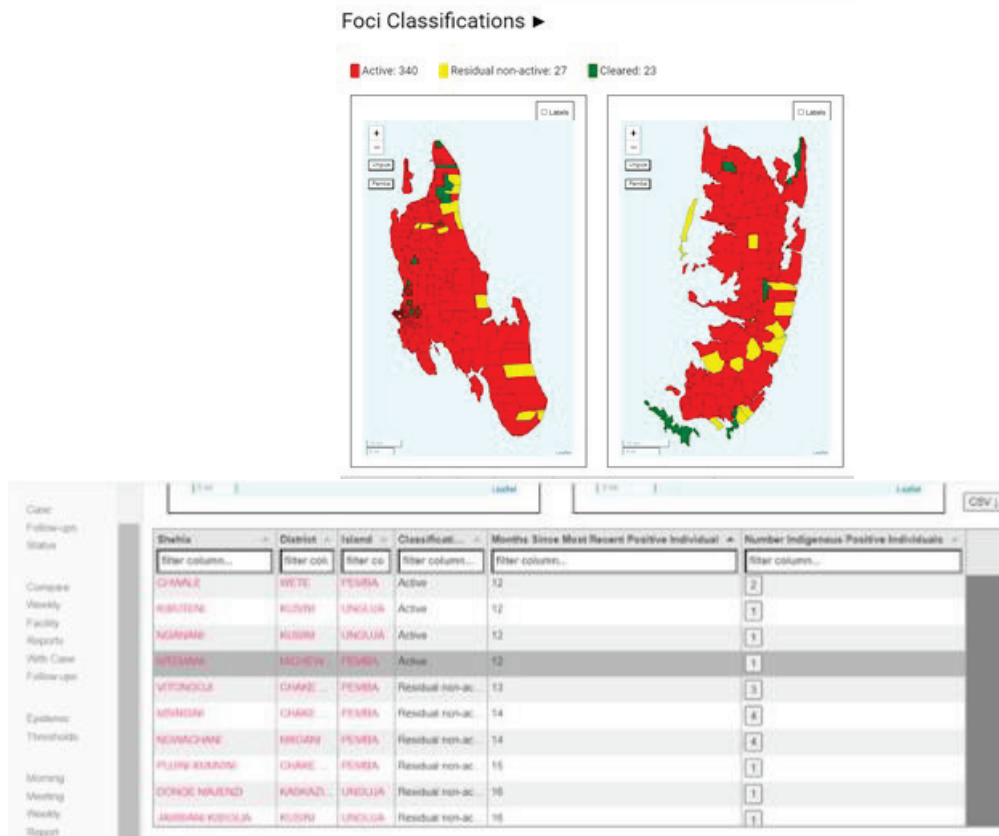
Continue to adapt and enhance MCN reports and data visualizations to meet emerging ZAMEP needs

Progress in Y2, Q3

In Q3, OMDM developed maps and .CSV downloadable files showing the classification of all Zanzibar shehias into their common foci classes according to the WHO’s *Malaria surveillance, monitoring & evaluation: a reference manual*.

Since case classifications are only available for a few cases between 2017–2018 and for all cases recorded between July 2019–2020, foci classifications only included cases where classification is available. Unclassified cases were regarded as indigenous and therefore included to suggest active foci. Figure 10 shows the current maps and screenshot views of the downloadable .CSV file.

Figure 10. Maps and Screenshot of Downloadable .CSV file



Planned for Q4

In Q4, OMDM will continue refining the data and improve data visualizations including implementing shehia-level custom thresholds.

2.1.7 Activity 1B.4: Support MCN implementation

Provide software technology and equipment support to CMSOs

Progress in Y2, Q3

This is an ongoing activity; in Q3, OMDM continued providing support to the MCN system and its software as required.

Planned for Q4

OMDM will continue this activity in Q4.

Continuously engage with ZAMEP and CMSOs to ensure that MCN is functional and data flow is adhered to in terms of timely collection and transfer of data, data completeness, and quality, and that reactive case follow-up occurs within stipulated time windows

Progress in Y2, Q3

OMDM's driving force under Result 1 in Zanzibar in Y1 and Y2 has been to update the MCN to meet WHO's malaria elimination guidelines. Minor updates are still in progress to improve data quality and optimize data collection, but all major requirements have been met.

OMDM's focus has now shifted to using available data effectively. The goal is not to accumulate data, but rather for the Activity to work alongside ZAMEP to implement data-driven actions to eliminate malaria. ZAMEP, OMDM, and PMI have collaborated to improve and update the reports used for weekly analysis, including automating their generation. Some of the reports have been updated to take advantage of new data—for example, charting case classification. However, much more remains to be done. Not only do new reports need to be created, but also an understanding and trust of the new data by decision makers and field workers needs to be instilled. As the users of data come to depend on new information, their need for more sophisticated analysis, automated alerts, and new integrations with other data will drive the Program to adopt new SOPs and responses that will hopefully lead the Program to increased success. Being able to measure successes—or failures—based on higher resolution data is another key area of reporting on which ZAMEP focused.

In order to achieve malaria elimination, ZAMEP needs to have the analysis and tools required to leverage the data. They also need the capacity and expertise to create new analyses without outside expertise and to solve problems that will inevitably arise. Parallel to the with efforts to develop new data analyses, OMDM is providing capacity building to ZAMEP and relevant MOHZ staff to ensure that local expertise is available for the technology upon which ZAMEP depends.

The Activity continues to engage with ZAMEP and CMSOs to ensure the functionality of the MCN. Data generated by the MCN is reviewed at least weekly—if not daily—by OMDM. Anomalies observed in the data are raised with ZAMEP, and any action required to correct the data or data collection procedures are discussed and implemented. In Q3, updates on the malaria situation in Zanzibar were consistently provided to PMI and partners through stakeholder meetings and weekly reports. Data is also reviewed and analyzed with ZAMEP's SME Unit through formal monthly data review meetings as described below.

Planned for Q4

OMDM will continue providing support to ZAMEP via daily follow-up of MCN data and through ensuring system performance remains stable to facilitate data management.

Facilitate data use workshops to review, analyze, and interpret epidemiological and programmatic data reported through DHIS2 and MCN

Progress in Y2, Q3

OMDM conducted two data review meetings via Zoom with ZAMEP’s SME Unit on May 11 and June 10, 2020. The first meeting reviewed malaria case classification data for the period of January–April 2020. **Table 5** highlights key discussion points of the meeting; and **Table 6** summarizes case classification from districts in both Pemba and Unguja.

Table 5. Monthly data review meeting on May 11, 2020

Topic	Key points/issues raised and action points
Review of malaria case classification data, January–April 2020	<ul style="list-style-type: none"> The overall proportion of cases investigated was 56% (3,576/6,349) with Pemba recoding 59% (640/1,077) and Unguja 56% (2,936/5,272) [Table 6]. In Pemba, Chakechake recorded 78% of all cases, the highest proportion of cases investigated; Micheweni recorded 45%, the lowest proportion of cases investigated [Table 6]. In Unguja, Kaskazini A recorded the highest proportion of cases investigated at 80%; Urban recorded 45%, the lowest proportion of cases investigated [Table 6]. It was noted that most of the cases which were investigated were classified for the period of January–April 2020. Overall, 98% (3,503/3,576) of the cases investigated were classified between January–April 2020 [Table 6]. In Pemba, 95% (611/640) of the cases investigated were classified [Table 6]. In Unguja, 99% (2,892/2,936) of the cases investigated were classified [Table 6]. However, it was noted that more than a third of the cases which were notified had not been classified. Overall, 45% (2,846/3,576) of the cases that were notified had not been classified for the period of January–April 2020. <div data-bbox="408 1301 1382 1621"> <p>This stacked bar chart displays the weekly number of malaria cases classified in Zanzibar over 18 weeks. The total number of cases peaks in week 3 at approximately 800. The categories are stacked from bottom to top: Imported (blue), Indigenous (orange), Induced (green), Introduced (yellow), Relapsing (purple), and (blank) (grey). The 'Induced' category is the most prominent throughout the period.</p> </div> <ul style="list-style-type: none"> In Pemba, 55% (240/435) of the cases were missing case data out of those that were notified in Micheweni. <div data-bbox="408 1697 1382 2016"> <p>This stacked bar chart shows the weekly number of malaria cases classified in the Micheweni district of Pemba over 18 weeks. The y-axis ranges from 0 to 100. The categories are Imported (blue), Indigenous (orange), and (blank) (grey). There is a significant number of 'blank' cases, particularly in weeks 4 and 5, indicating missing data.</p> </div>

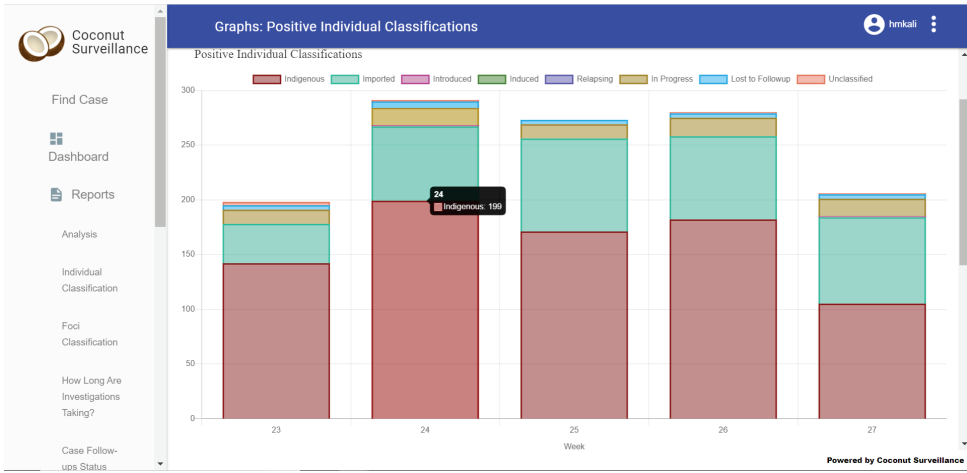
Topic	Key points/issues raised and action points																																																																												
	<ul style="list-style-type: none"> In Unguja, 55% (1,309/2,367) of the cases were missing case data out of those that were notified in Urban district. <div data-bbox="408 315 1366 629" style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">Case classification in Urban district, Unguja</p> <p style="text-align: center;">■ Imported ■ Indigenous ■ (blank)</p> <table border="1" style="display: none;"> <caption>Approximate data from the 'Case classification in Urban district, Unguja' chart</caption> <thead> <tr> <th>Week</th> <th>Imported</th> <th>Indigenous</th> <th>(blank)</th> </tr> </thead> <tbody> <tr><td>1</td><td>0</td><td>0</td><td>100</td></tr> <tr><td>2</td><td>0</td><td>0</td><td>300</td></tr> <tr><td>3</td><td>0</td><td>0</td><td>300</td></tr> <tr><td>4</td><td>0</td><td>0</td><td>250</td></tr> <tr><td>5</td><td>0</td><td>0</td><td>150</td></tr> <tr><td>6</td><td>0</td><td>0</td><td>150</td></tr> <tr><td>7</td><td>0</td><td>0</td><td>100</td></tr> <tr><td>8</td><td>0</td><td>0</td><td>100</td></tr> <tr><td>9</td><td>0</td><td>0</td><td>100</td></tr> <tr><td>10</td><td>0</td><td>0</td><td>50</td></tr> <tr><td>11</td><td>0</td><td>0</td><td>50</td></tr> <tr><td>12</td><td>0</td><td>0</td><td>20</td></tr> <tr><td>13</td><td>0</td><td>50</td><td>0</td></tr> <tr><td>14</td><td>0</td><td>50</td><td>0</td></tr> <tr><td>15</td><td>0</td><td>100</td><td>0</td></tr> <tr><td>16</td><td>0</td><td>50</td><td>0</td></tr> <tr><td>17</td><td>0</td><td>50</td><td>0</td></tr> <tr><td>18</td><td>0</td><td>50</td><td>0</td></tr> </tbody> </table> </div> <ul style="list-style-type: none"> Following the high number of cases missing case data, the team agreed on the following actions: <ul style="list-style-type: none"> The list was divided amongst the team members, with each team member tasked with identifying the reasons why the cases had missing case data. Team members were asked to go through data for each case against the evidence given for case classification to see if the two make sense. Members were asked to provide comments for each problem they identify. 	Week	Imported	Indigenous	(blank)	1	0	0	100	2	0	0	300	3	0	0	300	4	0	0	250	5	0	0	150	6	0	0	150	7	0	0	100	8	0	0	100	9	0	0	100	10	0	0	50	11	0	0	50	12	0	0	20	13	0	50	0	14	0	50	0	15	0	100	0	16	0	50	0	17	0	50	0	18	0	50	0
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Challenges faced by DMSOs	<ul style="list-style-type: none"> It was noted that some of the DMSOs' tablets tend to run out of internal memory hence their failure to upload new cases. It was advised that DMSOs should avoid using tablets for their personal use to avoid further memory issues. It was noted that the DMSOs in Pemba tend to receive notifications from Unguja HFs on their tablets, impacting their follow-up rate. It was noted that this issue appears when the shehia name in Unguja is the same as the one in Pemba; it was agreed that this issue will be presented to the programmer for resolution. 																																																																												

Table 6. Districts case investigation and classification January–April 2020

District	Case Investigation					Case Classification							
	Total No. of cases	No. of cases followed up	% of cases followed up	HH members tested	+ve HH members	% of cases classified out of investigated	% of cases classified out of notified	Imported	Indigenous	Induced	Introduced	Relapsing	Missing
Chakechake	139	108	78%	639	23	78%	60%	39	45	0	0	0	55
Micheweni	435	196	45%	1,087	21	99%	45%	28	167	0	0	0	240
Mkoani	151	115	76%	592	6	98%	75%	31	82	0	0	0	38
Wete	352	221	63%	903	31	99%	62%	68	151	0	0	0	133
Pemba	1,077	640	59%	3,221	81	95%	57%	166	445	0	0	0	466
Kaskazini A	354	284	80%	700	27	100%	80%	171	112	0	0	0	71
Kaskazini B	347	231	67%	669	19	100%	67%	116	106	1	8	0	116
Kati	589	393	67%	1607	44	98%	66%	145	239	1	0	1	203
Kusini	153	104	68%	232	4	99%	67%	61	41	0	1	0	50
Magharibi A	520	320	62%	918	5	99%	61%	160	157	0	0	0	203
Magharibi B	942	534	57%	1,650	3	96%	55%	166	347	1	0	0	428
Mjini	2,367	1,070	45%	2,834	49	99%	45%	280	778	0	0	0	1,309
Unguja	5,272	2,936	56%	8,610	151	99%	55%	1,099	1,780	3	9	1	2,380
Zanzibar	6,349	3,576	56%	11,831	232	98%	55%	1,265	2,225	3	9	1	2,846

The second data review meeting aimed at orienting ZAMEP’s SME Unit on updated features within Coconut. DMSO performance was also assessed, including discussions around key challenges faced by the officers that hampered timely investigations. **Table 7** highlights key discussion points of the meeting.

Table 7. Monthly data review meeting June 10, 2020

Topic	Key points/issues raised and action points
Orientation on new Coconut interface	<ul style="list-style-type: none"> The team was oriented on the two new features—the Coconut dashboard and epidemic threshold report. This demonstration can also be accessed through YouTube at the following link: https://youtu.be/tKfl1CFi54M On the Coconut dashboard, charts have been improved through the use of new graphic features and with added descriptions on each graph making them clear and easy to read.  <ul style="list-style-type: none"> With the addition of these new features, you users can click on any of the graphs and zoom in, allowing them to see the information presented in each of the categories or bar graphs. 

Topic **Key points/issues raised and action points**

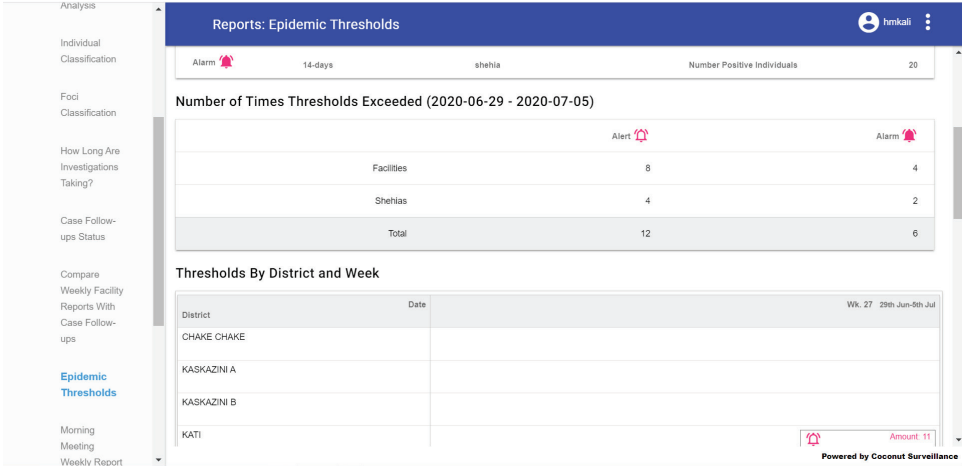
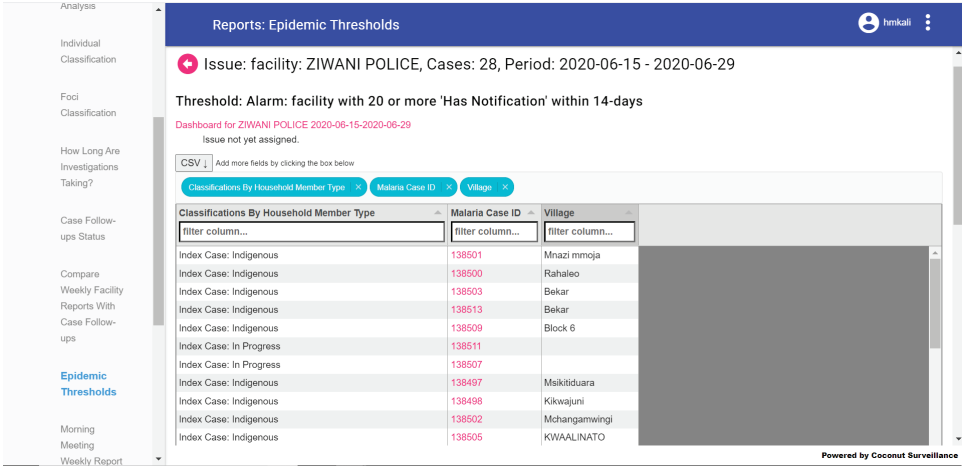
- Zoomed in graphs are presented with a table providing an opportunity for the user to review individual case data for further investigation.

Classifications By Household Member Type	Index Case Diagnosis Date ISO Week	Malaria Case ID
Index Case: Imported	2020-23	137518
Index Case: In Progress	2020-23	137566
Index Case: Indigenous	2020-23	137712
Index Case: In Progress	2020-23	137532
Index Case: Indigenous	2020-23	137592
Index Case: In Progress	2020-23	137529
Index Case: Indigenous	2020-23	137515
Index Case: Imported	2020-23	137522
Index Case: Indigenous	2020-23	137499
Index Case: Imported	2020-23	137503
Index Case: Imported	2020-23	137533

- Another new feature for which orientation was provided was the epidemic threshold report that was improved by adding more descriptions, threshold definitions, the number of times thresholds have been exceeded, and thresholds disaggregated by district and week. This detail can be obtained by clicking the forward arrow.
- The “threshold definitions” section provides a definition of each threshold based on the current ZAMEP guidelines of 10 or more cases notified in a week.

Type	Range	Aggregation Area	Indicator	Threshold
Alert	7-days	facility	Has Notification	10
Alert	7-days	shehia	Number Positive Individuals Under 5	5
Alert	7-days	shehia	Number Positive Individuals	10
Alarm	14-days	facility	Has Notification	20
Alarm	14-days	shehia	Number Positive Individuals Under 5	10
Alarm	14-days	shehia	Number Positive Individuals	20

- The “number of times threshold exceeded” section provides a numerical count and summary of thresholds that have been exceeded.

Topic	Key points/issues raised and action points
	<ul style="list-style-type: none"> The “threshold by district and week” section provides a detailed summary of where (district/shehia) and when (week) the threshold has been exceeded.  <ul style="list-style-type: none"> By clicking on the specific type of threshold, a detailed table will appear where you can add or remove data elements of interest. 
<p>Review of DMSO performance for the period of January– May 2020</p>	<ul style="list-style-type: none"> The overall follow-up rate has improved from 56% in April to 67% in May due to daily monitoring of DMSO follow-up activities conducted by ZAMEP’s SME officers. 67% (4,916/7,339) of the cases recorded complete HF visits out of those who were notified; 89% (4,385/4,916) of the cases were followed up within 48 hours out of those who had complete HF visits. In Pemba, 76% (898/1,176) of the cases had complete HF visits out of those who were notified; 82% (732/898) of the cases were followed up within 48 hours out of those who had complete HF visits. Micheweni district in Pemba recorded 70% (326/468), the lowest proportion of cases with complete HF data out of those who were notified and 69% (225/326), the lowest proportion of cases followed up within 48 hours out of those who had complete HF visits. In Unguja, 65% (4,018/6,163) of the cases recorded had complete HF visits out of those who were notified; 91% (3,653/4,018) of the cases had been followed up within 48 hours out of those who had complete HF visits. Mjini district in Unguja recorded 52% of cases that were followed up by DMSOs to the HF level (1,467/2,821), the lowest proportion of cases with complete HF visits out of those cases which were notified. Kusini district in Unguja had 72% of cases that were followed up by DMSOs to the HF level (117/162), the lowest proportion of cases followed up within 48 hours out of those cases with complete HF visits.

Topic	Key points/issues raised and action points
Challenges	<ul style="list-style-type: none"> • It was noted that some HFs have reported SIM card failures; this is recognized as one of the reasons for late reporting by HFs. • It was agreed that all HFs should be regularly re-registered and loaded with airtime. • It was noted that some HFs were not receiving SMS confirmation once they sent their weekly report. • It was agreed that a list of all HFs which do not receive SMS should be developed and that list communicated with Selcom for resolution.

Planned for Q4

OMDM will continue to schedule and conduct data review meetings with ZAMEP in Q4.

2.1.8 Activity 1B.5: Refine operational thresholds and triggers as MCN data are analyzed

Use MERLA approach to continuously support ZAMEP to assess sensitivity and specificity of thresholds and triggers, that change and adapt, as appropriate, to further increase interventions' programmatic effectiveness

Progress in Y2,

No activities were conducted during the reporting period.

Planned for Q4

No activities are planned for Q4.

Collaborate with ZAMEP, PMI, and stakeholders to update, as necessary, guidance and intervention strategies to prevent and respond to the emergency of case clusters at village or Shehia level

Progress in Y2, Q3

OMDM continued with ACD analysis in Zanzibar in Q3. Reactive case detection through HSaT by DMSOs has been ongoing since 2013. However, ZAMEP also conducts proactive case detection through MSaT in high incidence shehias to find and treat additional asymptomatic cases. MSaT is done periodically, targeting shehias with a history of ongoing transmission. In 2015, RTI conducted an assessment comparing HSaT and MSaT approaches and their respective costs based on ZAMEP's 2014 case detection data. MEASURE Evaluation used 2016 data to analyze costs associated with the reactive case detection component of Zanzibar's malaria surveillance system and used cost data to estimate and compare the costs of operational variants of that system. **Table 8** shows the cost comparison of ACD between RTI and MEASURE Evaluation.

Table 8. Comparison of cost/person screened and cost/person treated

	HSaT-No. of people screened	HSaT-No. of positives treated	MSaT-No. of people tested	MSaT-No. of positives treated	Total DMSO cost (excludes ZAMEP Admin)	Total MSaT cost	HSaT cost/person screened	HSaT cost/RDT positive treated	MSaT cost/person screened	MSaT cost/RDT positive treated
RTI, 2014 analysis	6,399	392	12,958	123	\$ 147,600.47	\$162,878.84	\$23.07	\$376.53	\$12.57	\$1,324.22
MEASURE Evaluation, 2016 analysis	8,153	355	Not available	Not available	\$ 129,643.00	Not available	\$15.90	\$365.19	Not available	Not available

The cost per person screened through HsaT varies between RTI’s 2014 analysis and Measure’s 2016 analysis. MEASURE Evaluation did not analyze cost data for MSaT.

In Q3, OMDM conducted a quick analysis using RTI’s unit costs to determine the total costs of both HsaT and MSaT for the 2017–2019 period. First, the overall costs were compared between HsaT and MSaT for each year (**Table 9**).

Table 9. Overall 2017–2019 comparison between HsaT and MSaT

	2017		2018		2019		Zanzibar 2017–2019	
	HSaT	MSaT	HSaT	MSaT	HSaT	MSaT	HSaT	MSaT
No. of cases followed up (HSaT only)	2,767		3,646		5,623		12,036	
No. of people targeted (MSaT only)		24,080		12,866		15,737		52,683
No. of people tested	7,638	16,880	10,782	9,665	14,963	9,571	33,383	36,116
No. of people positive	319	98	445	31	555	68	1,319	197
Malaria positivity among screened	4.2%	0.6%	4.1%	0.3%	3.7%	0.7%	4.0%	0.5%
Total cost of screening	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]
Total cost of treatment	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]

	2017		2018		2019		Zanzibar 2017–2019	
	HSaT	MSaT	HSaT	MSaT	HSaT	MSaT	HSaT	MSaT
Total cost	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]
Probability to find additional case during investigation	0.042	0.006	0.04	0.003	0.037	0.007	0.040	0.005
Cost per positive person	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]
Additional cost per positive person during MSaT vs HSaT		\$ [REDACTED]		\$ [REDACTED]		\$ [REDACTED]		\$ [REDACTED]
% increase in spending for MSaT compared to HSaT		276%		460%		210%		278%

Then, HSaT and MSaT data in similarly targeted shehias was compared (Table 10).

Table 10. 2017–2019 comparison between HSaT and MSaT shehias

	2017		2018		2019		Zanzibar 2017–2019	
	HSaT	MSaT	HSaT	MSaT	HSaT	MSaT	HSaT	MSaT
No. of Shehias targeted	32		5		14		51	
No. of cases followed up (HSaT only)	354	-	146	-	545	-	1045	-
No. of people targeted (MSaT only)		24,080		12,866		15,737	-	52,683
No. of people tested	1,553	16,880	891	9,665	2232	9,571	4676	36,116
No. of people positive	45	98	35	31	60	68	140	197
Malaria positivity among screened	2.9%	0.6%	3.9%	0.3%	2.7%	0.7%	3.0%	0.5%
Total cost of screening	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]
Total cost of treatment	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]
Total cost	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]
Probability to find additional case during investigation	0.029	0.006	0.04	0.003	0.027	0.007	0.030	0.005
Cost per positive person	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]
Additional cost per positive person during MSaT		\$ [REDACTED]		\$ [REDACTED]		\$ [REDACTED]		\$ [REDACTED]

	2017		2018		2019		Zanzibar 2017–2019	
	HSaT	MSaT	HSaT	MSaT	HSaT	MSaT	HSaT	MSaT
% increase in spending for MSaT compared to HSaT		198%		444%		151%		216%

Finally, OMDM used one shehia (Tumbe, located in Pemba’s Micheweni district) that had undergone MSaT each year and compared costs with HSaT to get a sense of how costs differed in a single shehia between the two approaches over the 2017–2019 period (**Table 11**).

Table 11. 2017–2019 comparison between HSaT and MSaT in Tumbe

	2017		2018		2019		Tumbe 2017–2019	
	HSaT	MSaT	HSaT	MSaT	HSaT	MSaT	HSaT	MSaT
Number of people tested	278	7,829	703	7,555	279	4,848	1260	20,232
Number of people positive	10	39	23	16	12	3	45	58
Malaria positivity among screened	3.6%	0.5%	3.3%	0.2%	4.3%	0.1%	3.6%	0.3%
Total Cost of screening	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]
Total cost of treatment	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]
Total cost	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]
Probability to find additional case during investigation	0.036	0.005	0.033	0.002	0.043	0.001	0.036	0.003
Cost per positive person	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]
Additional cost per positive person during MSaT		\$ [REDACTED]		\$ [REDACTED]		\$ [REDACTED]		\$ [REDACTED]
% increase in spending for MSaT compared to HSaT		278%		571%		2270%		458%

Based on the above analysis, results indicate the following:

- The total cost of screening for MSaT is cheaper than HSaT. However, the cost per person treated is more expensive through MSaT.
- In both cases, overall and shehia-based, reactive case detection through DMSOs yielded higher malaria positivity rates compared with mass screening and testing.
- Considering total costs per positive person, MSaT was more than two times more expensive than HSaT.
- The probability of finding a secondary case for HSaT was higher in Zanzibar (0.04) than MSaT (0.005)—meaning that for every 25 people tested, 1 secondary case was identified by DMSO. In contrast, for MSaT, 183 people had to be tested before 1 secondary case was identified.
- For Tumbe, DMSOs identified a secondary case for every 45 individuals tested compared with MSaT where 349 people had to be tested to find 1 secondary case.

Based on the above observations, the Activity recommends the following:

- Continue current HSaT activities. HSaT activities are the most cost-effective option when considering the cost per person treated and identify with a higher positivity rate compared to MSaT.
- Discontinue MsaT. MSaT, though a more cost-effective screening method than HSaT, is more expensive in cost per person treated because it identifies cases based on the prevalence rate of the general population. It is not more effective than the Zanzibar-wide strategy of follow-ups through DMSOs.
- Increase the timeliness of follow-ups by DMSOs to identify and treat additional malaria cases to limit further transmission in Zanzibar.
- Other strategies such as mass drug administration (MDA), rather than population-based screen and treat method, should be explored
- Update costing data to reflect more recent scenarios (e.g., increase in the number of DMSOs and their salaries, diagnostic and treatment costs)

Planned for Q4

OMDM will continue updating costing data for the above analysis and share with ZAMEP to ensure management is aware of cost implications and other resources at hand when considering mass screening and treatment of the general population in Zanzibar.

2.1.9 Activity 1B.6: Develop strategy and implementation plan to minimize malaria importation

Continuously monitor and assess proportion of reported cases with a history of travel through the MCN system

Progress in Y2, Q3

On June 12, 2020, OMDM shared preliminary results of the “**Effect of change in rainfall patterns on spatial and temporal occurrence of malaria cases in Zanzibar**” analysis to ZAMEP via Zoom. This analysis was conducted through support from ██████████, RTI’s Epidemiologist and Modeler. The objectives of this analysis included the following:

- Describe the temporal pattern of index cases and cases recorded during investigations conducted between January 1, 2015 to April 30, 2020

- Describe the relationship between cases and rainfall during low and high transmission seasons
- Investigate the spatial pattern of index cases recorded between January 1, 2015 to April 30, 2020
- Identify shehias that were statistical hotspots of index cases per each transmission season during the study period
- Identify shehias that were consistently statistical hotspots during the study period

A time series analysis was performed to describe index cases trends and temporal relationships with rainfall. Binomial regression analysis was then applied to estimate the probability of finding a case during investigations conducted each year. Spatial analysis (using Local Moran's I, called Local Indicators of Spatial Association [LISA]) was also performed to identify statistical hotspots per each season between 2015–2020.

Results

Between January 1, 2015 and April 30, 2020, more than 26,000 thousand index cases were notified by HFs in Zanzibar of which 22,686 (called index cases) were uploaded in the MCN system. The number of index cases showed a declining trend between 2015 and 2017, followed by an increase between 2017 and 2020 (**Table 12**, **Figure 11**, and **Figure 12**). Amongst reported cases, more than 40% of people traveled outside Zanzibar in the previous week. The fraction of index cases who reported traveling outside Zanzibar was lower during 2016 and 2017 but increased in 2018 and 2019. Comparing index cases reported between January 1 to April 30 of each year between 2015 to 2020, 2020 showed the highest number of reported cases and the lowest fraction of individuals testing positive with a travel history outside Zanzibar (**Table 12** and **Figure 12**). The fraction of the investigated index cases resulted in being ~70% for all years, with 2016 recording the highest values (81.9%) (**Table 12**). The percentage of household members who tested positive for malaria (secondary cases) showed a declining trend from 2015 to 2018 and an increase in 2019 (**Table 12**). Comparing index cases reported between January 1 to April 30 of each year, 2020 showed the lowest number of household members who tested positive for malaria. The probability of finding a positive person (detection rate) after index case investigation was ~0.04 (1 case every ~400 investigated index cases) and was significantly higher in 2015 compared with the other years. The trend of the detection rate has slightly declined between 2016 and 2019.

Tanzania's climate is characterized by two rainy seasons, the long rains from mid-March to May ("masika") and the short rains from November to mid-January ("vuli"). From 2017 to 2020, precipitation has increased in both rainy seasons (**Table 12**). Precipitation during the vuli season are usually lower compared with the masika season, as highlighted by the data from 2015 to 2018. In 2019, however, precipitation recorded in the vuli season and the masika season were similar (**Table 12**). The seasonality of reported index cases correlated significantly to the amount of precipitation that occurred during the previous rainy season (**Figure 12** and **Figure 13**). Cross-correlation analyses showed that the number of index cases had the highest correlations with the precipitation of the previous 12th and 13th weeks (**Figure 13**).

During outbreak events, Unguja reported more index cases compared to Pemba (**Figure 13**, and **Figure 15**). Additionally, the spatial pattern of the reported index cases in the two islands was quite different. Most of the index cases reported in Unguja were from shehias in the southern part of the island (Figures 11–12). In Pemba, northern shehias reported more cases compared to the rest of the island (**Figure 13** and **Figure 15**). The results from the

spatial analysis identified consistent hotspots in the northeastern and the southern parts of Unguja during the study period (**Figure 13**, **Figure 15**, and **Figure 16**). Hotspot shehias in Pemba were in the northern part of the island during the study period (**Figure 13**, **Figure 15**, and **Figure 16**). In 2019 and 2020, the spatial pattern of index cases reported in the outbreak after the masika season and the vuli season (outbreaks IX and X) were similar (**Figure 13** and **Figure 15**). In all other years, the outbreaks after the masika season had a more significant impact in terms of number of cases compared to the outbreaks that occurred after the vuli season (**Figure 13** and **Figure 15**).

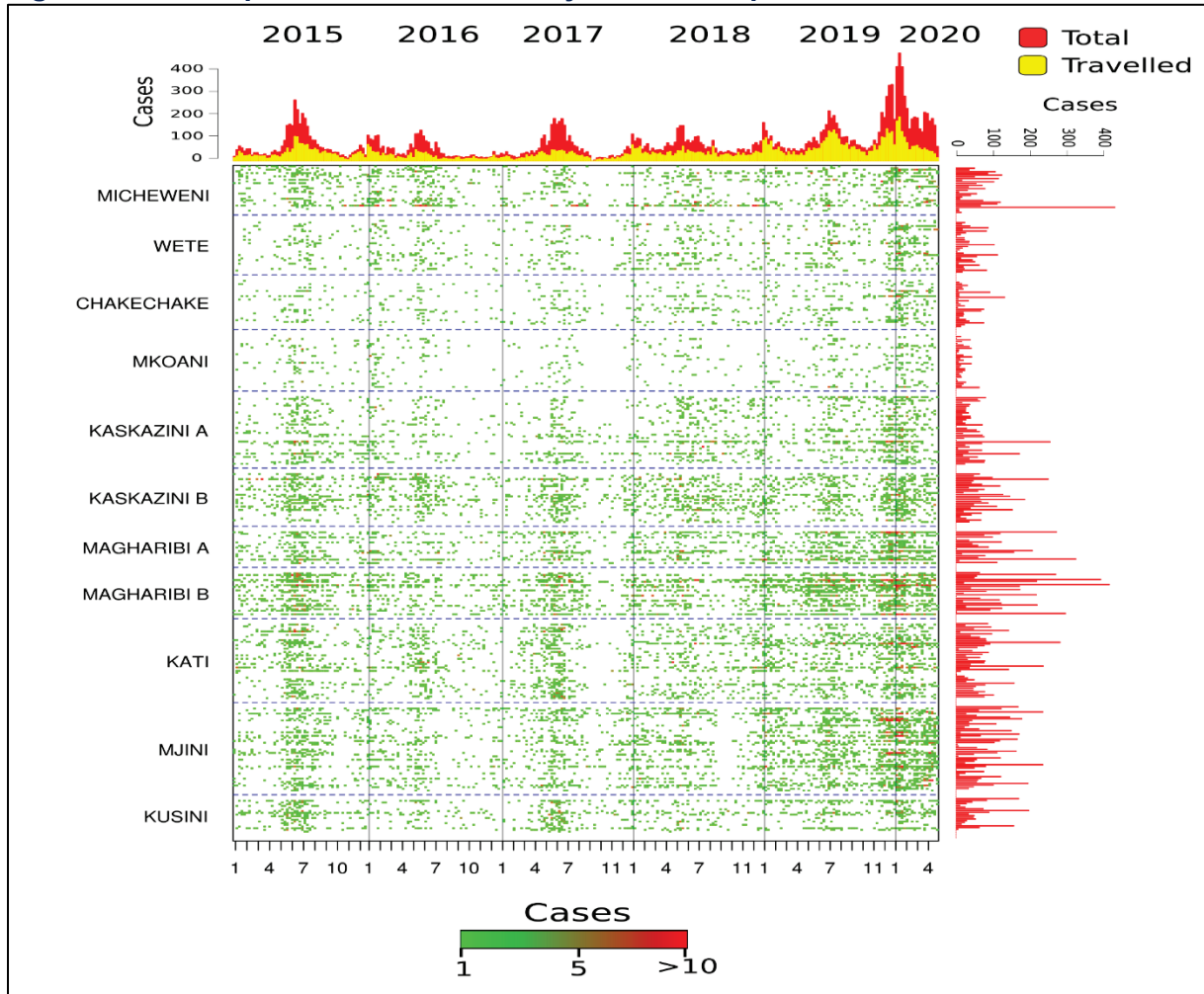
Table 12. Summary of reported index cases and secondary cases from 2015 to second week of February 2020 in Zanzibar

	2015	2016	2017	2018	2019	2020 ^a
Cases notified	-	3,856	4,252	5,494	6,766	6,362
Index cases followed up to HF's by DMSO	3,745	2,596	2,940	3,647	5,747	4,011
Index cases with travel history outside Zanzibar (%)	1,926 (51.4%)	1,195 (46.0%)	1,223 (41.6%)	1,938 (53.1%)	3,536 (61.5%)	1,365 (34.0%)
Index cases with travel history within Zanzibar (%)	139 (3.7%)	87 (3.4%)	87 (3.0%)	154 (4.2%)	197 (3.4%)	220 (5.5%)
Percentage of index cases reported between January–April with travel history outside Zanzibar	62.7%	51.0%	55.2%	58.6%	69.0%	35.1%
^c Percentage of index cases reported between January–April who have travel history within Zanzibar	4.4%	4.9%	3.0%	4.6%	3.0%	5.7%
Number of investigated index cases (%)	2,592 ^b (69.2%)	2096 (79.7%)	2081 (70.8%)	2736 (75.0%)	4259 (74.1%)	2,630 (65.6%)
Number of tested people during index case investigation	11,601 ^b	8,479	7,638	10,782	14,963	8,511
Number of positive investigated people (secondary cases) (%)	591 ^b (5.1%)	365 (4.3%)	319 (4.2%)	445 (4.1%)	544 (5.8%)	267 (3.7%)
^c Number of positive investigated people (secondary cases) January–April (%)	169 (6.7%)	167 (4.9%)	74 (4.7%)	164 (4.8%)	177 (5.1%)	267 (3.7%)
Probability to find a secondary case during investigation	0.048 ^b (0.045–0.052)	0.041 (0.037–0.045)	0.040 (0.036–0.044)	0.040 (0.036–0.043)	0.035 (0.032–0.038)	0.030 (0.027–0.034)
Weekly rainfall year (median interquartile range [IQR])	9.8 (1.9–30.7)	2.9 (0.0–18.3)	15.5 (3.1–72.6)	21.8 (6.9–63.5)	16.6 (2.4–88.9)	10.9 (6.0–12.9)
Weekly rainfall in the masika season, mid-March–May (median [IQR])	52.4 (12.5–96.3)	19.8 (3.7–55.1)	125.6 (62.7–175.7)	56.3 (25.2–129.3)	43.3 (13.3–84.6)	-
Weekly rainfall during the vuli season, November–mid January (median [IQR])	11.8 (4.5–43.8)	13.3 (2.6–19.3)	19.2 (9.1–66.3)	17.9 (9.9–24.8)	43.8 (15.7–74.4)	-

^aTime period January 1– April 30, 2020; ^bdata available from January 1 to September 16, 2015;

^cCalculated to make comparison among all years from 2015 to 2020.

Figure 11. Cases per shehia from January 1, 2015 to April 30, 2020



Each row of the plot above represents the time series of reported index cases per shehia. Shehias were grouped by district ordered by latitude, from north to south. **Figure 11** displays the cumulative number of index cases per year split by travel history (top) and cumulative number of cases per shehia during the study period (right).

Figure 82. Weekly rainfall and reported index cases in Zanzibar from January 1, 2015 to the April 30, 2020

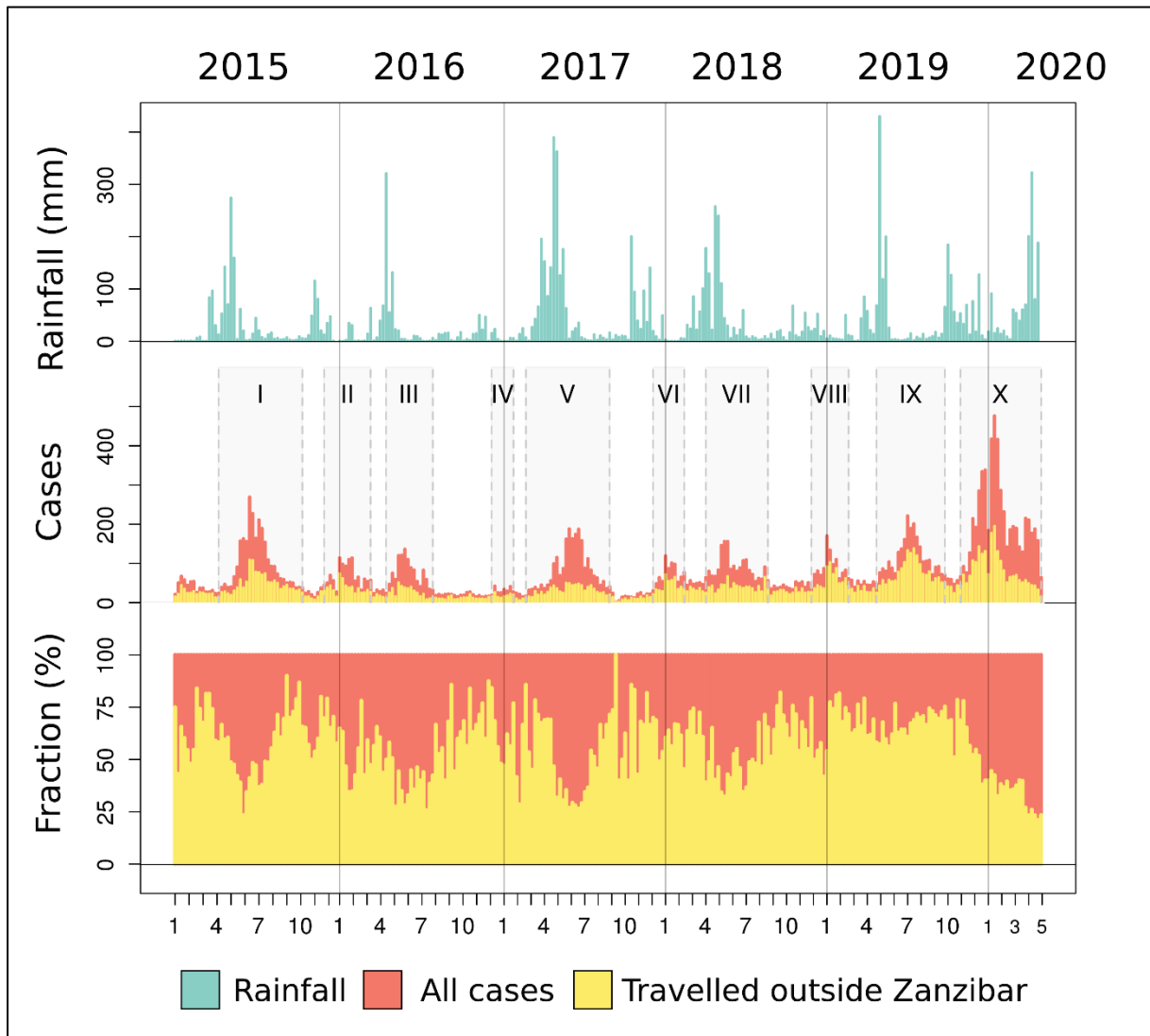
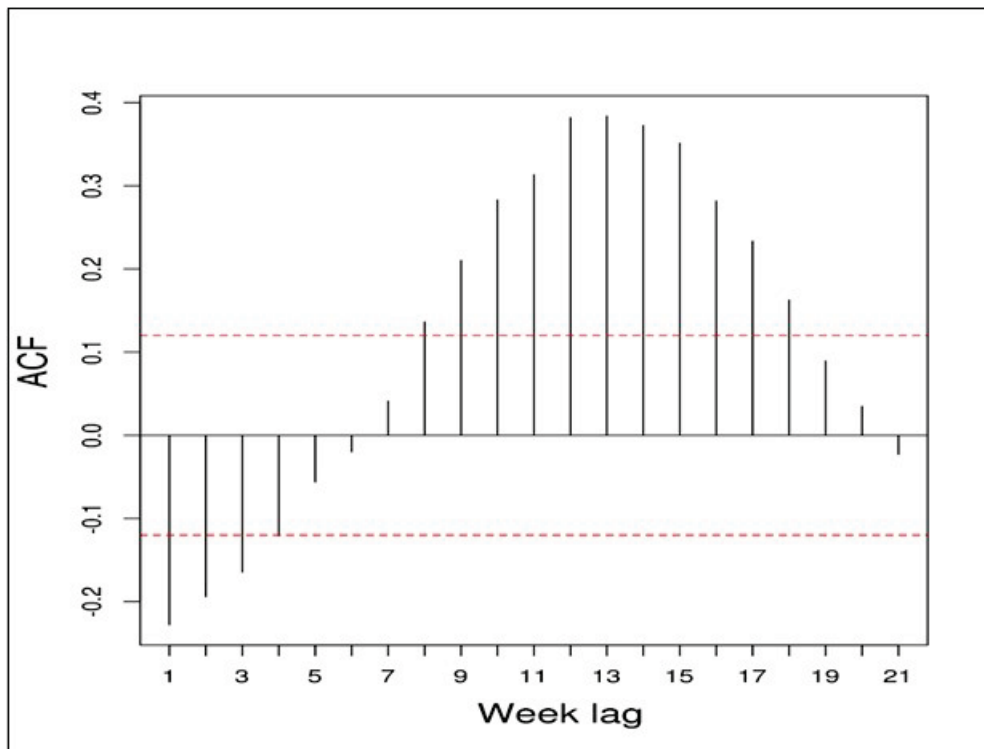


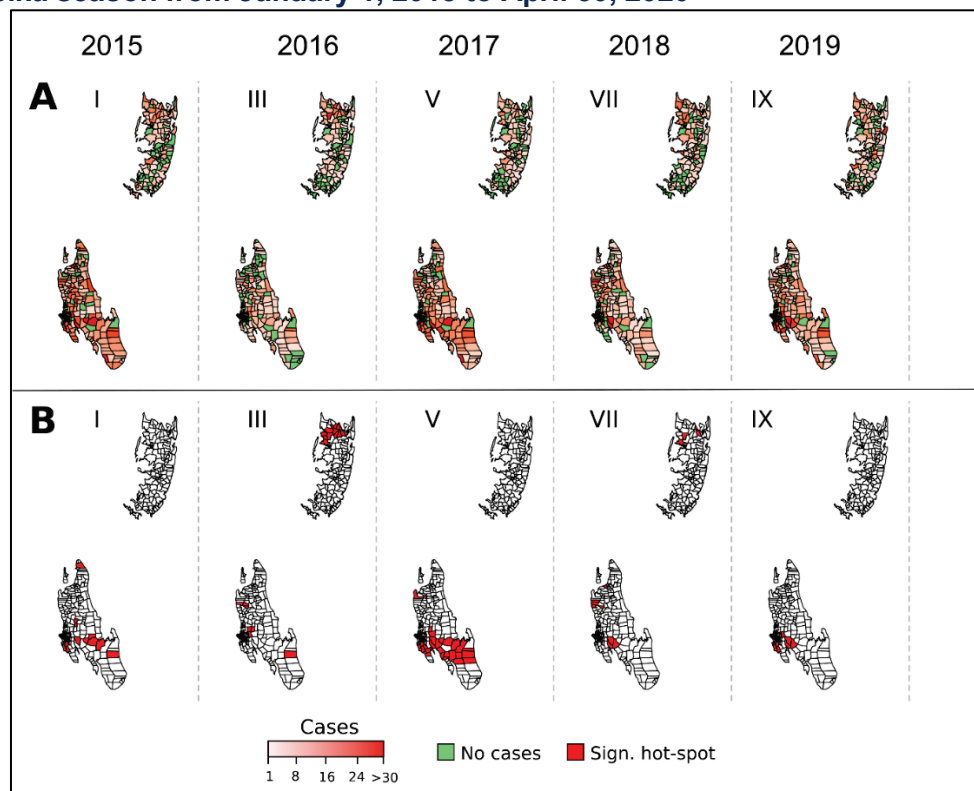
Figure 12 also displays the number and fraction of index cases with travel history outside Zanzibar (yellow bars).

Figure 9. Cross-correlation of weekly reported index cases and weekly precipitation



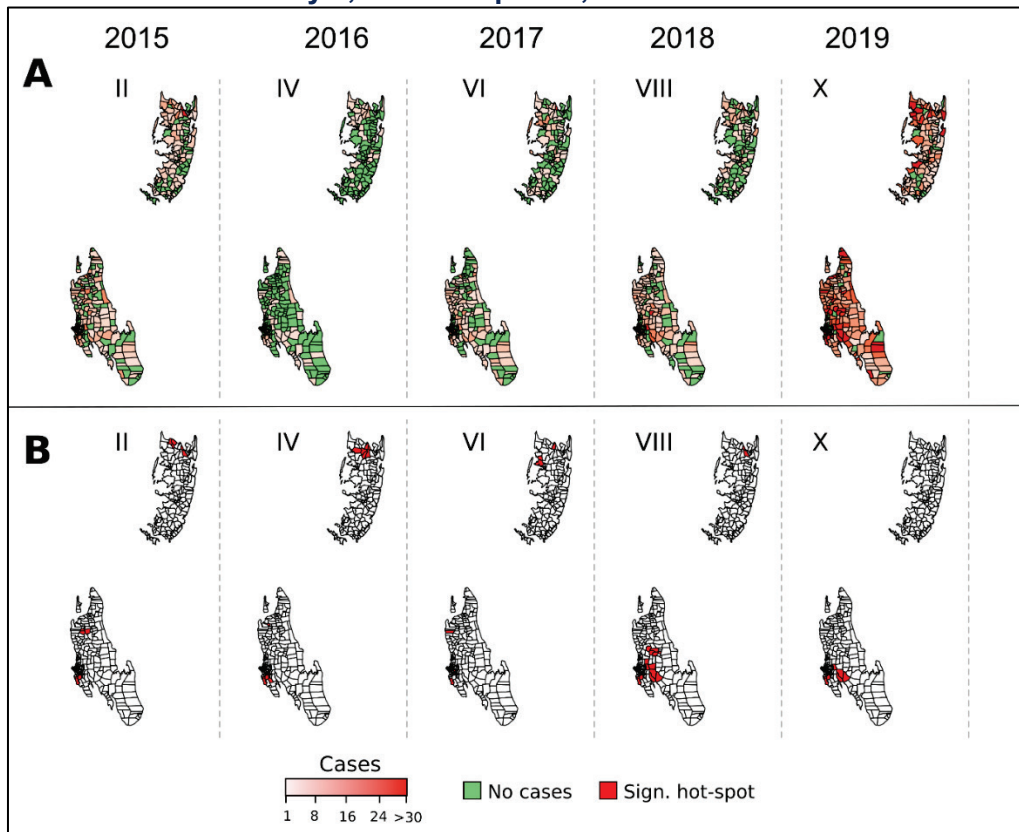
The black lines passing the red dotted lines represent significant correlations, $p < 0.05$.

Figure 10. Index cases per shehia (A) and hotspot shehias (B) during outbreaks after the masika season from January 1, 2015 to April 30, 2020



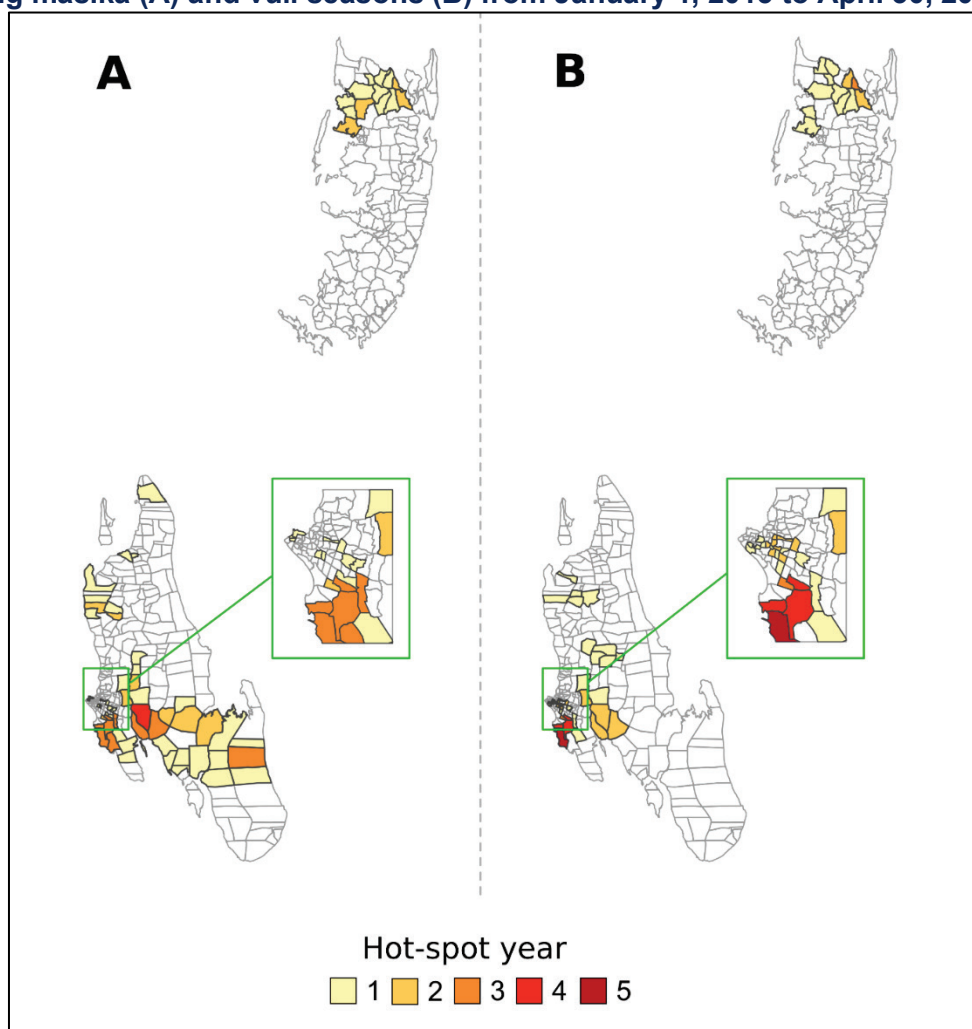
The Roman numbers are outbreak identification numbers used in Figure 12. Hotspots were considered significant when $p < 0.05$ (Local Moran's I).

Figure 15. Index cases per shehia (A) and hotspot shehias (B) during outbreaks after the vuli season from January 1, 2015 to April 30, 2020



The Roman numbers are outbreak identification numbers used in Figure 12. Hotspots were considered significant when $p < 0.05$ (Local Moran's I).

Figure 16. Years in which each shehia was identified as hotspot during outbreak following masika (A) and vuli seasons (B) from January 1, 2015 to April 30, 2020.



Based on discussions with ZAMEP during the dissemination meeting, OMDM is working on further analysis, including the following:

- Identifying epidemiological hotspots per each transmission season during the study period. Hotspots were identified using a decision tree based on incidence and case count.
- Creating a profile per each shehia displaying index case trend, statistical and epidemiological hotspot status, IRS intervention, insecticide treated nets (ITN) access and use, adherence to reporting system timeline, and travel flux from the mainland.
- Investigating the relationship of statistical and epidemiological hotspot status with rainfall, interventions, and travel flux. The model will take into account the spatio-temporal autocorrelation of the data.

In order to finalize the bulleted analyses above, OMDM will develop a decision tree to identify epidemiological hotspots based on data provided by ZAMEP. The decision tree will use case reporting and incidence thresholds set by ZAMEP, population data, and interventions to decide if a shehia was a hotspot during seasons of each year. Network analysis will also be performed to describe the flux of people from Mainland to Zanzibar. Spatio-temporal regression analyses based on Bayesian regression models will be

performed to investigate the effect of rainfall, interventions, and travel flux on the probability of a shehia to be identified as a hotspot (statistical hotspot, epidemiological hotspot, both).

Planned for Q4

OMDM will continue engaging with RTI HQ for support on the above analysis. We are also in the process of drafting a manuscript due for publication in FY2; we will circulate the draft for PMI feedback when available.

Support the development of a strategy and implementation plan with PMI and other stakeholders that outlines approaches to target travelers leaving and returning to Zanzibar

Progress in Y2, Q3

No activities were conducted during the reporting period.

Planned for Q4

Activities will be initiated in Y3.

Implement selected approaches of the strategy and implementation plan as operational research (OR) studies

Progress in Y2, Q3

No activities were conducted during the reporting period.

Planned for Q4

Activities will be initiated in Y3.

2.2 Result 2: Entomological monitoring is improved

2.2.1 Activity 2.1: Compile and review entomological monitoring data

Carry out a desk-based review of all entomological monitoring efforts in the past decade in Tanzania

Progress in Y2, Q3

- OMDM facilitated a virtual meeting with entomology teams from ZAMEP, NIMR Amani, NIMR Mwanza, PMI, CDC, WHO and VectorLink project on June 9, 2020. Key issues discussed included the following:
 - Update on entomological monitoring activities supported by OMDM in Mainland Tanzania and Zanzibar including insecticide resistance monitoring.
 - Update on malaria vector entomological surveillance (MVES) activity in 62 districts. This activity is financially supported by the GFATM and PMI; OMDM provides technical support. NIMR Amani provided a snapshot of their progress in entomological surveillance activities including laboratory results from their analysis of field-collected mosquitoes. Triangulation and analysis of previously recorded data has not occurred due to COVID-19; this will likely take place in Q4.
 - Updates on entomological database and its analytical plan: The task force for overseeing the development of the entomological composite database presented progress in the development of entomological indicators for inclusion in a composite database. After a short discussion, it was agreed that OMDM should continue coordinating the entomological database task force and fast-track the integration of the entomological database with the national DHIS2.

- In Q3, OMDM continued developing a protocol to assess the impact of IRS in Tanzania's Lake Zone and Zanzibar. The protocol, initiated in Q1, is in the final stages of development and will be shared with PMI, NMCP and ZAMEP in Q4.
- OMDM continued supporting ZAMEP to review and compile entomological surveillance data. The final report of the reviewed entomological data has been converted into a publishable article and will be shared with ZAMEP and PMI for review in Q4.

Planned for Q4

In Q4, OMDM will continue working with ZAMEP to review, finalize, and publish an article on "*Malaria vectors dynamic in Zanzibar: implications for malaria elimination*". Additionally, OMDM will continue supporting the NMCP to identify and agree on parameters and modalities to incorporate research institution data into the DHIS2 composite database. OMDM will also continue discussions with ZAMEP to create a repository for historical and current entomology data in the DHIS2.

Review entomological monitoring sites and their current operational and analytical capacity to successfully conduct entomological monitoring

Progress in Y2, Q3

In Q3, OMDM initiated the inclusion of malaria entomological database into the MCN and orientated ZAMEP's Entomology Unit on its use.

Planned for Q4

In Q4, OMDM will continue supporting the orientation of ZAMEP's entomologists to use the MCN, including training on data collection forms.

Conduct an IRS impact evaluation study

Progress in Y2, Q3

During this implementation period, OMDM continued finalizing the protocol to conduct an impact analysis of IRS in Tanzania's Lake Zone and Zanzibar.

Planned for Q4

In Q4, OMDM will share the IRS impact analysis protocol with the NMCP, ZAMEP, and PMI for approval. Once approved, OMDM will lead data collection activities aligned with the protocol and will present initial findings from the IRS impact analysis to the NMCP and ZAMEP vector control TWGs for feedback.

Provide TA to NMCP for entomological monitoring and data analysis

Progress in Y2, Q3

In Q3, OMDM planned to provide technical assistance (TA) to the NMCP to perform MVES data triangulation, analysis, and report writing. However, this was not possible because of COVID-19 restrictions.

Planned for Q4

OMDM will provide TA to the NMCP to perform MVES data triangulation, analysis, and report writing.

2.2.2 Activity 2.2: Conduct entomological monitoring planning and implementation

Entomological surveillance, including Anopheles mosquito vector distribution, density, seasonality, biting behavior, human blood index, sporozoite rate, and entomological inoculation rate (EIR)

Progress in Y2, Q3

OMDM continued to support NIMR Mwanza and ZAMEP to conduct entomological monitoring in Mainland Tanzania and Zanzibar. Summary data for Y2, Q3 is presented below.

NIMR MWANZA

In Q3, OMDM continued supporting NIMR Mwanza to conduct entomological monitoring in ten sites; six are located in the districts where IRS is conducted while four are in districts where IRS is not taking place (control sites). One village was randomly selected in each of the districts; in each village, two households were selected for monthly mosquito collection. Mosquito collections were conducted using CDC light traps, clay pots, Prokopack aspirators, and CDC light traps with collection bottle rotators (CBR) in all selected villages and households.

A total of 7,998 female *Anopheles* mosquitoes were collected by all collection methods between April 2020 and June 2020. Of these, 5,454 (68%) were morphologically identified as *An. gambiae* s.l. and 2,544 (32%) as *An. funestus* s.l. A total of 3,879 (48%) female *Anopheles* mosquitoes collected were by CDC light traps, 2,057 (26%) by CBR, 1,351 (17%) by Prokopack aspirator, and 711(9%) by clay pots. *An. gambiae* s.l. was the abundant vector species sampled by all collection methods in each IRS district. Identification of species by polymerase chain reaction (PCR)-based methods showed the local vector population across sites to be predominantly *An. arabiensis* (58.7%), *An. funestus* (20.9%), *An. gambiae* s.s. (18%) and *An. parensis* (0.2%). Of the processed samples, 101 (2.2%) were not amplified by PCR (**Table 13**). *Anopheles arabiensis* was the most abundant species in almost all IRS districts, while *An. gambiae* s.s. was the primary species observed in the unsprayed districts. *Anopheles arabiensis* was the most abundant species in sprayed districts compared to the unsprayed ones ($p < 0.0001$). Similarly, the proportion of *An. funestus* in unsprayed districts was significantly higher than in sprayed ($p < 0.0001$).

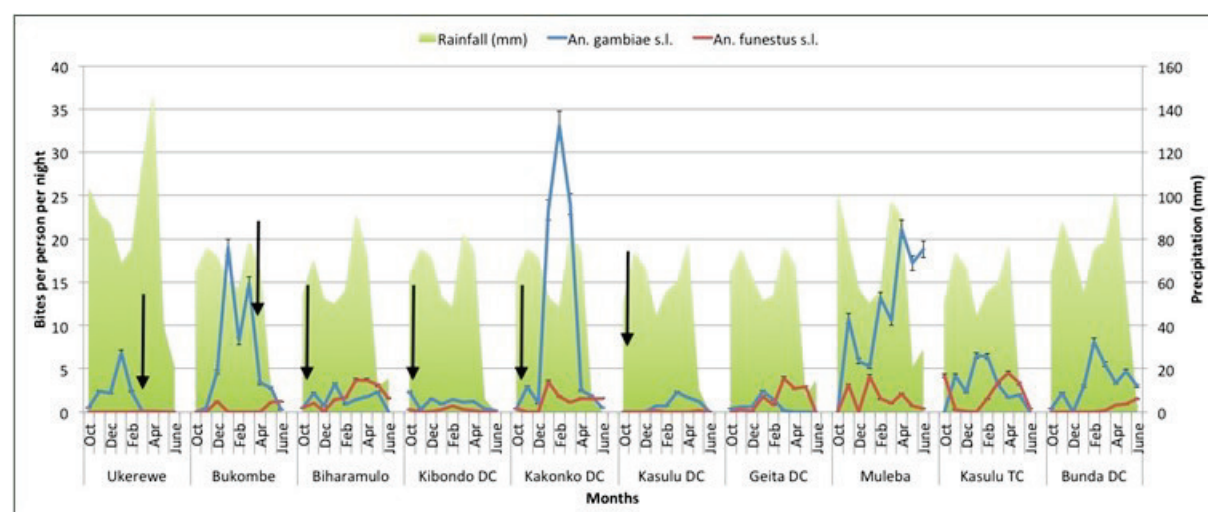
Sporozoite rates varied across the sites ranging from 0.3% to 2.7 % in sprayed districts and from 1.4% to 4.0% in unsprayed districts (**Table 13**). Sporozoite rates were significantly higher in unsprayed districts (1.8%) as compared with sprayed districts reflecting sporozoite rates of 1% ($p = 0.0018$).

Low indoor biting rates were observed in all sprayed sentinel sites with the exception of Bukombe that exhibited a slight surge of *An. funestus* s.l. biting indoors. All unsprayed sentinel districts reflected the highest mosquito densities (*An. gambiae* s.l. and *An. funestus* s.l.) resting indoors unlike the sprayed districts. Both indoor biting rates and indoor resting density tend to increase with the decrease in rainfall in all sites with exception of Muleba (**Figure 17**). There was also a significant decrease in the mean bites per person per hour after deployment of IRS in sprayed districts as compared to the unsprayed. This has contributed to the observed low Entomological Inoculation Rate (EIR) in sprayed districts as compared to the unsprayed.

Table 13. PCR species identification and sporozoite rates in sprayed and unsprayed districts

SPECIES BY PCR							ELISA		
District	Total tested (N)	<i>An. gambiae</i> s.s, n (%)	<i>An. arabiensis</i> , n (%)	<i>An. funestus</i> s.s, n (%)	<i>An. parensis</i> , n (%)	Negative, n (%)	Total tested (N)	Number positive (n)	Sporozoite rate (%)
Sprayed Sites									
Biharamulo	347	53 (12)	141 (7.2)	143 (30.9)	0	10 (18.2)	364	10	2.7
Kasulu DC	185	5 (1.1)	149 (7.6)	25 (5.4)	0	6 (10.9)	185	2	1.1
Kibondo	329	85 (19)	172 (8.7)	62 (13.4)	0	10 (18.2)	317	6	1.9
Kakonko	1,009	69 (1.3)	751 (38.1)	227 (49)	10 (100)	15 (27.3)	1,128	6	0.5
Bukombe	676	1 (0.2)	664 (33.7)	6 (1.3)	0	5 (9.1)	832	11	1.3
Ukerewe	410	307 (67)	94 (4.8)	0 (0)	0	9 (16.4)	797	2	0.3
Total	2,956	457 (15)	1,971 (66.7)	463 (15.7)	10 (0.3)	55 (1.9)	3,623	37	1.0
Unsprayed Sites									
Bunda	385	98 (25)	274 (35.2)	7 (1.4)	0	6 (13)	488	7	1.4
Muleba	568	143 (37)	113 (14.5)	288 (55.7)	0	24 (52.2)	752	30	4.0
Geita	189	20 (5.2)	92 (11.8)	73 (14.1)	1 (100)	1 (6.5)	189	6	3.2
Kasulu TC	588	127 (33)	299 (38.4)	149 (28.8)	0	9 (28.3)	763	21	2.8
Total	1,730	388 (22)	778 (45)	517 (29.9)	1 (0.1)	46 (2.7)	2,192	64	2.9
Total (All sites)	4,686	845 (18)	2,749 (58.7)	980 (20.9)	11 (0.2)	101 (2.2)	5,815	104	1.8

Figure 17. Monthly indoor biting rates of *Anopheles* mosquitoes collected by CDC light traps in sprayed and unsprayed districts



Arrows indicate when IRS operations were implemented.

ZAMEP

In Q3, ZAMEP continued routine entomological monitoring in ten sentinel sites in Zanzibar. The detailed outcome of this activity is included in **Annex 2**.

Planned for Q4

The following entomological activities conducted by NIMR Mwanza and ZAMEP will continue in Q4:

- Continue observing indoor biting rates using CDC light traps through the collection of mosquitoes for 14 nights during two consecutive weeks each month. NIMR Mwanza and ZAMEP will survey two different houses per night.
- NIMR Mwanza will continue monitoring outdoor biting rates using CBR, including sampling on nights near the new moon.
- NIMR Mwanza and ZAMEP will continue monitoring malaria vector feeding times and locations using CBR and human landing catches (HLC), with mosquitoes collected on ten days of the lunar month.
- On a monthly basis, NIMR Mwanza and ZAMEP will continue determining mosquito indoor and outdoor resting densities using Prokopack aspiration (NIMR Mwanza) or pyrethrum spray catch (PSC; ZAMEP).
- NIMR Mwanza and ZAMEP will continue identifying species of mosquitoes via laboratory analysis, including determining sporozoite rates and blood meal type.
- NIMR Mwanza and ZAMEP will continue conducting periodic quality assurance (QA) checks for species identification.
- NIMR Mwanza will conduct molecular sequencing on unidentified mosquitoes for species determination.

QA and insecticide residual efficacy monitoring following IRS

Progress in Y2, Q3

NIMR MWANZA

In Q3, NIMR Mwanza conducted cone bioassays to determine the residual efficacy of the insecticides sprayed on different wall surfaces inside houses in Biharamuro, Bukombe, and Ukerewe after the IRS campaign using SumiShield 50WG; and in Kibondo, Kakonko, and Kasulu DC, which were sprayed with Actellic® 300CS. WHO wall cone bioassays were conducted monthly with laboratory susceptible *An. gambiae* s.s. (Kisumu strain) on different wall surfaces reflecting those most typically found in the communities surveyed—mud, oil- or water-painted, lime-washed, unplastered burnt bricks, cement plastered—sprayed with either Actellic 300CS or SumiShield 50WG. Eight months after spraying with SumiShield 50WG (in Biharamulo) and Actellic 300CS (in Kakonko, Kibondo, and Kasulu DC), all surfaces retained effective insecticide residual efficacy. Four months after spraying SumiShield 50WG in Bukombe and Ukerewe, all surfaces also effectively retained the insecticide.

ZAMEP

In Q3, wall cone bioassays were conducted in IRS shehias in Zanzibar. The detailed outcome of this activity is included in **Annex 2**.

Planned for Q4

In Q4, NIMR Mwanza and ZAMEP will continue performing cone bioassays to evaluate spray quality and monitor insecticide decay rates for all IRS-treated sites.

Insecticide resistance testing

Progress in Y2, Q3

In Q3, OMDM supported NIMR Amani to conduct refresher trainings for laboratory, scientific, and vector control staff involved in insecticide resistance monitoring activities and to undertake resistance monitoring in the field. NIMR Amani conducted the training via training of trainers (ToTs) and cascade training.

Hands-on training of field implementers

A refresher hands-on training of field implementers (entomologists, laboratory staff and District Vector Control Officers [DVCOs] from the districts implementing the surveillance activities) normally precedes the insecticide resistance monitoring activity. The hands-on training pays a special focus on harmonizing field methodologies and SOPs, while equipping fieldworkers with the necessary knowledge and skills for insecticide resistance monitoring. Following the Government's restrictions of free movement and gatherings due to the COVID-19 pandemic, NIMR Amani adapted a cascaded way of training field implementers for monitoring insecticide resistance across all 22 sentinel districts. Firstly, in-house refresher training with NIMR scientists and laboratory technicians was conducted via ToT at NIMR Amani Centre in Muheza. Thereafter, the trained scientists and/or laboratory technicians were dispersed to their respective sentinel districts for further on-site hand-on training of the DVCOs in their respective districts. This was immediately followed by fieldwork in the 22 sentinel districts.

Insecticide Resistance Monitoring

Under their fixed award agreement (FAA) with OMDM, NIMR Amani conducted insecticide resistance monitoring using its trained field teams in 22 selected districts across Tanzania. Field teams finalized data collection in early July 2020. The objectives of insecticide resistance monitoring activities were to:

- Determine susceptibility status of malaria vectors (*An. gambiae* s.l.) to deltamethrin (0.05%), permethrin (0.75%), bendiocarb (0.1%), and pirimiphos-methyl (0.25%) in 22 sentinel districts;
- Determine the susceptibility status of malaria vectors (*An. gambiae* s.l.) to a new IRS insecticide (clothianidin [SumiShield]);
- Determine the intensity of resistance of malaria vectors (*An. gambiae* s.l.) to deltamethrin and permethrin in districts recorded to have high permethrin and deltamethrin resistance;
- Determine involvement of metabolic resistance mechanisms by conducting bioassays with the synergist piperonyl butoxide (PBO) in selected sentinel sites; and,
- Determine malaria vector species composition in sentinel sites.

The WHO standard methods were used to detect knockdown and mortality rates in the wild female Anopheles mosquitoes reared from larvae collected in the sentinel districts. The WHO diagnostic doses of 0.75% permethrin; 0.05% deltamethrin; 0.1% bendiocarb, and 0.25% pirimiphos-methyl were used. In addition, Whatman® No. 1 filter papers measuring 12cm by 15cm treated with the diagnostic dose of clothianidin (2% weight per unit volume

[w/v]) was used. The WHO susceptibility test papers using 5× and 10× the discriminating concentrations in a stepwise manner was used to assess the intensity of resistance. PBO synergist tests were conducted using the WHO standard method in sentinel sites where mosquitoes were found to be resistant to permethrin and/or deltamethrin.

Preliminary findings shows that *Anopheles gambiae* s.l. are resistant to permethrin (mortality rate <90%) in all sentinel districts except Kilombero and Misungwi where resistance is suspected. Resistance to deltamethrin was detected in all districts except Ngara and Kigoma DC. Malaria vectors were susceptible to bendiocarb in all districts except Bukoba Rural, Kinondoni, Magu, Nzega DC and Bagamoyo. The mosquito population was susceptible to pirimiphos-methyl in all districts except Buchosa, Kinondoni, Misenyi, Misungwi, and Ngara. Results also show that local malaria vectors are fully susceptible (mortality >98%) to clothianidin in all seven selected districts. The detailed susceptibility status of all tested insecticides in the 22 sentinel sites are shown in **Table 14** below. Partial restoration of susceptibility to deltamethrin and permethrin was observed after pre-exposure to PBO in all sites. These responses suggest that insecticide resistance in the *An. gambiae* population is partially mediated by oxidase (cytochrome P450s) based metabolic resistance, with some contribution from other mechanisms including knock down resistance (*kdr*).

Table 14. Susceptibility status (mortality rates) of *An. gambiae* s.l. to the WHO-recommended concentrations of four different insecticides

District	Permethrin	Deltamethrin	Bendiocarb	Pirimphos Methyl
	%Mortality (95% C.I)	%Mortality (95% C.I)	%Mortality (95% C.I)	%Mortality (95% C.I)
Bagamoyo	31.25 (30.4-32.1)	16.25 (16.14-16.36)	75.00 (72.81-77.19)	95.00 (94.82-95.18)
Buchosa	37.50 (36.65-38.35)	73.75 (73.00-74.50)	100.00 (100-100)	82.50 (82.08-82.92)
Bukoba DC	32.50(32.04-32.96)	56.25 (55.97-56.53)	93.33 (93.13-93.54)	100.00 (100-100)
Chato	39.76(39.49-40.03)	55.95 (55.51-56.39)	100.00 (99.89-100.11)	100.00 (99.83-100.17)
Kakonko	50.00 (49.20-50.80)	32.50 (32.12-32.88)	100.00 (100-100)	100.00 (100-100)
Karagwe	57.50 (57.22-57.78)	55.00 (54.31-55.69)	100.00 (100-100)	96.25 (96.04-96.46)
Kigoma DC	*	100.00 (99.79-100.21)	*	*
Kilombero	95.00 (94.82-95.18)	90.00 (89.82-90.18)	100.00 (99.89-100.11)	100.00 (100-100)
Kinondoni	10.00 (9.82-10.18)	15.00 (14.82-15.18)	93.75 (93.47-94.03)	88.75 (88.38-89.12)
Kyela	90.00 (89.75-90.25)	81.67 (81.19-82.15)	98.33 (98.21-98.46)	100.00 (100-100)
Magu	40.00 (39.35-40.65)	38.75 (38.00-39.50)	92.50 (92.22-92.78)	96.25 (96.04-96.46)
Misenyi	23.75 (23.38-24.12)	18.75 (18.38-19.21)	100.00 (100-100)	65.00 (63.06-66.94)
Misungwi	95.00 (94.82-95.18)	96.25 (96.14-96.36)	98.75 (98.64-98.86)	88.75 (88.42-89.08)
Mpanda	75.00 (74.53-75.47)	95.00 (94.69-95.31)	100.00 (100-100)	100.00 (100-100)
Mtwara DC	100.00 (100-100)	100.00 (100-100)	100.00 (100-100)	100.00(100-100)
Ngara	76.25 (75.76-76.74)	97.50 (97.37-97.63)	100.00 (100-100)	31.25 (30.46-32.04)
Nyang'hwale	21.25 (20.97-21.53)	22.50 (21.82-23.18)	100.00 (100-100)	97.50 (97.37-97.63)
Nyasa	70.00 (67.94-72.06)	90.00 (89.82-90.18)	100.00 (100-100)	100.00 (100-100)
Nzega DC	47.50 (46.98-48.02)	66.25 (65.62-66.88)	96.00 (95.77-96.23)	91.00 (90.67-91.33)
Ruangwa	11.25 (11.14-11.36)	2.50 (2.37-2.63)	100.00 (100-100)	100.00 (100-100)

District	Permethrin	Deltamethrin	Bendiocarb	Pirimphos Methyl
	%Mortality (95% C.I)	%Mortality (95% C.I)	%Mortality (95% C.I)	%Mortality (95% C.I)
Sengerema	30.00 (29.85-30.15)	70.00 (69.67-70.33)	100.00 (100-100)	98.33 (98.21-98.46)
Uvinza	77.50(77.22-77.78)	91.25 (91.04-91.46)	100.00 (100-100)	100.00 (100-100)
	LEGEND			
Resistant (\leq 90%)		Suspected Resistant (97 – 90%)		Susceptible (\geq 98%)

*information not available at the time of compilation of this report.

Planned for Q4

In Q4, OMDM will support NIMR Amani to conduct data analysis, produce a complete insecticide resistance monitoring report for 2020, and disseminate the results to malaria control stakeholders.

Species identification using PCR

Progress in Y2, Q3

Molecular analysis of mosquito samples using PCR was planned for Q3; however, due to the delayed completion of field activities as a result of COVID-19, this activity will be conducted in Q4.

Planned for Q4

NIMR Amani will initiate molecular analysis of mosquito samples using PCR following the completion of field insecticide resistance testing in Q4.

Maintain Anopheles colony in NIMR Mwanza and ZAMEP insectaries

Progress in Y2, Q3

ZAMEP and NIMR Mwanza continued to maintain their *An. gambiae* s.s. colonies (Kisumu strain) in Q3. Production of adult mosquitoes continued to be maintained to meet the required demands for IRS quality assessment and residual efficacy testing.

Planned for Q4

In Q4, NIMR Mwanza and ZAMEP will continue maintaining their insectaries.

2.2.3 Activity 2.4: Provide equipment and supplies for entomological monitoring

Progress in Y2, Q3

In Q3, OMDM continued working with vendors and freight forwarders to ship entomological monitoring equipment, supplies, and reagents to NIMR Mwanza, NIMR Amani, and ZAMEP. Most of the items procured on behalf of subrecipients have now been shipped and received by each partner; the few outstanding items continue to be delayed due to the impact of COVID-19 on international shipping.

Planned for Q4

In Q4, OMDM will continue working with RTI's home office logistics team to coordinate shipment of the final materials and supplies to partners in Tanzania.

2.2.4 Activity 2.5: Entomological investigation and response in hot spot areas/active foci (Zanzibar only)

Progress in Y2, Q3

Details related to ZAMEP's entomological investigations and responses in hot spot and active foci areas can be found in **Annex 2**.

Planned for Q4

OMDM will continue providing technical guidance to ZAMEP to conduct entomological investigations and respond accordingly in hotspot and active foci areas.

2.2.5 Activity 2.6: Capacity building of new entomological field team in new emerging hotspots (Zanzibar only)

Progress in Y2, Q3

OMDM initiated the development of SOP to support entomological investigations of active foci. The draft document is available; once finalized, it will be used to orient ZAMEP's entomology team in field entomological investigations.

Planned for Q4

Finalize the foci investigation SOP for ZAMEP's entomological team and orient the field staff on its use.

2.2.6 Activity 2.7: Strengthen national malaria vector control strategies, policies, and guidelines

Engage with the respective subcommittees and TWGs

Progress in Y2, Q3

OMDM hosted a virtual meeting with entomology teams from ZAMEP, NIMR Amani, NIMR Mwanza, PMI, CDC, WHO and the VectorLink project on June 9, 2020 as highlighted in activity 2.1 above (section 2.2.1). The vector control TWG meeting in the mainland scheduled for June 2020 has been postponed due to COVID-19.

Planned for Q4

In Q4, OMDM will support the NMCP's vector control TWG meeting in addition to working with ZAMEP to develop the terms of reference (ToR) for a vector control TWG for Zanzibar.

Review and update relevant policy and technical guidelines

Progress in Y2, Q3

OMDM continues to support the NMCP to finalize its malaria programme review (MPR) initiated on March 23, 2020. The MPR comprehensively analyzed the malaria situation in Tanzania and the NMCP's performance against their strategic plan. Findings from the reviews and lessons learned were used in the development of a new strategic plan. OMDM supported the NMCP in the development of this new strategic plan beginning on April 23, 2020. This process continued virtually through mid-May 2020, including a virtual meeting to discuss the IMVC thematic area on May 22, 2020.

OMDM also supported the NMCP to develop the GFATM concept note between April 19 and May 20, 2020. OMDM participated in a virtual meeting on April 29, 2020 to specifically discuss the IMVC thematic area.

Provide financial and logistic support to disseminate updated guidance documents

Progress in Y2, Q3

No activities were conducted during the reporting period because of challenges posed by COVID-19.

Planned for Q4

OMDM will present the finalized larval source management (LSM) operational tool to ZAMEP's management team for feedback.

2.3 Result 3: Drug efficacy monitoring is improved

2.3.1 Activity 3.2: Plan, monitor, and implement TES

Mainland Tanzania: Plan, monitor, and implement TES

Progress in Y2, Q3

Under their FAA with OMDM, CUHAS finalized preparations for TES 2020. The initiation of TES 2020 was delayed due to COVID-19. In Q3, OMDM supported the TES TWG's virtual meetings on April 23, June 1, and June 23, 2020, during which final plans for TES 2020 were discussed. These meetings brought together representatives from OMDM, NMCP, MUHAS, IHI, NIMR Tanga, CUHAS, KCMC, PMI/USAID, and CDC/PMI. Training and site initiation started on June 27, 2020, in Mlimba; subsequent study initiation dates are indicated in **Table 15**.

OMDM continued to support NIMR Tanga to conduct molecular analysis of TES 2018 and 2019 samples. However, this activity stopped due to the delayed arrival of reagents and supplies as a result of the COVID-19 pandemic.

Table 15. TES 2020 study initiation and supervision dates

Activity	Mlimba	Mkuzi	Yombo	Ujiji
Site initiation and training dates	6/27/2020– 7/3/2020	7/4/2020– 7/10/2020	7/18/2020– 7/24/2020	7/25/2020– 7/31/2020
Enrollment by July 24 2020	47	33	8	0
1st supervision	8/9/2020– 8/14/2020	8/16/2020– 8/21/2020	8/23/2020– 8/28/2020	8/30/2020– 9/4/2020
2nd supervision	9/27/2020– 10/2/2020	10/4/2020– 10/9/2020	10/25/2020– 10/30/2020	11/1/2020– 11/6/2020
Expected site closing date	10/10/2020	10/18/2020	11/1/2020	11/7/2020

Planned for Q4

OMDM will continue to support CUHAS and other implementing partners with TES 2020 activities throughout Q4.

Enter all historical and future clinical data in a DHIS2 database

Progress in Y2, Q3

No data collected in Q3. Available TES 2019 data was entered in the DHIS2 composite database.

Planned for Q4

OMDM will coordinate with CUHAS to submit TES 2020 data to the NMCP upon completion of molecular analysis activities. OMDM will also continue supporting NIMR Tanga to conduct

molecular analysis of TES 2018 and 2019 samples and training of identified staff on the analysis.

Review TES sites and their current operational and analytical capacity to successfully conduct TES

Progress in Y2, Q3

No activities were conducted this reporting period.

Planned for Q4

No changes related to TES implementation are planned for Q4.

2.3.2 Activity 3.3: Provide equipment and supplies for TES

Mainland Tanzania: Plan, monitor, and implement TES

Progress in Y2, Q3

OMDM continued working with RTI's shipping and logistics department to ship reagents to Tanzania as soon as international flights re-started during the COVID-19 pandemic; however, there has been a challenge in clearing the supplies through customs once the reagents arrive in-country. The Government Procurement Service Agency (GPSA)—responsible for the clearance of all government goods—has been slow; RTI headquarters and OMDM staff continue to push to get the supplies to NIMR Tanga.

Planned for Q4

OMDM will continue working with RTI's shipping and logistics department to push to get the remaining supplies to NIMR Tanga as quickly as possible.

2.3.3 Activity 3.5: Strengthen national malaria case management strategies, policies, and guidelines

Engage with the respective subcommittees and TWGs

Progress in Y2, Q3

In Q3, OMDM supported virtually TES TWG meetings on April 23, June 1 and June 23, 2020, during which the preparations for TES 2020 were discussed. These meetings brought together representatives from OMDM, NMCP, Muhimbili University of Health and Allied Sciences (MUHAS), IHI, NIMR Tanga, CUHAS, Kilimanjaro Christian Medical Centre (KCMC), PMI/USAID, and CDC/PMI and focused on TES 2020 planning in light of the COVID-19 pandemic and decisions made by the National Research Ethical Committee about human subject research. On June 23, 2020, clearance was received to continue with TES. Participants emphasized the importance of ensuring all safety precautions are taken during training and implementation to ensure research staff and client safety are prioritized.

Planned for Q4

In Q4, OMDM will continue supporting TES TWG and case management TWG meetings.

2.4 Result 4: GOT's evidence-based decision making is improved

2.4.1 Activity 4.1: Strengthen Tanzania's capacity for state-of-the-art (SOTA) analysis and interpretation of surveillance, entomological, and drug efficacy data

Provide and/or support attendance of short courses

Progress in Y2, Q3

OMDM was unable to support attendance of short courses in Q3 due to the COVID-19 pandemic.

Planned for Q4

We will keep track of any courses that may be made available post-COVID-19 and will follow-up with the selected participants to enroll.

Support for Field Epidemiology and Laboratory Training Program (FELTP) trainees

Progress in Y2, Q3

No activities were conducted during the April–June 2020 reporting period as the FELTP course was delayed due to the COVID-19 pandemic.

Planned for Q4

OMDM will support FELTP trainees once the training is reinitiated.

Hold scientific stature/data analysis workshops

Progress in Y2, Q3

Due to the ongoing COVID-19 pandemic, OMDM was unable to hold workshops planned during the period.

Planned for Q4

The Activity has planned a virtual six-week 'Foundation of R Language' training. Four staff from OMDM and ZAMEP's SME Unit and three NMCP SME staff will participate in the trainings to be held once a week beginning in Q4. These trainings will be facilitated by [REDACTED], RTI's Epidemiologist and Modeler. The training described above will be conducted via Zoom. The activity is finalizing the training outline and will begin sessions in July 2020.

Mentor and coach MoHCDGEC/NMCP and MOHZ/ZAMEP staff

Progress in Y2, Q3

As highlighted under result areas 1 and 2, OMDM staff continuously engage with the NMCP and ZAMEP through the mentoring, coaching, and one-on-one engagement of team members, staff secondment in Zanzibar, and support to the NMCP through TA in various TWGs and meetings.

OMDM also began the process of identifying, recruiting for, and hiring a full-time staff in Dodoma to provide full-time, hands-on support to the NMCP. A job description was developed and advertised in the Guardian Newspaper.

Planned for Q4

OMDM will continue mentoring and coaching activities for NMCP and ZAMEP staff. OMDM intends to have the Surveillance and MERLA Advisor position for which we're currently recruiting identified and onboarded by October 1, 2020 in Dodoma.

2.4.2 Activity 4.2: Conduct SOTA analysis and interpretation of surveillance, entomological, and drug efficacy data

Progress in Y2, Q3

Working with the NMCP and ZAMEP, OMDM continues to identify various areas for further analysis and interpretation of epidemiological and entomological data. In Q3, OMDM continued supporting data management and analysis. Examples follow:

- Working with the NMCP, ZAMEP, and Boresha Afya, OMDM jointly prepared for data review meetings by downloading and reviewing indicators with the larger team before each meeting.
- OMDM provided PMI with a monthly summary of the malaria situation in the regions and councils of Mainland Tanzania.
- OMDM conducted a Joint Partner Planning Meeting (JPPM) with ZAMEP, the NMCP, PMI and other implementing partners.
- OMDM supported ZAMEP in the analysis and dissemination of malaria data. Trends in the number of weekly malaria cases, rainfall patterns, DMSO and health facility reporting performance, along with secondary analysis on LLIN use and access in communities, was shared via meetings with key stakeholders and partners. OMDM also continued with finalizing the analysis entitled "**Effect of change in rainfall patterns on spatial and temporal occurrence of malaria cases in Zanzibar**" as described under section 2.1.9 above.
- OMDM continued supporting the NMCP and ZAMEP to integrate the entomological database with the national DHIS2.
- OMDM continued working with the NMCP to conduct data review meetings and with ZAMEP to perform secondary analysis of malaria cases.

Planned for Q4

OMDM will continue working with the NMCP, ZAMEP and Boresha Afya to conduct data review meetings and other secondary analyses.

2.4.3 Activity 4.3: Disseminate OMDM results through various channels

Progress in Y2, Q3

In Q3, OMDM disseminated Activity results through various channels, including the following:

- OMDM, in collaboration with the NMCP, ZAMEP, and Boresha Afya conducted a total of five data review meetings as highlighted under result area 1.
- OMDM supported the NMCP in the printing of issue #9 of the 2019 Annual Malaria Bulletin.
- OMDM supported ZAMEP with frequent data analysis by updating malaria trends and DMSO and HF performances that were frequently presented during ZAMEP stakeholder meetings.

- Additional analysis on case classification and LLIN use and access data collected by DMSOs through household follow-ups in the communities was also showcased for the period January 2017–June 2020. This helped shed light on the impact of travel restrictions on cases being classified as locally acquired rather than imported during the pandemic, as well as net use and coverage (access) in household members of index cases over the last 3 three years.
- OMDM also disseminated preliminary analysis of the spatio-temporal occurrence of malaria cases to ZAMEP.
- OMDM shared the 2019 consolidated entomological monitoring report with the NMCP, ZAMEP, PO-RALG and WHO.
- OMDM subrecipients—NIMR Amani, NIMR Mwanza and ZAMEP—disseminated entomological surveillance results with PMI, CDC, VectorLink project, WHO, IHI and other malaria vector control stakeholders in the entomology team update meeting held on June 9, 2020.

Planned for Q4

In partnership with the NMCP and ZAMEP, OMDM will continue supporting the analysis of routine malaria data, including entomological data.

Support drafting and disseminating programmatic updates

Progress in Y2, Q3

In addition to the seven abstracts developed and highlighted in our Q2 report, four more abstracts were finalized and submitted to the annual meeting of the American Society of Tropical Medicine and Hygiene (ASTMH) in Q3, including the following:

- 1) Assessing the reliability of surveillance data collected by District Malaria Surveillance Officers (DMSOs) in Unguja District, Zanzibar, Wahida Hassan, Abdullah S. Ali, Mohammed Ali, Mwatima Suleiman, Makame Hassan, Raya Ali, Amina Juma, Humphrey Mkali, Shabbir Lalji, Naomi Serbantez, Erik Reaves, Chonge Kitojo, Abdul-wahid Al-mafazy
- 2) Response to an increase in malaria transmission in Urban district, Zanzibar–2019, Faiza B. Abbas, Abdullah S. Ali, Mohammed Ali, Naomi Serbantez, Shabbir Lalji
- 3) Trends of Intermittent Preventive Therapy uptake in pregnant women attending Antenatal Care (ANC), 2015–2019, Mainland Tanzania, Samwel Lazaro, Khalifa Munisi, Franky Chacky, Anna Mahendeka, Ssanyu Nyinondi, Shabbir Lalji, Humphrey Mkali, Joseph Joachim Joseph, Chonge Kitojo, Naomi Serbantez, Erik Reaves, Claud John, Ally Mohamed.
- 4) Integration of malaria case-based surveillance (Coconut) and District Health Information Software (DHIS2) in Zanzibar to improve data use in decision making, Joseph Joachim Joseph, Humphrey R. Mkali, Shabbir Lalji, Abdul-wahid Al-mafazy, Abdullah S. Ali, Faiza B. Abbas, Mohamed H. Ali, Wahida S. Hassan, Chonge Kitojo, Naomi Serbantez, Ahlam Saeed, Bilali Kabula, Ssanyu S. Nyinondi, Donal Bisanzio, Richard Reithinger, Jeremiah Ngondi, Mike McKay

Planned for Q4

OMDM will continue updating PMI with new programmatic updates in Q4.

Develop policy and advocacy briefs

No activities are planned for Y2.

Attend national, regional, and international conferences and workshops

Progress in Y2, Q3

As noted above, OMDM provided technical support to key implementing partners to develop a total of 11 abstracts that were reviewed by PMI and later submitted to ASTMH in April 2020.

Planned for Q4

In Q4, OMDM will begin working with the authors to prepare oral and poster presentations once feedback is received from ASTMH.

Manuscript submitted for peer review

Progress in Y2, Q3 OMDM continued collaborating with RTI's key technical experts to continue manuscript development in Q3. **Table 16** highlights the key topics being worked on and the targeted dates for sharing the drafts with PMI.

Table 16. List of draft manuscripts being developed by OMDM in Y2

Key result area	Topic	System data	Paper title or Description	OMDM point of contact	Estimated date to share draft with PMI
Surveillance	eIDSR 1 descriptive analysis	DHIS2	Improving reporting of weekly malaria data through the eIDSR in Mainland Tanzania	[REDACTED]	August 10, 2020
Surveillance	eIDSR 2 descriptive analysis	DHIS2	Malaria surveillance in Tanzania: Performance of the electronic Integrated Disease and Surveillance Response system	[REDACTED]	August 10, 2020
Surveillance	MCN Risk Factors	MEEDS/MCN	Risk factors associated with malaria epidemiology in Zanzibar	[REDACTED]	August 10, 2020
Surveillance	MCN case	MCN, TMA	Effect of change in rainfall patterns on spatial and temporal occurrence of malaria cases in Zanzibar	[REDACTED]	August 28, 2020
Vector Control	IRS description for Tanzania Vector Control Scale-Up Project (TVCSUP) operations	IRS Project Records Data	REVIEW: IRS logistics/ operations/ process/ data/usage/ different cycles (financial, weather, procurement, operations, Actellic CS 300)	[REDACTED]	August 10, 2020

Key result area	Topic	System data	Paper title or Description	OMDM point of contact	Estimated date to share draft with PMI
Vector Control	IRS impact	DHIS2	TBD	[REDACTED]	NB. Data for Mainland downloaded, and analysis plan developed with Donal Bisanzio. Preliminary results to be shared by August 28, 2020
Vector Control	Entomology/epidemiology	ZAMEP Ento record data	Malaria vectors dynamic in Zanzibar: implications for malaria elimination	[REDACTED]	August 15, 2020

Planned for Q4

OMDM will continue working on the above manuscripts in Q4.

Success stories

Progress in Y2, Q3

In Q3, OMDM finalized and submitted a success story (**Annex 3**) on the data review meetings we have been conducting with the NMCP.

Planned for Q4

In Q4, OMDM will continue to identify stories to further publicize OMDM successes, aligned with the goals of the Activity's Communications Plan.

2.4.4 Activity 4.4: Implementing Learning Agenda

Progress in Y2, Q3

In Q3, OMDM continued to implement its Learning Agenda, including frequent meetings with RTI's headquarters based MERLA team. The team also had a phone call with PMI to further discuss the development of the OR concept note titled "**Measuring the programmatic impact of Reactive Case Detection vs. focal Mass Drug Administration to control malaria in Zanzibar.**" This is a proposed OR that OMDM wants to undertake in Zanzibar pending resolution of key issues around funding and timing of the study currently under discussion OMDM and PMI.

OMDM also developed a MEL Contingency Plan in Q3 for each result area highlighting potential indicators that could be impacted due to the ongoing pandemic. This was required due to the suspension of some activities and OMDM's inability to monitor their performance, especially under Result Area 3. The plan was shared with PMI in May 2020, including revision of targets and ways to mitigate some of the affected activities as COVID-19 unfolded in Tanzania.

Planned for Q4

In Q4, OMDM will continue implementing the Activity's Learning Agenda and focus on the OR development and other analysis and assessments described above.

3. Implementation Challenges

OMDM's implementation experienced minimal challenges in Y2, Q3 as detailed in **Table 17**.

Table 17. OMDM implementation challenges

Implementation challenge	Context
COVID-19	The COVID-19 pandemic has impacted implementation of OMDM activities as described throughout the narrative. While the OMDM office in Dar es Salaam has re-opened with restrictions as of July 2020, we continue experiencing delays with international shipments of entomological commodities to Tanzania due to international flight cancellations. Once the goods have arrived in Tanzania, we've experienced additional delays clearing goods for our subwards through the new government-instituted system requiring the use of GPSA to clear all commodities to be delivered to GOT institutions. Since goods imported by RTI are tax exempted and consigned to institutions this is unavoidable. To date, shipments have averaged up to one month clearing customs, even when all necessary paperwork is obtained prior to the actual shipment. We are working closely with the receiving institutions to push GPSA personnel to shorten clearance timelines.

4. Gender Considerations

OMDM ensured gender integration in implementation of all activities during the reporting period. Please see **Annex 1** to review OMDM's progress on the performance indicators specified in the MEL plan.

5. Environmental Compliance

TES continues at four study sites (health facilities) as detailed under Result 3. Teams observe PPE requirements (e.g., laboratory coats and gloves) and use of sharps and biological sample waste bins for disposal of needles, test kits, and slides during supervision visits to TES sites as per MoHCDGEC medical waste disposal procedures. Site supervision checklists include components for monitoring waste disposal procedures.

6. MEL Plan: Progress on OMDM Performance Indicators

OMDM's Performance Indicator Summary Table is attached as **Annex 1**. The table includes reporting on indicators for which quarterly updates are required. Annual and periodic indicators will be updated as proposed in OMDM's MEL plan.

7. OMDM's Learning Agenda and proposed OR studies

On June 9, 2020, OMDM's field and home office teams met virtually for our quarterly Pause and Reflect session. [REDACTED], Senior MERLA Specialist, led the session with [REDACTED], OMDM's Surveillance & MERLA Director; [REDACTED], Senior Operations Research Specialist; and [REDACTED], Infectious Diseases Portfolio Director. The goal of this session was to review the Learning Agenda and review OR studies. Discussions included the following:

- **MEL Plan:** To address the potential effects of the COVID-19 pandemic on OMDM's MEL plan and the ability of the Activity to meet indicators, targets, and complete data

collection activities, [REDACTED] and [REDACTED] drafted and presented to PMI a contingency MEL plan.

- **OR studies:** On May 12, 2020, OMDM met with PMI to discuss the revised OR concept note and proposed studies on MDA effectiveness and RDT sensitivity. PMI provided comments and encouraged the team to revise and resubmit for funding consideration in FY2021.
- **Potential PhD student:** OMDM is exploring the possibility of engaging a PhD student to conduct their dissertation on one of the proposed OR topics. [REDACTED], RTI's Senior Operations Research Specialist, is exploring this opportunity with various universities for FY2021.

8. Management

8.1 Collaboration with OMDM partners and stakeholders

Substantial collaboration occurred among OMDM's partners and stakeholders throughout this reporting period in support of technical activities. OMDM staff members have contributed to, and participate in, the partners' and stakeholders' meetings and events detailed in **Table 18**.

Table 18. OMDM Q3 collaboration with partners and stakeholders

Event	Participants	FY2020 Q3 dates
MSDQI dashboard meeting	Boresha Afya, OMDM, NMCP, Swiss TPH	April 3 and 12, 2020
GFATM concept note development	NMCP, PMI implementing partners, Swiss TPH, OMDM, WHO, PMI, USAID	April 20, 2020
TES TWG meetings	NMCP, PMI/USAID, CUHAS, MUHAS, NIMR, KCMC, IHI, RTI/OMDM	April 23, June 1, and June 23, 2020
ZAMEP stakeholders' meetings	ZAMEP, PMI implementing partners, Swiss TPH, WHO, USAID, PMI	April 30, May 14, June 4, and June 24, 2020
ZILS/DHIS2 integration meeting	OMDM, ZAMEP, GHSC, HMIS, ICT	May 11, and June 30 2020
Data review meetings	ZAMEP, Boresha Afya, NMCP, PO-RALG	May 11, May 14, and June 10, 2020
Entomology team meeting	OMDM, NIMR Amani, NIMR Mwanza, PMI, CDC, WHO, ZAMEP, VectorLink	June 9, 2020
TES training/site initiation	CUHAS, NMCP, IHI, NIMR Tanga, MUHAS	June 27, 2020

8.2 List of all documents submitted to the Development Experience Clearinghouse (DEC)

Work continued in Q3 to ensure that performance reports to date meet 508 compliance requirements in terms of redaction and readability to allow posting to the DEC. All Y1 reports have been posted; OMDM's Y2 Q1 and Q2 Reports are being made 508 compliant and will be posted to DEC in Q4.

9. Upcoming Events

Table 19 highlights planned events involving OMDM and key implementing partners in Y2, Q3.

Table 19. Upcoming events

Event	Lead	FY2020, Q4 dates
DMSO Coconut system training	OMDM	TBD
School Malaria Parasitemia Survey (SMPS) 2020 Dissemination Meeting	NMCP	July 22, 2020
PORALG supportive supervision report out	PO-RALG	TBD
Tanzania Parliamentarians Against Malaria (TAPAMA) supervision report out meeting	TAPAMA	August 3, 2020
Workplanning session NMCP	OMDM	TBD

Annex 1. Performance Indicator Summary Table

Annual and periodic indicators presented below have been shaded grey as quarterly updates are not applicable. Indicators with annual reporting frequency are presented in the Y1 column; indicators requiring periodic frequency will be updated on an ad-hoc basis.

Indicators		Data source	Disaggregation	Reporting frequency	Domain	Baseline	Q1	Q2	Q3	Q4	Y2
1a	# of malaria-related deaths per year	HMIS/DHIS2	Gender/district/regions/Mainland Tanzania and Zanzibar	Annually	Mainland Tanzania	4,294 (2017)					
1b					Zanzibar	1 (2017/2018)					
2a	# of malaria cases	HMIS/DHIS2	Gender/district/regions/Mainland Tanzania and Zanzibar	Annually	Mainland Tanzania	5,593,544 (2017)					
2b					Zanzibar	4,190 (2017)					
3a	Malaria prevalence rate among children aged 6–59 months	Demographic and Health Survey/MIS	Gender/district/regions/Mainland Tanzania and Zanzibar	Periodically	Mainland Tanzania	7.5% (2017)					
3b					Zanzibar	0.2% (2017)					
4a	Malaria prevalence in pregnant women attending antenatal clinics	ANC malaria testing reports	Gender/district/regions/Mainland Tanzania and Zanzibar	Periodically	Mainland Tanzania	6.7% (2017)					
4b					Zanzibar	0.3%, N = 383 (2017/2018)					
RESULT 1: MALARIA SURVEILLANCE IS IMPROVED											
1.1a	# of national meetings (TWGs, etc.) conducted with policy and decision makers	Reports	Mainland Tanzania and Zanzibar	Quarterly	Mainland Tanzania	2 (2017)	0	2	3		
1.1b					Zanzibar	0 (2017/18)	0	2	4		

Indicators		Data source	Disaggregation	Reporting frequency	Domain	Baseline	Q1	Q2	Q3	Q4	Y2
1.2a	# of districts implementing regular data review meetings for data analysis as a basis for sound planning	Reports	District/Mainland Tanzania and Zanzibar	Quarterly	Mainland	TBD	8, Dodoma; 6, Njombe; 5, Iringa; 7, Mbeya; 9, Morogoro	8, Mwanza; 6, Shinyanga; 7, Arusha; 5, Dar es Salaam; 7, Mbeya	0		
1.2b					Zanzibar	0 (2017/2018)	0	2 (national level)	0		
1.3	% of districts that conducted MSDQI supervision in the Mainland and supportive SME supervision in Zanzibar	Activity records	District/Mainland Tanzania and Zanzibar	Quarterly	Mainland Tanzania	Not applicable (NA)	25% (46/184)	41.3% (76/184)	59.2% (109/184)		
					Zanzibar	NA	100%	100%	100%		
1.4	% of districts using malaria dashboard based on DHIS2 and other local systems	Activity records	District/Mainland Tanzania and Zanzibar	Quarterly	Mainland Tanzania	76.34 % (2018)	80%	80%	80%		
					Zanzibar	NA	NA	NA	NA		
1.5	# of data use, Pause and Reflect meetings under NMCP/ZAMEP's leadership with meeting minutes distributed	Activity records	Mainland Tanzania and Zanzibar	Annually	Mainland Tanzania	NA					
					Zanzibar	NA					

Indicators		Data source	Disaggregation	Reporting frequency	Domain	Baseline	Q1	Q2	Q3	Q4	Y2
1.6	# of GOT staff trained in HMIS/DHIS2 and MCN (cumulative)	Activity records	Gender/Mainland Tanzania and Zanzibar	Annually	Mainland Tanzania	NA					
					Zanzibar						
1.7	# of GOT staff trained in data analysis and scientific stature (cumulative)	Activity records	Gender/Mainland Tanzania and Zanzibar	Annually	Mainland Tanzania	NA					
					Zanzibar						
1.8a	% of outbreaks detected and investigated	Epidemiological records	Districts/Regions/Mainland Tanzania and Zanzibar	Upon every outbreak	Mainland Tanzania	NA	NA	NA	NA		
1.8b					Zanzibar	100% (N = 8) ^a (2018/2019)	39.5% (15/38)	17.5% (7/40)	14% (7/50)		
1.9a	% of malaria outbreaks responded to by district councils within 2 weeks of onset	NMCP/ZAMEP Activity reports	Districts/Regions/Mainland Tanzania and Zanzibar	Annually	Mainland Tanzania	NA	NA	NA	NA		
1.9b					Zanzibar	100% (N = 8) ^a (2018/2019)	39.5% (15/38)	17.5% (7/40)	14% (7/50)		
1.10a	# of rapid response guidelines and protocols	Draft guidelines/SME records	Mainland Tanzania and Zanzibar	Periodically	Mainland Tanzania	NA					
1.10b					Zanzibar	1 (2017/2018)					
1.11	% of eIDSR reports submitted	Electronic reports/case registers	Districts/Regions/Mainland Tanzania	Monthly/Quarterly/Annually	Mainland Tanzania	51.3% (Aug 2018)	81.4%	90.6%	89.4%		
1.12	% of MEEDS (SMS) reports submitted	Electronic reports/case registers	Districts/Regions/Zanzibar	Monthly (Weekly in surveillance system)	Zanzibar	23.8% (2017/2018)	97.4%	98.6% (3,046/3,094)	96.0% (2,972/3,094)		

Indicators		Data source	Disaggregation	Reporting frequency	Domain	Baseline	Q1	Q2	Q3	Q4	Y2
1.13a	% of facilities reporting complete and accurate routine malaria indicators quarterly ¹ and within a prescribed time period	HMIS/ DHIS2/ Electronic reports/ case registers	Districts/Regions/ Mainland Tanzania and Zanzibar	Monthly/ Quarterly/ Annually	Mainland Tanzania	98% (2017)	ANC: 99.8% OPD: 99% IPD: 98.6%	ANC: 99.8% OPD: 99.1% IPD: 99%	ANC: 99.7% OPD: 99.3% IPD: 98.9%		
1.13b					Zanzibar	47% (2017/2018)	ANC: 100% OPD: 89.7% IPD: 83.3%	ANC: 97.3% OPD: 84.2% IPD: 77.4%	ANC: 98.0% OPD: 83.6% IPD: 78.1%		
1.14a	% of health facilities conducting data quality assessments	DQA	Districts/regions/ Mainland Tanzania and Zanzibar	Annually	Mainland Tanzania	NA					
1.14b					Zanzibar	55%					
1.15	% of health facilities submitting eIDSR reports on time	Electronic and supervision records	Districts/regions/ Mainland Tanzania	Weekly/ monthly/ quarterly/ annually	Mainland Tanzania	40.9% (Sept 2018)	68.6%	73.6%	75.5%		
1.16	% of health facilities submitting MEEDS (SMS) reports on time	Electronic and Supervision Records	Districts/regions/ Zanzibar	Monthly (weekly in surveillance system)	Zanzibar	80% (2018/19)	91.0%	88.6%	90%		
1.17a	# of positive cases reported		Gender/district/ regions/ Mainland	Monthly/	Mainland Tanzania	NA	2,944 cases	5,504 cases	3,412 cases notified;		

¹ Monthly data for DHIS2 is also available

Indicators		Data source	Disaggregation	Reporting frequency	Domain	Baseline	Q1	Q2	Q3	Q4	Y2
1.17b	and investigated/ confirmed from health facilities	MCN analysis dashboard	Tanzania and Zanzibar	quarterly/ annually	Zanzibar	4,106 cases notified; 2,997 cases investigated (2017/2018)	notified; 1,712 cases investigate 58.2%	notified; 2,927 cases investigate 53.2%	2,635 cases investigate 77.0%		
1.18a	% of districts conducting active CBS	Reports	Districts/Mainland Tanzania and Zanzibar	Upon case detection	Mainland Tanzania	NA	NA	NA			
1.18b					Zanzibar	100% (2017/2018)	100%	100% (11/11)	100% (11/11)		
1.19a	% of notified cases that were fully investigated within specified time	MCN analysis dashboard	Districts/Mainland Tanzania and Zanzibar	Upon case detection	Mainland Tanzania	NA	NA	NA			
1.19b					Zanzibar	30% (2016/2017)	56% (965/ 1,712)	41.3% (1,209/ 2,927)	57.9%		
RESULT 2: ENTOMOLOGICAL MONITORING IS IMPROVED											
2.1a	% of entomological surveillance sites reporting timely on expected parameters	Entomological monitoring reports	Mainland Tanzania and Zanzibar, by site	Periodically/ annually	Mainland Tanzania	61% (2017)					
2.1b					Zanzibar	100% (2017/2018)					
2.2a	# of entomological monitoring plans developed and adopted	Entomological monitoring reports	Mainland Tanzania and Zanzibar	Annually	Mainland Tanzania	1 (2014)					
2.2b					Zanzibar	0					
2.3a	Vector susceptibility (% mortality of vector population)	Entomological monitoring reports	Mainland Tanzania and Zanzibar, by site, by insecticide	Annually	Mainland Tanzania	Various					
2.3b					Zanzibar	Various					
2.4a	Resistance among malaria	Entomological		Annually	Mainland Tanzania	Various					

Indicators		Data source	Disaggregation	Reporting frequency	Domain	Baseline	Q1	Q2	Q3	Q4	Y2
2.4b	mosquito hosts to current, recently used, and new insecticides for IRS and insecticide-treated nets	monitoring reports	Mainland Tanzania and Zanzibar, by site		Zanzibar	Various					
2.5a	# of sentinel sites established for monitoring insecticide resistance	Activity reports	Mainland Tanzania and Zanzibar, by site	Annually	Mainland Tanzania	28 (2017)					
2.5b					Zanzibar	10 (2017/2018)					
2.6a	Malaria vector abundance and morphological characterization by species in selected sentinel sites	National malaria vector surveillance (MVS) sites	Mainland and Zanzibar, by site	Annually	Mainland Tanzania	Various					
2.6b					Zanzibar	TBD					
2.7a	Sporozoite rate among <i>Anopheles</i> spp	National MVS Sites	Mainland Tanzania and Zanzibar, by site	Annually	Mainland Tanzania	1.8% (2017)					
2.7b					Zanzibar	0 (2017/2018)					
RESULT 3: DRUG EFFICACY MONITORING IS IMPROVED											
3.1a	% of patients with an absence of parasitemia on day 28 (day 42)	TES reports	Gender/age, by TES site	Semi-annually	Mainland Tanzania	>95% (2017/2018)					
3.1b					Zanzibar	100% (2017/2018)					
3.2a	Therapeutic efficacy of the first-line and alternate ACT nominated by NMCP/ZAMEP for consideration	TES reports	District/regions/ Mainland Tanzania and Zanzibar	Annually for 4 out of 8 established sites	Mainland Tanzania	TBD					
3.2b					Zanzibar	97% (2017)					

Indicators		Data source	Disaggregation	Reporting frequency	Domain	Baseline	Q1	Q2	Q3	Q4	Y2
3.3a	# of patients enrolled in TES	TES reports	Gender/age, by TES site	Annually	Mainland Tanzania	Various					
3.3b					Zanzibar	146 (2017)					
RESULT 4: GOT'S EVIDENCE-BASED DECISION MAKING IS IMPROVED											
4.1	# of GOT staff trained in data analysis and scientific stature	Activity records	Gender/Mainland Tanzania and Zanzibar	Annually	Mainland Tanzania Zanzibar	NA					
4.2	National malaria strategies, policies, and guidelines reviewed, renewed, or updated	Activity records	Mainland Tanzania and Zanzibar	Annually	NA	0					
4.3	# of OR studies conducted with GOT collaboration	Activity records	Mainland Tanzania and Zanzibar	Annually	NA	0					
4.6	# of presentations on OR study results given in partnership with GOT	Activity records	TWGs/conferences	Annually	NA	0					
4.7	# of peer-reviewed manuscripts published with NMCP/ZAMEP collaboration	Activity records	Mainland Tanzania and Zanzibar	Annually	NA	0					

Indicators		Data source	Disaggregation	Reporting frequency	Domain	Baseline	Q1	Q2	Q3	Q4	Y2
4.8	# of success stories and blog entries written in partnership with NMCP/ZAMEP	Activity records	Mainland Tanzania and Zanzibar	Quarterly	NA	0	1	0	1		

Annex 2. ZAMEP Q3 Report



USAID *Okoa Maisha Dhibiti* *Malaria* (OMDM) Activity

QUARTERLY PERFORMANCE REPORT, ZANZIBAR MALARIA
ELIMINATION PROGRAM (ZAMEP): YEAR 2, QUARTER 3

Submitted: July 31, 2020

This report was made possible by the generous support of the American people through the United States Agency for International Development (USAID) and the U.S. President's Malaria Initiative (PMI). It was prepared by the Zanzibar Malaria Elimination Program for the USAID | *Okoa Maisha Dhibiti Malaria* Activity.

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Abbreviations and Acronyms

ACD	active case detection
ANC	antenatal care
Bti	<i>Bacillus thuringiensis var. israelensis</i>
CHMT	Council Health Management Team
CI	confidence interval
CMS	Central Medical Store
DMO	District Medical Officer
DMSO	District Malaria Surveillance Officer
ELISA	enzyme-linked immunosorbent assay
HF	health facility
HLC	human landing catch
LLIN	long-lasting insecticide net
LTC	CDC-light trap collection
MEEDS	malaria early epidemic detection system
MIS	malaria information system
MOHZ	Ministry of Health, Zanzibar
mRDT	malaria rapid diagnostic test
OPD	outpatient department
PBO	piperonyl butoxide
PCR	polymerase chain reaction
PMI	U.S. President's Malaria Initiative
PPE	personal protective equipment
PSA	public service announcement
PSC	pyrethrum spray catch
PTC	pit trap catch
SBCC	social behavior change communication
SME	surveillance, monitoring and evaluation
USAID	U.S. Agency for International Development
WHO	World Health Organization
ZAMEP	Zanzibar Malaria Elimination Program

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The Management Team of the Zanzibar Malaria Elimination Program (ZAMEP) would like to acknowledge the U.S. President's Malaria Initiative (PMI) and U.S. Agency for International Development (USAID) for their continuous financial and technical support to malaria interventions including surveillance, vector control, diagnosis, social and behavior change communication (SBCC) and case management. Currently, ZAMEP is in a strong position to maintain our achievements toward malaria elimination in Zanzibar, despite the seasonal variation of malaria cases. We are similarly grateful to the commitment shown by health workers and Council Health Management Teams (CHMT) at service delivery points for their efficient distribution of malaria commodities to the communities we serve. Last, but not least, ZAMEP appreciates the community for complying with and accepting our services.

Executive Summary

This quarterly report summarizes the Zanzibar Malaria Elimination Program's (ZAMEP) major findings and achievements for activities conducted between April and June 2020. Due to the global pandemic of coronavirus 2019 (COVID-19), activities during this period—including trainings, meetings, and promotional activities at the community level—were significantly impacted.

Routine vector collection at 10 monitoring sites indicates that sentinel sites had a high number of outdoor host-seeking malaria vectors, evidence that residual transmission occurs outdoors. *Anopheles arabiensis* remains the predominant malaria vector displaying exophagic behavior. Entomological monitoring in two operational villages in Pemba indicated an unusual increase in cases, revealing low universal coverage and poor utilization of long-lasting insecticidal nets (LLIN) at the household level. Efforts to distribute LLINs to cover existing gaps are planned; additionally, four productive breeding sites were treated with *Bacillus thuringiensis* var. *israelensis* (Bti). Pyrethroid resistance among malaria vectors remain stable on the island, though the strength varies from site to site. Sporozoite rates were 0.5% across 401 *Anopheles* vectors screened in Unguja, indicating that the area is sensitive to malaria transmission.

ZAMEP's work in malaria microscopy and quality control reflected an average sensitivity of 95% and specificity of 99%. During this reporting period, *Plasmodium falciparum* was identified as the predominant parasite in ~85% of cases. *P. vivax* and *P. ovale* were also observed, at 0.5% and 11.73%, respectively. ZAMEP also observed that there was limited availability of malaria rapid diagnostic tests (mRDTs) in many health facilities (HFs).

Despite challenges related to COVID-19, ZAMEP conducted six live television programs and five radio programs as part of our social behavior change communication (SBCC) efforts, covering topics including LLIN use for malaria prevention and encouraging clean living environments to eliminate malaria mosquitoes. Each program was designed to increase the community's awareness about key interventions for malaria elimination.

In quarter (Q) 3, 80% of HFs submitted their reports on time, with Unguja at 76% on-time reporting and Pemba at 90%. However, significant delays were observed between report submission by health care providers and case notifications. Out of the 3,381 malaria cases reported, only 2,557 cases (76%) were fully investigated by District Malaria Surveillance Officers (DMSOs). Data cleaning and auditing revealed that there was 97% agreement in positive cases between the malaria early epidemic detection system (MEEDS), malaria case registers (MCR), and health management information system (HMIS), and 95% agreement between MEEDS and HMIS for negative cases. MEEDS and HMIS data matched for outpatient department visits (OPD) in 96% of cases. These findings suggest strong data management in HFs, though ZAMEP recognizes the goal to achieve 100% agreement across all data sources.

Zanzibar Malaria Elimination Program (ZAMEP)

Quarter 3 report, April–June 2020

1. Diagnostic Unit

1.1 Malaria microscopy supervision and quality control

In Q3, ZAMEP conducted supervision of all 96 HFs (100%) involved in malaria microscopy quality assurance (QA) and quality control (QC) to ensure timely, accurate, and consistent quality of results. **Table 1** highlights results by district in both Unguja and Pemba.

Table 1. QA/QC results by district, Unguja and Pemba

Districts	HF's Results											Malaria Microscope Quality Assurance Quality Control Results									
	Total Patients Examined						Total Patients <5 yrs Pts Examined					Positive		Negative		Species composition					
	Examined	F	M	Positive			Exd	F	M	Positive			R1	R2	R1	R2	Pf	PM	PO	PV	Pf + PM
				T/P	F	M				T/P	F	M									
South	352	206	146	2	1	1	56	32	24	0	0	0	2	2	31	31	2	0	0	0	0
Central	173	101	72	2	0	2	27	13	14	0	0	0	2	1	35	35	1	0	0	0	0
Urban	5,436	2,782	2,654	299	83	214	882	401	485	15	8	7	299	281	546	546	283	4	1	0	3
North "A"	963	473	490	32	7	24	119	66	48	1	1	0	32	29	108	108	26	2	0	0	1
North "B"	323	182	141	13	6	7	76	29	47	0	0	0	13	10	34	34	10	0	0	0	0
West "A"	186	99	87	5	2	3	28	13	15	0	0	0	5	5	19	19	4	1	0	0	0
West "B"	779	443	336	13	2	11	131	56	74	2	0	2	13	7	83	83	7	0	0	0	0
Mkoani	512	270	242	16	7	9	74	33	41	3	1	2	16	16	56	56	0	0	15	1	0
Chakechake	730	408	322	11	4	7	112	50	62	4	3	1	11	11	88	87	0	0	11	0	0
Wete	583	292	291	3	0	3	153	67	86	0	0	0	3	3	61	61	0	0	3	0	0
Micheweni	610	325	285	17	5	12	138	70	68	2	1	1	17	17	69	69	0	0	16	1	0
Total	10,647	5,581	5,066	413	117	293	1,796	830	964	27	14	13	413	392	1,130	1,129	333	7	46	2	4

F: female; M, male; PF: P. falciparum; PM, P. malariae; PO, P. ovale; PV, P. vivax.

Through slide cross-checking, there was agreement amongst positive slides measuring sensitivity and specificity at 94.90% (Unguja) and 99.9% (Pemba). Malaria speciation revealed the following species were observed: *P. falciparum* (84.95%; 333), *P. malaria* (1.79%; 7), mixed infection of *P. falciparum* and *P. malariae* (1.02%; 4), *P. vivax* (0.5%; 2), and *P. ovale* (11.73%; 46).

During supervision visits, supervisors reviewed staff performance and quality in the preparation of slides for malaria microscopy identification, preparation of blood films, and the staining and reading of blood films; performance was measured at 90%. Overall, 8 out of 16 HFs in Unguja also participated in a proficiency test; results are shown in **Table 2**.

Table 2. Proficiency test results

HF	No. of slides prepared	Agreement	False positive	False negative	Speciation	Quantification	Total score
Bandarini	10	6	1	2	1	1	60
Donge vijibweni	10	8	0	0	0	2	80
Fuoni PHCU	10	4	0	1	3	2	40
JKU Saateni	10	6	0	1	2	2	60
Kwamtapura	10	6	0	1	1	3	60
Magogoni	10	7	0	1	1	1	70
Mahonda	10	7	0	2	2	3	70
North valley	10	7	0	2	2	3	70
Total	80	51	1	10	12	17	

1.2 Quarterly supportive supervision on mRDT QA/QC in public HFs

Between April and June 2020, ZAMEP conducted mRDT supervision at public HFs in Zanzibar to resolve operational challenges and generate data to inform results at the intermediate and central levels. In total, ZAMEP visited 163 out of 169 HFs (96%) in Q3.

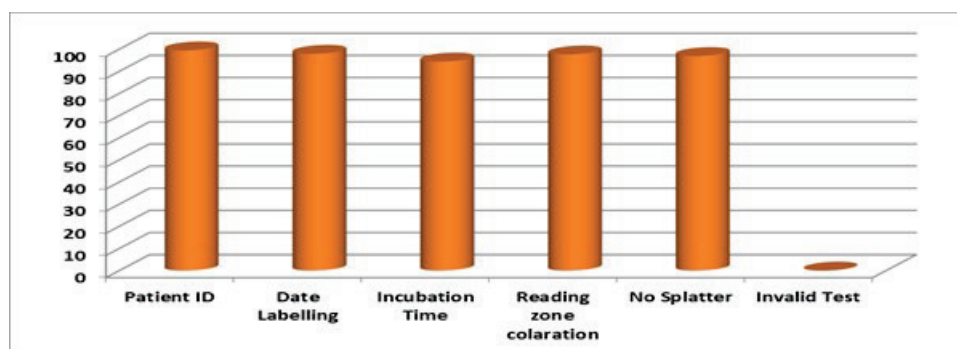
mRDT availability

All HFs visited in Unguja and Pemba reported insufficient stock of mRDTs.

HFs

ZAMEP staff visited 96% of public HFs using mRDTs in Q3. Of the 40,887 outpatient department (OPD) visits attended, 8,964 (21.9%) of patients were screened for malaria antigens using SD-Bioline mRDTs. Of these, 114 (1.27%) revealed malaria antigens, classified as *P. falciparum* (53.5%; 61), *Pan* (14.9%; 17), and *P. falciparum plus Pan* (31.57%; 36). mRDT QC results are depicted in **Figure 1**.

Figure 1. mRDT QC results



1.3 Collection of positive mRDTs

Microscopy and mRDTs are effective tools used to diagnose malaria in Zanzibar. Because mRDTs are unable to speciate and quantify malaria parasites, malaria microscopy is used. Based on the malaria microscopy results during the reporting period, other malaria *Plasmodium* species were identified besides *P. falciparum*.

We selected a total of 74 slides from HF—Mjini, Magharibi A, and Magharibi B in Unguja; and Micheweni in Pemba. None revealed auto-fixation. Overall, 66 slides (89%) tested positive for trophozoite *P. falciparum*, 5 (6.8%) with mixed infection of *P. falciparum* plus *Plasmodium malariae*, 1 (2%) with *P. falciparum* trophozoite plus gametocyte, and 2 (2.7%) tested negative. All slides were examined and blood speciation and quantification conducted per microliters (μ l) of parasites.

2. Entomological monitoring and vector control

2.1 Entomological monitoring in 10 sentinel sites

ZAMEP conducted entomological monitoring activities in Q3 to evaluate the impact of indoor residual spraying (IRS) and LLIN use against malaria transmission factors, including vector density, seasonality, behavior, infection rate, etc. As this analysis is ongoing, ZAMEP is reporting preliminary results only (Table 3).

Table 3. Malaria vectors captured from ten sentinel sites, April–June 2020

Sentinel site	Vector species	HLC		PSC	PTC	LTC	Total
		Indoor	Outdoor				
Uwandani	<i>An. gambiae s.l.</i>	0	5	2	7	0	14
Bopwe	<i>An. gambiae s.l.</i>	12	103	0	5	0	120
Tumbe	<i>An. gambiae s.l.</i>	1	120	2	5	6	134
Wambaa	<i>An. gambiae s.l.</i>	2	295	10	7	17	331
Mwera	<i>An. gambiae s.l.</i>	0	1	0	178	0	179
Bumbwini	<i>An. gambiae s.l.</i>	3	12	0	0	0	15
Stone Town	<i>An. gambiae s.l.</i>	0	0	0	0	0	0
Donge	<i>An. gambiae s.l.</i>	6	3	0	0	0	9
Muyuni	<i>An. gambiae s.l.</i>	0	0	0	0	0	0
Cheju	<i>An. gambiae s.l.</i>	94	96	0	0	0	190
Total		118	635	14	202	23	992

2.2 Feeding location of malaria vectors observed by human landing catch (HLC)

Of the 538 malaria vectors collected using HLC in Pemba, 97% were collected outdoors; in Unguja, 52% of malaria vectors were observed to feed outdoors. These two data points indicate the highly exophagic nature of malaria vectors in Zanzibar, highlighting the impact of the outdoor biting behavior of *An. gambiae* complex among the factors driving residual transmission on the island. These findings highlight the importance of using complementary measures—e.g., larviciding—to combat outdoor biting vectors because simply using the combination of IRS and LLIN is insufficient to eliminate local malaria cases in Zanzibar.

2.3 Biting times of *An. gambiae* complex indicated by HLC

Of the 728 malaria vectors collected in Pemba and Unguja using HLC, 63% (Pemba) and 61% (Unguja) were captured before midnight, indicating that malaria transmission occurs earlier in the day when people are still active.

2.4 Molecular identification of vector species

Of the 388 mosquito samples captured from Unguja sites subjected for polymerase chain reaction (PCR) testing, 91% (n = 353) were identified as *An. arabiensis* and 9% (n = 35) as *An. merus*, *An. lesson*, and *An. rivulorum*. In total, ~800 samples from Pemba are currently undergoing more species analysis and infection rate determination.

2.5 Sporozoite rate infection

401 *Anopheles* vectors were screened using enzyme-linked immunosorbent assay (ELISA) for the presence of sporozoites. *An. gambiae* complex (*An. arabiensis* and *An. merus*), constituted ~92% of the total samples examined. The remaining 8% consisted of *An. rivulorum*, *An. lesson*, and non-amplified mosquito species. Two mosquito vectors were identified positive for *P. falciparum* at an infection rate of 0.5%, indicating that the area is sensitive for local malaria transmission and linked to indigenous cases. ZAMEP's Entomology Unit was surprised to identify the *An. lesoni* species among the vectors collected, as this species is not known to be a vector for malaria transmission. This indicates that these highly zoophilic *Anopheles* vectors should not be ignored as they may play a silencing role in malaria transmission in an elimination setting.

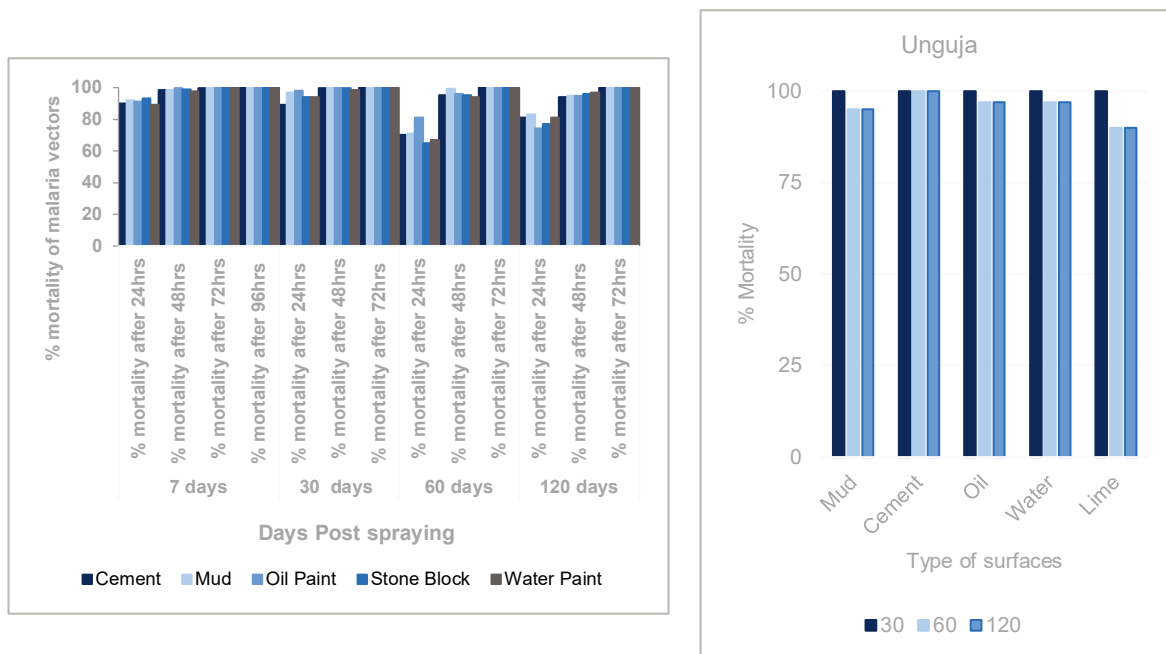
2.6 Insecticide decay rate on treated surfaces following IRS

ZAMEP, in collaboration with PMI's VectorLink project, conducted targeted IRS in February 2020, covering 72 shehia—9 in Pemba and 63 in Unguja—using Clothianidin [SumiShield 50WG] at the dosage of 300mg AI/m² on various wall surfaces and substrates. Clothianidin is a slow-acting insecticide; as such, the typical World Health Organization (WHO) protocol to conduct cone bioassays was modified to observe and record mortality rates every 24 hours for one week. Clothianidin is a new insecticide class; its slow-acting nature may expand insecticide rotation in Zanzibar, which would—in turn—allow for more effective insecticide resistance management.

Insecticide decay rates were assessed in six shehias in both Unguja and Pemba. Fifteen houses per shehia were selected, built of various wall surfaces—mud, cement, oil paint, water paint, and stone block—were selected for the WHO cone bioassays. Three houses representing each wall surface type were tested in each shehia. Selected houses were sprayed by different spray operators and supervised by different team leaders to reduce bias.

Average mosquito mortality rates observed from three shehia in Pemba ranged from 74% to 83% on day 1 and from 95% to 100% on days 2 and 3 following clothianidin exposure (Figure 2). In total, 100% mosquito mortality was observed on all wall surfaces in Unguja within 24 hours.

Figure 2. Clothianidin efficacy on treated walls in Zanzibar



2.7 Malaria foci investigations

Hotspot investigations were conducted in two operational villages at Tumbe in Pemba following the reporting of nine local cases in one week (Table 4). Investigations aimed to identify entomological risk factors driving residual transmission within the community to ensure an appropriate response to eliminate transmission through LLIN ownership and use, IRS, and elimination of mosquito breeding sites close to residential dwellings.

Table 4. Summary findings, vector control application at households

Village/ sub-unit	Population	No. of households	No. of LLINs	% PBO nets	% people who slept under LLINs last night	% with universal coverage	% households sprayed in last 6 months
Mjini tumbe	2,383	400	459	21%	36%	36.5%	99%
Kaliwa	1,210	272	320	14%	42%	52%	99.6%
	3,593	672	779	17.5%	39%	44.3%	99.3%

2.8 Malaria entomological characterization and mosquito breeding sites

Based on 10 years of mosquito collection records in Tumbe, *An. arabiensis* was documented as the predominant vector exhibiting exophagic behavior and with peak biting at times while people are still active, which may indicate outdoor residual transmission. Of the eight mosquito breeding sites recorded, four were found to have both *Culex* and *Anopheles* larvae. This area was treated with Clothianidin in February 2020; records indicate the residual efficacy of the insecticide, as susceptible vectors died within two days post-exposure to the treated walls.

Focused interventions have been initiated in Tumbe. Data analysis indicated the need for 600 additional LLINs, to be distributed as soon as the consignment arrives in Pemba. Larviciding has started and is expected to continue for seven rounds in four (out of eight) breeding sites; unfortunately, the existing stock of insecticide is insufficient to spray all water bodies in this foci area.

2.9 Insecticide susceptibility, monitoring, intensity, and malaria vector resistance

Insecticide resistance among malaria vectors is monitored to maintain the efficacy of the IRS and to assess the susceptibility of local vectors to common insecticides. The most recent insecticide resistance studies were conducted in April 2019; *An. gambiae* complex were reported to have pyrethroid resistance but were fully susceptible to the carbamate and organophosphate classes of insecticides.

Wild *Anopheles* larvae and pupae were collected across breeding sites from established entomological sentinel sites, including yards, cultivated land, and rice fields, to ensure samples obtained were representative of the area. Mosquitoes were reared at ZAMEP's insectary in Pemba.

Resistance testing was conducted using permethrin (0.75%), deltamethrin (0.05%), bendiocarb (0.01%), alpha-cypermethrin (0.05%), pirimiphos methyl (0.25%), lambda cyhalothrin (0.05%) and clothianidin (**Table 5**). The strength of pyrethroid resistance was tested using papers impregnated with 5× and 10× concentrations of permethrin, alpha-cypermethrin, deltamethrin, and lambda cyhalothrin. Insecticide resistance was not measured in Q3 using piperonyl butoxide (PBO) 4% papers; these tests will be completed and results shared in Q4.

Table 5. Summary findings, vector control application at households

Site	Percentage mortality (95% confidence interval [CI])						
	Permethrin	Deltamethrin	alpha-cypermethrin	lambda cyhalothrin	p-methyl	Bendiocarb	Clothianidin
Bopwe	43 (36–49)	22 (6–38)	34 (10–55)	27 (16–38)	100 (100–100)	100 (100–100)	100 (100–100)
Tumbe	52 (40–63)	35 (28–41)	49 (34–63)	48 (38–58)	100 (100–100)	100 (100–100)	100 (100–100)
Uwandani	46 (42–50)	15 (10–21)	10 (2–15)	40 (30–50)	100 (100–100)	100 (100–100)	100 (100–100)
Wambaa	60 (46–74)	77 (58–96)	N/A	N/A	N/A	N/A	N/A
Mwera	95 (89–100)	N/A	86 (71–100)	N/A	100 (100–100)	N/A	100 (100–100)

Site	Percentage mortality (95% confidence interval [CI])						
	Permethrin	Deltamethrin	alpha-cypermethrin	lambda cyhalothrin	p-methyl	Bendiocarb	Clothianidin
Donge	90 (79–100)	N/A	N/A	84 (78–89)	N/A	N/A	100 (100–100)
Cheju	N/A	N/A	66 (58–74)	N/A	100 (100–100)	N/A	N/A
Muyuni	N/A	89 (83–95)	N/A	N/A	N/A	N/A	100 (100–100)
Bumbwini	N/A	N/A	N/A	N/A	N/A	N/A	100 (100–100)
Stone Town	N/A	N/A	N/A	N/A	N/A	N/A	N/A

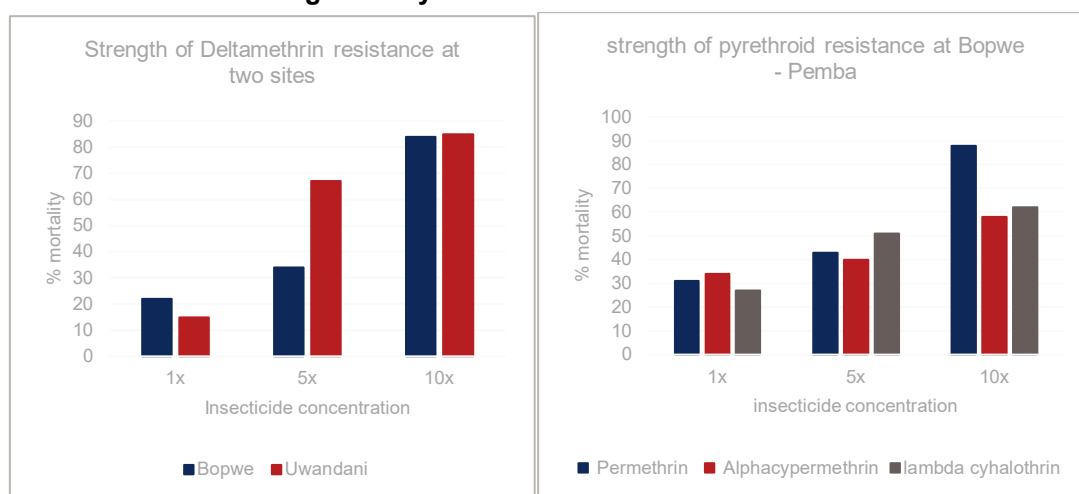
Key:



2.10 Strength of pyrethroid resistance

Preliminary results from Bopwe and Uwadani (Pemba) indicate high resistance among *An. gambiae* s.l. mosquitoes to 5× and 10× diagnostic doses of alpha-cypermethrin, permethrin, deltamethrin, and lambda cyhalothrin (**Figure 3**).

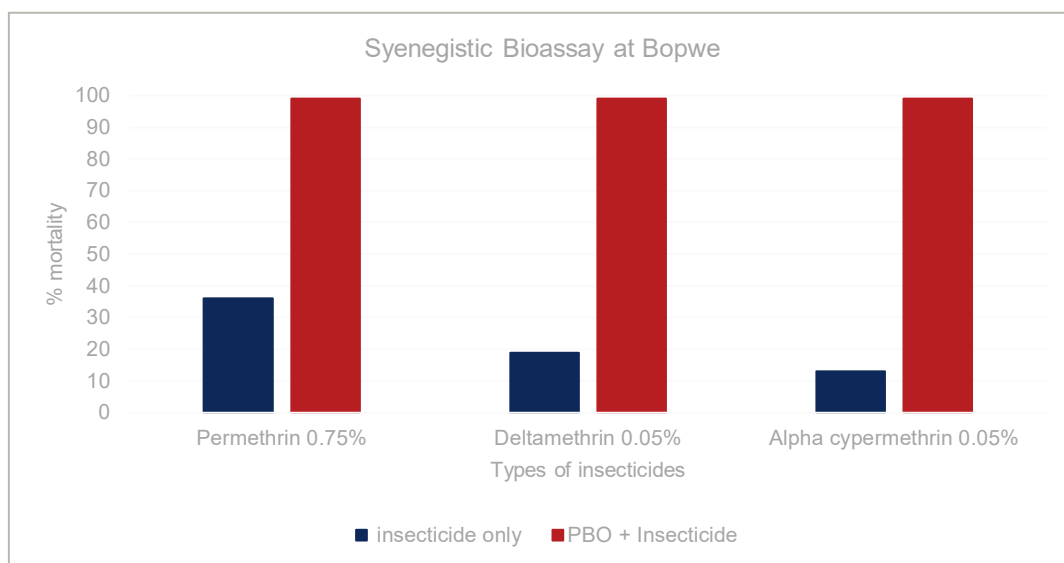
Figure 3. Pyrethroid resistance test results



An. gambiae complex pyrethroid resistance

Figure 4 shows complete restoration of insecticide susceptibility after exposing samples of *An. gambiae* complex collected at Bopwe site in Pemba to PBO, followed by permethrin (0.75%), deltamethrin (0.05%), and alpha-cypermethrin (0.05%). This test implies that a monooxygenase-based resistance mechanism exists amongst the vector population and suggests that the introduction of PBO nets in the community may have additional value in malaria protection.

Figure 4. Synergistic bioassay tests, Bopwe (Pemba)



3. SBCC

Because of the impact of COVID-19, ZAMEP did not implement scheduled SBCC activities in Q3. What follows below is a description of the activities ZAMEP was able to conduct.

3.1 Monitoring and supervision of SBCC activities

ZAMEP staff visited 25 HFs during this reporting period to monitor and supervise SBCC activities implemented by health workers. It was observed that the SBCC activities were not implemented as planned due to the shift in campaign focus to combat COVID-19. Health workers were reminded of the importance of continuing to promote strategies for malaria elimination so individuals can take proper precautions against both diseases.

During these visits, ZAMEP staff reviewed the SBCC plan developed by antenatal care (ANC) health workers to implement SBCC activities at the HF and community levels. The plan includes providing health education messages while distributing LLINs to clients as part of the continuous net distribution scheme.

3.2 SBCC messaging through mass media

Despite the emphasis on COVID-19 prevention messaging supported by the Ministry of Health Zanzibar (MOHZ), ZAMEP's SBCC Unit launched six live television programs and five radio programs sharing malaria prevention and elimination messages with the community. The SBCC Unit also broadcasted radio spots on two radio stations, including messaging emphasizing the importance of consistent LLIN use for malaria prevention and the importance of maintaining a clean living environment to eliminate malaria mosquitoes.

3.3 Public service announcements (PSA) to support mini-mass LLIN distribution campaign

PSAs have been used successfully in 52 shehia involved in the mini-mass LLIN distribution campaign. PSAs were designed to inform community members about the importance of participating in the distribution campaign and to encourage their support for successful distribution. PSAs were launched before, during, and after the distribution started.

Additionally, community sensitization activities were conducted to persuade communities on the importance of continued LLIN use for malaria prevention.

3.4 Launch of mini-mass LLIN distribution campaign

Zanzibar's Deputy Minister of Health was the guest of honor at ZAMEP's launch event on June 13, 2020 which started the mini-mass LLIN distribution campaign in 52 shehia from West A, West B, and Urban districts. In her speech, the Deputy Minister emphasized the proper use of personal protective equipment (PPE) throughout net distribution. She also encouraged the Zanzibar community to continue to use LLINs for malaria prevention and the need for extra preventive efforts against COVID-19.

3.5 Developing SBCC materials

USAID's Tulonge Afya project supports ZAMEP to develop and produce SBCC materials encouraging LLIN use, reminding travelers about the importance of malaria prevention, and highlighting community-based malaria surveillance activities in which District Malaria Surveillance Officers (DMSOs) are fully involved. First drafts of materials have been developed, including posters, car stickers, billboards, and radio spots and are currently being pre-tested. Feedback received will be incorporated and final materials re-submitted to ZAMEP during the last week of July 2020.

4. Surveillance, Monitoring and Evaluation (SME) Unit

4.1 Improve MEEDS reporting timeliness

ZAMEP's SME Unit continues to emphasize to HFs and CMSOs the importance of reporting data on time. The SME Unit uses two approaches to increase reporting timeliness—(1) HFs will be called when problems are identified (e.g. reporting delays or mismatched data); and (2) SME Unit staff visit HFs to resolve the issues locally.

Between April and June 2020, 80% of facilities submitted their reports on time, on Monday of each week; Unguja reported a 76% on time reporting rate, Pemba 90%. In this reporting period, the primary challenge observed was delayed notifications after health care providers submitted their reports. Some HFs were observed delaying submission of their current reports as they waited to receive a notification from the system. This problem was reported to Selcom and has been resolved.

4.2 DMSO feedback meetings

ZAMEP's SME Unit routinely conducts DMSO feedback meetings in Pemba and Unguja to review case investigation data and understand operational challenges, including case duplications and system failures. In Q3, ZAMEP conducted six meetings, primarily focused on DMSO performance in case investigations. Between April and June 2020, 3,381 malaria cases were reported, with 2,557 (76%) fully investigated by DMSOs. One issue discussed was the problem of global positioning system (GPS) inaccuracies impacting case follow-up; it was agreed that DMSOs would enter GPS coordinates at the index case location. Another issue shared was that some cases were not accepted by DMSOs after receiving the automatic system notification. The SME Unit agreed to follow-up on the system side, and requested that all non-accepted cases are followed up to the HF level. Finally, it was agreed that the weekly performance of DMSOs would be shared with the assistant directors of their council to improve their performance and create a sense of accountability amongst DMSOs.

4.3 Support data auditing and cleaning

ZAMEP's SME Unit conducted data auditing and cleaning activities on both islands to assess and improve data quality. Data from three sources—MEEDS booklets, the MCR, and the HMIS outpatient register—were compared to ensure alignment across malaria systems. This activity revealed 97% data agreement in positive cases across the MEEDS, MCR and HMIS; data agreement for MEEDS and malaria information systems (MIS) for OPD visits was 96%. The results show that HF data management is strong, though more work is required to get to 100% agreement across all data sources.

Data cleaning was conducted in Q3 to review all evidence collected during case investigations against case classifications. Of the 2,451 cases investigated, 2,391 (97%) were correctly classified; only 69 cases (3%) were not matched. The SME team collaborated with OMDM to re-enter un-matched cases in Coconut.

4.4 Investigating areas with increased malaria cases

This activity was conducted following the reported increase in the number of malaria cases across 29 shehia of Unguja and Pemba. Results indicate that all malaria cases reported by HFs were confirmed malaria and exceeded threshold levels; as a result, active case detection (ACD) activities were required. ZAMEP's SME Unit and council team will conduct screening in all shehia reporting an increased number of malaria cases in Q4.

5. Case Management

5.1 Supportive supervision

In Q3, Council Health Management Teams (CHMT) conducted supportive supervision visits to 41 HFs in Unguja and 18 in Pemba. During these visits, CHMTs were tasked with the following:

- Assessing the availability, coverage, and proper use of primaquine in public health facilities
- Assessing record keeping, commodity availability, procurement, and accurate use of commodities and management tools
- Providing job training and on-site mentorship to health care workers on reporting and commodity storage

All HFs visited were observed to use malaria registration tools, including daily updated dispensing registers. Bin card and store ledger quantities also matched physical counts of supplies at HFs assessed during these supervision visits. Expired products were separated from normal stores and kept on a separate shelf in storerooms. Records were well-kept and easily accessible across all sites and with commodities readily available at all sites observed. The only exception across HFs was Cheju facility, which showed non-compliance with standard commodity storage and record keeping.

Supervisors noted sufficient stocks of artesunate and amodiaquine across HFs in either 25/50 mg (artesunate) or 67.5/135 mg (amodiaquine) doses. Primaquine was also available at the recommended dosage.

5.2 Technical review of antimalarial supplies at the HF level and feedback provided to DMO, CMSOs and District Pharmacists

ZAMEP routinely conducts a technical review of antimalarial supplies at HFs to ensure sufficient quantities of each and provides feedback to District Medical Officers (DMOs),

CMSOs, District Pharmacists, and the Central Medical Store (CMS), ZAMEP's Logistics and Management Unit, and the Zanzibar Food and Drugs Authority. Because of COVID-19 restrictions prohibiting in-person meetings, these regular meetings and site visits were canceled. As a result, ZAMEP's Case Management Unit assigned district-level stakeholders, led by the Deputy District Director for Health and District Pharmacists, to electronically collect antimalarial stock status data from all HFs across Unguja and Pemba for further analysis by the ZAMEP team. Data were collected between May and June 2020 and submitted electronically to ZAMEP.

All 11 districts provided antimalarial stock data following a physical check at each HF in each district; CMS submitted updates on their antimalarial supplies at the central level. Reports indicate that HFs have at least two to four categories of antimalarial supplies on hand, including gametocidal (primaquine), for the treatment of uncomplicated malaria. Supplies of injectable artesunate for the treatment of severe malaria cases are in stock in Mpendae, Chumbni, Sebleni, and Rahaleo in Unbuja and in all HFs in Pemba. In addition, there were adequate supplies of mRDTs in Kaskazini 'B' Kati and Kusini HFs in Unguja districts; insufficient supplies of mRDTs were observed in Pemba HFs, including in Mjini, Magharibi A, Magharibi B districts.

Annex 3. Success Story



U.S. President's Malaria Initiative

Success Story

Monthly malaria data review meetings have improved data use and evidence-based decision making



[Redacted] (standing) explains issues to NMCP SME Unit Staff during the data review meeting (January 2020). Photo credit: RTI International



One of data review session that was conducted virtually via Zoom, due to COVID-19 pandemic (April 2020). Photo credit: RTI International.



Discussions amongst NMCP and partners during the data review meeting (December 2019). Photo credit: RTI International

A data review is a process of thoroughly examining routine data captured on monthly basis. It is useful for programs to compare performance against set targets and develop action plans to address data anomalies. Data review meetings aim to improve data quality and use by Programs and stakeholders for informed decision making. at national, and subnational levels, as well as to build the capacity of malaria surveillance, and monitoring and evaluation officers.

Telling Our Story
U.S. Agency for International Development
Washington, DC 20523-1000
<http://stories.usaid.gov>

USAID's Okoa Maisha Dhibiti Malaria (OMDM) Activity began conducting monthly data review meetings alongside the National Malaria Control Program (NMCP), President's Office—Regional Administration and Local Government (PO-RALG) and other U.S. President's Malaria Initiative (PMI) implementing partners, including the USAID's Boresha Afya project implemented by FHI 360. We conducted five data review sessions between December 2019 and May 2020. With the restrictions on in-person meetings because of the COVID-19 pandemic, two data review sessions were conducted virtually in April and May 2020 via Zoom.

How data review meetings are facilitated

Before each data review meeting, the NMCP selects the indicator of interest requiring further review and discussion. With support from OMDM, performance data for the indicator is gathered from the District Health Information System 2 (DHIS2), the main data source capturing routine malaria data in Tanzania. Information is summarized in graphs, tables, and charts for further interpretation and discussion.

Indicators under discussion are reviewed annually, quarterly, and monthly and are disaggregated by region, district, and health facility.

For example, the March 2020 data review meeting focused on reviewing intermittent preventive treatment in pregnancy (IPTp 3) uptake in the last two years. Through the review, participants attempted to answer the following questions:

- Was the 80% uptake target met?
- How did regions, districts or facilities perform? What are possible reasons for inadequate performance?
- What action steps are required to improve performance?

A report highlighting discussion and action points is then prepared with are responsible units assigned to follow up.

As a result of these meetings, the NMCP now uses a WhatsApp group to share the issues raised during data review meetings with and malaria focal persons to facilitate their response. These data review meetings enable the NMCP to collectively review performance and take actions based on the findings including strengthening malaria service data quality improvement supervisions and follow-up with regional and district malaria focal persons.

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Annex 4. Okoa Maisha Dhibiti Malaria Activity Learning Agenda

OMDM Learning Agenda Matrix (updated Y2 Q3)

Project activity	Learning questions	Current actions (Y2Q3)	Timeline	Partners/people involved	Data sources	Findings	Next steps	Timeline	Partners/people involved
Overall Activity learning questions									
Theory of Change (ToC) and Results Framework (RF)	What results is OMDM achieving? Why and how are results being achieved or not achieved? At what cost are results being achieved? How can we adapt OMDM learning to guide and inform programmatic direction, course correction, or policy discussions?	Did not have a chance to review the ToC and RF during Pause and Reflect session in June 2020	Y3	OMDM Activity and technical staff	OMDM work plan and MEL plan	ToC and RF will be revisited in Y2Q4 as part of work planning	Pause and Reflect session to review Y2	Y2 Q4	OMDM Activity and technical staff
Gender Action Plan	Are we appropriately incorporating gender into our Activity? Are we asking our partners to do the same? Are we implementing gender-sensitive practices (through hiring)? Are indicators gender disaggregated?	Gender Action Plan was approved by USAID in Y2	Y2	OMDM Activity and technical staff, USAID	OMDM MEL plan	Gender Action Plan was submitted in Y1 Q2	Monitor gender-sensitive practices within OMDM MEL Plan	Y2 Q4	OMDM MEL team
MEL plan									
	Are the performance indicators measuring the intended results? Are performance targets realistic, or do the assumptions/rationale behind the targets need to be updated? Are the performance indicators providing the information needed?	OMDM team submitted a MEL plan contingency plan to PMI	Y2 Q3	OMDM Activity and technical staff, USAID	OMDM MEL plan	OMDM team will work on revisions to MEL plan for Y3	Will send revised MEL plan to USAID for their review and feedback	Y2 Q4	OMDM Activity and technical staff, USAID

Project activity	Learning questions	Current actions (Y2Q3)	Timeline	Partners/people involved	Data sources	Findings	Next steps	Timeline	Partners/people involved
Analyses and assessments									
eIDSR assessment (Follow-up to MEASURE Evaluation/ Tulane Study)	How can OMDM help to improve the reporting rate of the eIDSR? What is the quality of data submitted to the eIDSR system?	Collaborating with [REDACTED] on a working draft publication based on analysis done in Y1/Y2	Y2 Q3	[REDACTED]	eIDSR/ DHIS2)/ MEASURE Evaluation Assessment	Tanzania has moved to stratified method; this is conducive to using the eIDSR.	OMDM team will send draft in August	Y2 Q4	[REDACTED]
Mortality rate study	Does the facility have a death register? Are all deaths occurring at the facility recorded in the death register? Are all deaths occurring at the facility reported in the DHIS2 system with correct underlying cause of death? Does DHIS2 show all reported deaths?	Developing on a SoW for field review by FELTP trainee, based on desk review findings	Y2 Q3	[REDACTED]	DHIS2, IPD, and death registers at HFs	FELTP has completed the desk review, OMDM met 3/27 with FELTP, PMI, NMCP	[REDACTED] will share the findings from the desk review and will follow-up with FELTP appointee about next steps	Y2 Q4	[REDACTED]
Spatial epidemiology of travel malaria	Is there a difference in imported cases (e.g., travel cases)? This could be used to identify potential malaria hotspots.	[REDACTED] and have started work on this	Y2 Q3	OMDM MEL Team, [REDACTED]	Coconut dataset, DHIS2	N/A	Continue with secondary analysis including stratification and modeling	Y3	[REDACTED]
Community engagement in accelerating malaria elimination in Zanzibar	What is the impact of community engagement using a door-to-door approach to accelerate malaria elimination in Zanzibar?	OMDM currently working with [REDACTED] to implement this activity as part of her dissertation	Y2 Q3	[REDACTED] (ZAMEP), OMDM	MEEDS/ MCN data, developed questionnaire	Draft protocol developed and submitted to supervisors for review and approval	Awaiting comments from supervisors	Y2	ZAMEP, OMDM