U.S. PRESIDENT'S MALARIA INITIATIVE

Tanzania (Zanzibar)

Malaria Operational Plan FY 2022

This FY 2022 Malaria Operational Plan has been approved by the U.S. Global Malaria Coordinator and reflects collaborative discussions with national malaria control programs and other partners. Funding available to support outlined plans relies on the final FY 2022 appropriation from U.S. Congress. Any updates will be reflected in revised postings.

This document was prepared in the early months of 2021 as the COVID-19 pandemic continued to evolve worldwide, including in PMI-focus countries. The effects of the pandemic on malaria control and elimination work in 2022 are difficult to predict. However, because U.S. Congressional appropriations for PMI are specific to work against malaria and any appropriations for work against the COVID-19 are specific for that purpose and planned through separate future U.S. Government planning processes, this FY 2022 MOP will not specifically address the malaria-COVID-19 interface and will reassess any complementary work through timely reprogramming in countries.

CONTENTS

ABBREVIATIONS

ACD	Active case detection
ACT	Artemisinin-based combination therapy
ANC	Antenatal care
ASAQ	Artesunate-amodiaquine
BMGF	Bill & Melinda Gates Foundation
CDC	Centers for Disease Control and Prevention
CHW	Community Health Worker
CMS	Central Medical Stores
CMSO	Council Malaria Surveillance Officers
CY	Calendar year
DHIS2	District Health Information System 2
DHS	Demographic and Health Surveys
DQA	Data quality audit
eLMIS	Electronic Logistics Management Information System
EPI	Expanded Program on Immunizations
FETP	Field Epidemiology Training Program
FY	Fiscal year
Global Fund	Global Fund to Fight AIDS, Tuberculosis, and Malaria
HCW	Healthcare worker
HMIS	Health Management Information System
HSS	Health systems strengthening
ILS	Integrated Logistic System
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
IT	Information technology
ITN	Insecticide-treated mosquito net
KAPB	Knowledge, attitudes, practices, and behavior
LMIS	Logistics Management Information System
LMU	Logistics Management Unit
LSM	Larval source management
MBS	Malaria behavioral survey
MCN	Malaria Case Notification
MEEDS	Malaria Epidemic Early Detection System
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey
MOH	Ministry of Health
MOHCDGEC	Ministry of Health, Community Development, Gender, Elderly, and Children
MOP	Malaria Operational Plan
mRDT	Malaria rapid diagnostic test
MSD	Medical Stores Department
MSDQI	Malaria Service and Data Quality Improvement

NMCP	National Malaria Control Program
OR	Operational research
PBO	Piperonyl butoxide
PCR	Polymerase chain reaction
PMI	U.S. President's Malaria Initiative
PO-RALG	President's Office – Regional Administration and Local Government
PSA	Public spots announcement
QA/QC	Quality assurance/quality control
RCD	Reactive case detection
RCH	Reproductive and child health
RDT	Rapid diagnostic test
RGOZ	Revolutionary Government of Zanzibar
SBC	Social and behavior change
SDC	Swiss Development Corporation
SM&E	Surveillance, monitoring, and evaluation
SMC	Seasonal malaria chemoprevention
SP	Sulfadoxine-pyrimethamine
STPH	Swiss Tropical Public Health institute
TA	Technical assistance
TES	Therapeutic efficacy study
THMIS	Tanzania HIV and Malaria Indicator Survey
TWG	Technical working group
USAID	United States Agency for International Development
WHO	World Health Organization
ZAMEP	Zanzibar Malaria Elimination Program
ZMEAC	Zanzibar Malaria Elimination Advisory Committee

EXECUTIVE SUMMARY

The U.S. President's Malaria Initiative (PMI)—led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC)—delivers cost-effective, lifesaving malaria interventions alongside catalytic technical and operational assistance to support Tanzania to end malaria. PMI has been a proud partner of Tanzania since 2006, helping to decrease child death rates by 40 percent through investments totaling over $613 million.

The proposed PMI fiscal year (FY) 2022 budget for Tanzania (both Mainland and Zanzibar) is $39 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Zanzibar using FY 2022 funds. Developed in consultation with the Zanzibar Malaria Elimination Program (ZAMEP) and key malaria stakeholders, proposed activities reflect national and PMI strategies, draw on best-available data, and align with the country context and health system. Proposed PMI investments support and build on those made by the Government of Zanzibar as well as other donors and partners.

PMI will support investments in the following intervention areas with FY 2022 funds:

Vector control

Progress in FY 2020:

- Procured and distributed 154,077 piperonyl butoxide (PBO) insecticide-treated mosquito nets (ITNs) and distributed 136,523 Global Fund-procured PBO nets through antenatal care (ANC)/Expanded Program on Immunizations (EPI) and community channels. PMI provided technical assistance (TA) for the distribution of 197,031 PBO nets through mass campaigns.
- Entomological monitoring including insecticide resistance testing, longitudinal monitoring, and insecticide efficacy evaluations for indoor residual spraying (IRS).
- Targeted IRS reaching approximately 94,339 structures and protecting about 225,374 people.

Proposed investments with FY 2022 funding:

- Annual rapid assessment survey to determine the ITN coverage across Zanzibar.
- Procurement and distribution of PBO nets for the community-based and Reproductive and Child Health (RCH)/EPI distribution channels.
- Entomological monitoring including insecticide resistance testing, longitudinal monitoring, and insecticide efficacy evaluations for IRS.
- Annual guidance on effectiveness of vector control interventions used in Zanzibar.
- Technical support to improve targeting, monitoring, and evaluation of larval source management (LSM) activities.

Case Management

Progress in FY 2020:

- Ninety-six health facility laboratories received malaria microscopy quality assurance/quality control (mMQA/QC) supervision visits. A total of 8,922 slides were collected from health facilities for mMQAQC.
- Forty laboratorians received training on mMQAQC and attended feedback meetings.
- One hundred healthcare workers (HCWs) received training on microscopy slide preparations for outpatient and inpatient departments at health facilities.
- Among 252 microscopy slides created from positive malaria rapid diagnostic tests (mRDTs) collected in 2020, the proportions of *Plasmodium* species by microscopy were *Pf* 85.3 percent, *Pm* 5.1 percent, mixed *Pf* and *Pm* 7.7 percent, and *Po* 1.9 percent. No *Pv* was reported.
- Malaria RDT QC supervision visits were conducted in 169 health facilities (of the 169 public and 112 private health facilities), 260 HCWs received mRDT training and attended feedback meetings.
- With support from PMI, ZAMEP continued to distribute single low-dose primaquine in 112 private health facilities.
- Following an initial Malaria Services and Data Quality Improvement (MSDQI) training and pilot in three health facilities, in 2020 ZAMEP conducted MSDQI in 28 health facilities in Kati District. Through the MSDQI process, 75 HCWs received on-the-job malaria case management training.

Proposed investments with FY 2022 funding:

- Support improvement of malaria case management with an emphasis on service delivery in all public health facilities in Zanzibar.
- Support the continued implementation and scale-up of the MSDQI process including the electronic tablet-based system for recording, reporting, and using data.
- Training for and the maintenance of the microscopy and mRDT QA/QC systems in public as well as private facilities in Zanzibar as ZAMEP simultaneously transitions supportive supervision training for HCWs to the MSDQI process.
- SBC activities to combat imported malaria cases by travelers, promote preventative and curative malaria-related behaviors during active case detection (ACD) activities, and promote prompt care-seeking upon onset of signs and symptoms of malaria.
- Monitor artemisinin-based combination therapy (ACT) stock and procure ACTs if gaps are identified.

Malaria in Pregnancy (MIP)

Progress in FY 2020:

- Supported continuous ITN distribution through EPI and ANC clinics (more details in ITN section).
- Supported ZAMEP to finalize the diagnostics and treatment guidelines to include a MIP chapter.
- Supported developing a quality improvement tool, based on the MSDQI described in the Case Management section to encourage supervisors and providers to monitor the quality of malaria services, including MIP. The MSDQI process is being adapted for Zanzibar and will be used to observe providers' diagnosis, treatment, and ANC practices. Facilities will be selected as part of supportive supervision, with priority given to the low performers, identified from previous rounds of supervision data.

Proposed investments with FY 2022 funding:

- Support MIP efforts in Zanzibar including ANC supervisory visits by ministry staff using the modified MSDQI process.
- Support the rollout and orientation of the revised national case management guidelines which include a MIP chapter.
- Procure and provide long-lasting ITNs to pregnant women through continuous distribution at ANC.
- Support social and behavior change (SBC) initiatives focusing on preventing and treating MIP.

Supply Chain

Progress in FY 2020:

- Quantified and analyzed supply chain through TA to ZAMEP and Central Medical Stores (CMS).
- Enhanced data security and visibility of ITNs at Chandarua Clinic through supporting revival of the dashboard.
- Conducted monitoring and reporting on performance of supply chain system and identified performance issues that need corrective actions.
- Supported the Ministry of Health (MOH) to review Zanzibar Supply Chain Action Plan.
- Supported for revision of Zanzibar Integrated Logistics System (ILS) to ensure monthly reporting and distribution to the last mile.

Proposed investments with FY 2022 funding:

- Strengthen forecasting, supply planning, strategy and planning, in-country storage and distribution, monitoring and evaluation, as well as human resources capacity-building and support of management information systems such as electronic Logistics Management Information System (eLMIS).
- Strengthen the transitioned Logistics Management Unit (LMU) to continue with monitoring of stock levels of all malaria commodities at central medical store and health facilities through routine physical counts.
- Support ZAMEP to conduct quantification exercises and the quarterly review of the supply plan to improve coordination and procurement planning across development partners.

Surveillance, Monitoring and Evaluation

Progress in FY 2020:

- ZAMEP completed the integration of Malaria Epidemic Early Detection System (MEEDS) with routine Health Management Information System (HMIS), including linking both MEEDS and malaria case notification (MCN) data within the District Health Information Software 2 (DHIS2) platform. Integration efforts also included migrating MCN data from 2012 to 2020 into DHIS2 and developing a dashboard for malaria indicators. A total of 41 participants were trained on the MCN functionality and information technology (IT) troubleshooting to build capacity within ZAMEP and the HMIS unit to sustain the system.
- ZAMEP continued to capture information to enhance the classification of individual malaria cases and their associated foci.

Proposed investments with FY 2022 funding:

- Continue to strengthen ZAMEP's ability to analyze and disseminate surveillance, monitoring, and evaluation (SM&E)-related information for decision-making, hold regular meetings and attend technical working group (TWG) meetings to review and discuss SM&E activities, and make regular SM&E supervisory visits to the field.
- Maintain MEEDS at all government and private health facilities until it's determined that MEEDS will be transitioned to routine HMIS.
- Fund and strengthen the MCN system, including solving system failures, and reactive case detection (RCD) among household and neighborhood contacts of confirmed cases.
- Continue integrating data generated from MCN to DHIS2 and building capacity among ZAMEP and HMIS unit staff for basic IT system maintenance and troubleshooting IT issues related to MCN.
- Develop an operational data dashboard to visualize entomological monitoring data and foci investigation findings in the new MCN/DHIS2 malaria dashboard.
- Finalize the Zanzibar malaria epidemiological stratification and develop interventions for each strata to be adapted by the program.

Program Evaluation (PE) and Operational Research (OR)

Progress in FY 2020:

- PMI supported an OR study titled, "Operational research to increase the effectiveness of the malaria surveillance and response system in Zanzibar," between April 2017 and October 2018, with secondary analysis and results still underway as of March 2021.
- PMI is currently supporting the use of genetic sequencing methods applied to samples collected during the rolling cross-sectional survey in the RCD OR study titled, "Operational research to increase the effectiveness of the malaria surveillance and response system in Zanzibar," to further understand parasite population genetic diversity and multiplicity of *Plasmodium falciparum* infections in Zanzibar.

Proposed investments with FY 2022 funding:

- No activities are proposed with FY 2022 funds.

Social and Behavioral Change (SBC)

Progress in FY 2020:

- SBC was associated with the distribution of 197,031 PBO nets through mass campaigns in 52 *shehias/*wards.
- Community activities were focused on correct and consistent ITN use and care, prompt care-seeking after the onset of fever, and acceptance of IRS.

Proposed investments with FY 2022 funding:

- SBC activities to combat imported malaria cases by travelers, promote the acceptance of IRS, and promote correct and consistent use of ITNs.

Health Systems Strengthening (HSS) general/other

Progress in FY 2020:

- PMI supported Zanzibar to strengthen its ability to improve HMIS for reporting malaria indicators.
- Developed and distributed COVID-19 malaria guidelines to health facilities to ensure malaria services continue.
- Supported ZAMEP to recover HMIS data lost when the server crashed and enhance data security governance.
- Trained ZAMEP on the use of HMIS/DHIS2 and R-Stat software and the Integration of Coconut app with DHIS2.
- Promoted data use for informed decision-making in Zanzibar, particularly at the health facility and community level (i.e., establishing information systems with decision support and visual analytics).

Proposed investments with FY 2022 funding:

- Address key health system challenges in achieving and maintaining malaria results.
- Support the Zanzibar Malaria Elimination Advisory Committee (ZMEAC) meetings and follow up on implementation of the recommendations from the committee.
- Support the public sector system in Zanzibar to strengthen the inclusion of malaria interventions in planning, budgeting, and financing from the community.
- Support the management of health information to improve the quality, completeness, timeliness, and use of routine monthly and weekly malaria-related data collection, management, and reporting from health facilities.

I. INTRODUCTION

The U.S. President's Malaria Initiative (PMI)—led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC)—delivers cost-effective, lifesaving malaria interventions alongside catalytic technical and operational assistance to support Tanzania to end malaria. PMI has been a proud partner of Tanzania since 2006, helping to decrease child death rates by 40 percent through investments totaling over $613 million.

The proposed PMI fiscal year (FY) 2022 budget for Tanzania (both Mainland and Zanzibar) is $39 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Tanzania using FY 2022 funds. Developed in consultation with the Zanzibar Malaria Elimination Program (ZAMEP) and key malaria stakeholders, proposed activities reflect national and PMI strategies, draw on best-available data, and align with the country context and health system. Proposed PMI investments support and build on those made by the Government of Tanzania as well as other donors and partners.


Tanzania at a Glance

- **Geography:** Located in East Africa along the Indian Ocean with a land area of over 947,000 square kilometers. Comprises the Mainland, Zanzibar (two islands, Unguja and Pemba), and a number of offshore islands.

- **Climate and Malaria Transmission Seasonality:** Largely tropical climate with regional variations due to topography, with cooler, less humid regions in the highlands. The north and east experience two rainy seasons in October–December and March–May, while the central, southern, and western regions have one longer wet season from October through April or May. Rainy seasons correspond to high malaria transmission periods.

- **Population in 2021:** 59,441,988 (National Bureau of Statistics)

- **Population at Risk of Malaria:** 100 percent (WHO)

- **Principal Malaria Parasites:** *Plasmodium falciparum* (National Malaria Control Program [NMCP], ZAMEP)

- **Principal Malaria Vectors:** *An. arabiensis*, *An. funestus* s.s., *An. gambiae* s.s. (National Institute of Medical Research; ZAMEP)

- **Malaria Case Incidence per 1,000 Population:** 113/1,000 (WHO)

- **Under-Five Mortality Rate:** 67/1,000 (2015/16 DHS)

- **World Bank Income Classification and Gross Domestic Product (GDP):** Low-income, GDP per capita $1,051 (World Bank Group)

- **Government Health Budget:** $936,538,506, MOH Budget 2020/2021

- **Trafficking in Persons Designations, 2018–2020:** Tier 2 Watchlist Country (Department of State Trafficking in Persons Report, June 2020)

- **Malaria Funding and Program Support Partners Include:**

  - U.S. President's Malaria Initiative (PMI)

  - Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund)

  - World Health Organization (WHO)

  - Swiss Development Corporation (SDC)

  - Comic Relief

- **PMI Support of National Malaria Control Strategy:** As a major partner of the Tanzania National Malaria Control Program and the Zanzibar Malaria Elimination Program, PMI aims to help Mainland Tanzania reduce its malaria burden with a focus on the high to moderate regions, and to help Zanzibar push toward its goal of elimination. PMI supports most of the interventions laid out in both programs' strategic plans. (See III. Overview of PMI's support of Tanzania's Malaria Control Strategy for additional details).

- **PMI Investments:** Tanzania began implementation as a PMI-focus country in FY 2006. The proposed FY 2022 PMI budget for Tanzania is $39 million; this brings the total PMI investment to over $650 million.

PMI organizes its investments around the activities below, in line with Zanzibar's malaria strategy.

Figure 1. PMI's approach to end malaria[1]
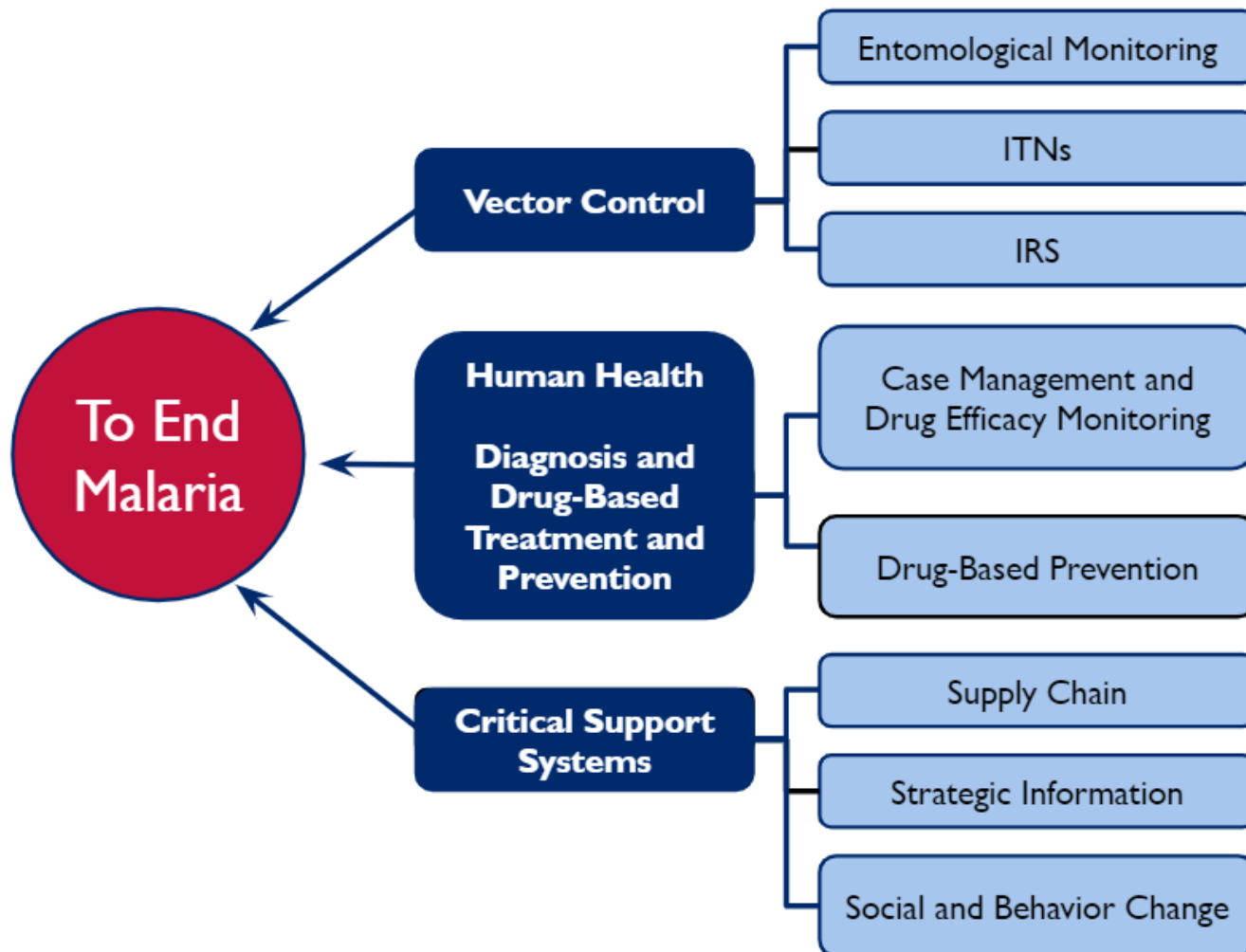
Building and strengthening the capacity of Tanzania's people and institutions—from the central level to communities—to effectively lead and implement evidence-based malaria control and elimination activities is paramount to PMI. The majority of PMI's planned support for FY 2022, across the areas of vector control, human health, and critical support systems such as supply chain, contains elements of capacity-building and system strengthening. PMI/Tanzania will continue to rely on and engage with local partners such as National Institute of Medical Research (NIMR), Ifakara Health Institute, and Muhimbili University of Health and Allied Sciences. Finally, PMI/Tanzania is continuing to build private sector partnerships to extend case management and service delivery

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[1]A number of actions are cross-cutting in nature. For example, social and behavioral change (SBC) is embedded in all vector control and human health work; program evaluation (PE) and operational research (OR) are relevant in all of the fieldwork; finance and management support and the introduction of new tools/interventions are critical for all programs; and elimination requires work across the full spectrum of transmission.

through Accredited Drug Dispensing Outlets and working alongside other partners to advocate for the inclusion of mRDT testing in their suite of services offered.

The activities proposed in this MOP are tailored to draw on strengths and address weaknesses; activities will be monitored to evaluate the effectiveness of capacity-building efforts. In addition, while PMI understands it will take time for Tanzania to fully finance its development priorities, PMI will work with other partners (e.g., the Global Fund) to jointly track Tanzania's funding commitments across the malaria portfolio.

II. MALARIA SITUATION AND PROGRESS

The malaria burden in Zanzibar has remained low over the past several years, with a test positivity rate in those seeking treatment at 2.6 percent in 2020. The total number of malaria cases increased from 6,970 in 2019 to 13,209 in 2020, with 10 malaria deaths reported in 2020. The 2017 Tanzania MIS showed a malaria prevalence in Zanzibar of 0.2 percent by mRDT, ranging from 0 percent in Pemba to 0.4 percent in Unguja. High coverage of ITNs and IRS has resulted in a shift in the malaria vector population from *An. gambiae* s.s. to predominantly *An. arabiensis* and reflects the predominant outdoor biting pattern observed on both Pemba and Unguja.

Figure 2. Trends in malaria prevalence

This figure is a line graph of malaria prevalence in Zanzibar among children ages 6 to 59 months of age who tested positive for malaria by microscopy or mRDT during the 2007–2008 Tanzania HIV and Malaria Indicator Survey (THMIS), 2011–2012 THMIS, 2015–2016 DHS-MIS, and 2017 Malaria Indicator Survey (MIS). The overall prevalence observed during these surveys has ranged from 0.2 to 0.8 percent.
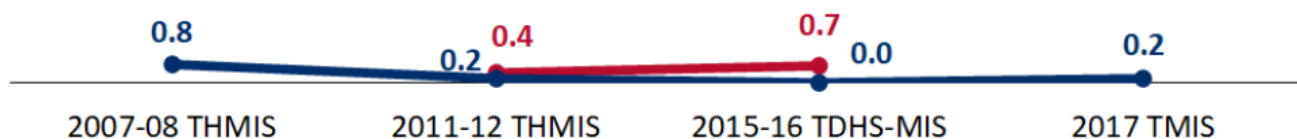
Figure 3. Malaria prevalence by geographic area

This figure is a map of malaria prevalence by region in Zanzibar among children 6 to 59 months of age who tested positive for malaria by mRDT during the 2017 MIS. The overall malaria prevalence in Zanzibar was 0.2 percent by mRDT, ranging from 0 percent in Pemba to 0.4 percent in Unguja.

Zanzibar
.2%

Kaskazini Pemba 0.0%
Kusini Pemba 0.0%
Kaskazini Unguja 0.0%
Kusini Unguja 0.0%
Mjini Magharibi 0.6%
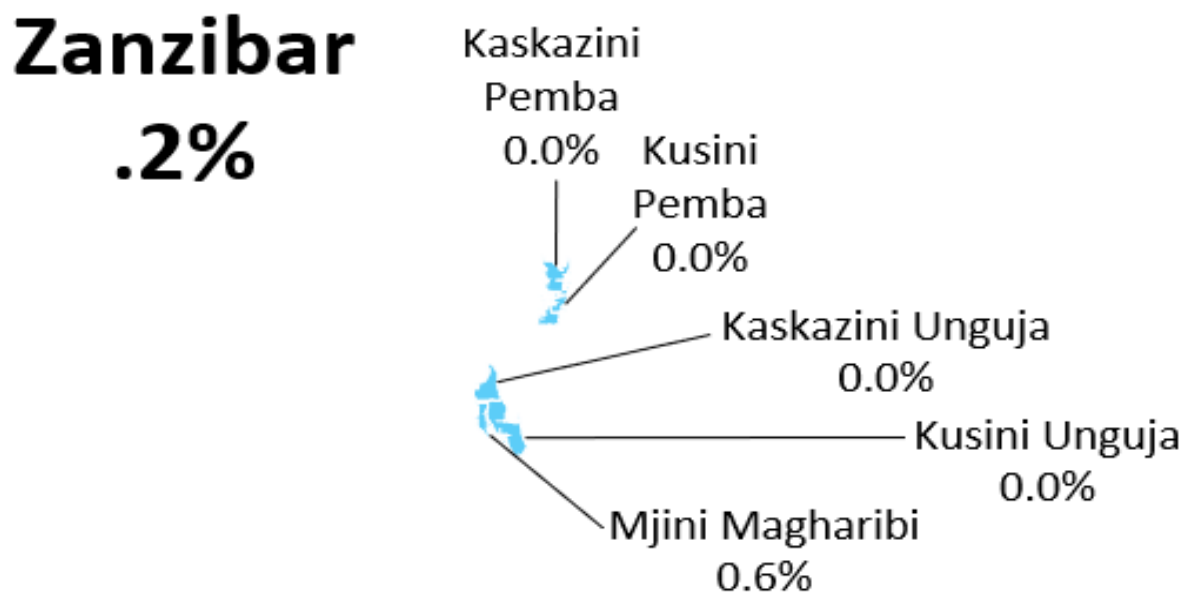
Table 1. Key indicators from demographic and health surveys (DHS) and malaria indicator surveys (MIS)

Indicator	2004–2005 DHS	2007–2008 THMIS	2010 DHS	2011–2012 THMIS	2015–2016 DHS-MIS	2017 MIS
% Households with at least one ITN	28	72	76	74	74	79
% Households with at least one ITN for every two people	10	34	39	43	40	42
% Population with access to an ITN	18	57	58	n/a	57	62
% Population who slept under an ITN the previous night	16	44	45	44	47	59
% Children under five years of age who slept under an ITN the previous night	22	59	55	51	56	67
% Pregnant women who slept under an ITN the previous night	20	51	50	36	52	63
% Children under five years of age with fever in the last two weeks for whom advice or treatment was sought	80	81	73	69	79	82
% Children under five years of age with fever in the last two weeks who had a finger or heel stick	n/a	n/a	n/a	26	34	31
% Children receiving an ACT among children under five years of age with fever in the last two weeks who	n/a	n/a	n/a	n/a	n/a	n/a

Indicator	2004–2005 DHS	2007–2008 THMIS	2010 DHS	2011–2012 THMIS	2015–2016 DHS-MIS	2017 MIS
received any antimalarial drugs						
Under-five mortality rate per 1,000 live births	101	79	73	n/a	56	n/a
% Children under five years of age with parasitemia (by **microscopy**, if done)	n/a	n/a	n/a	0.4	0.7	n/a
% Children under five years of age with parasitemia (by **RDT**, if done)	n/a	0.8	n/a	0.2	0.0	0.2
% Children under five years of age with severe anemia (Hb<8gm/dl)	6	5	4	4	4	4

Table 2. Evolution of key malaria indicators reported through routine surveillance systems

Indicator	2016	2017	2018	2019	2020
# Suspect malaria cases[1]	N/A	N/A	N/A	N/A	N/A
# Patients receiving diagnostic test for malaria[2]	317,910	343,304	392,617	419,479	476,508
Total # malaria cases[3]	3,771	4,171	5,146	6,970	13,209
# Confirmed cases[4]	3,771	4,171	5,146	6,970	13,209
# Presumed cases[5]	0	0	0	0	0
% Malaria cases confirmed[6]	100%	100%	100%	100%	100%
Test positivity rate (TPR)[7]	1.2%	1.2%	1.3%	1.7%	2.8%
Total # under five years of age malaria cases[8]	560	525	702	487	679
% Cases in children under five years of age[9]	14.9%	12.6%	13.6%	6.9%	5.1%
Total # severe cases[10]	N/A	N/A	N/A	N/A	N/A
Total # malaria deaths[11]	1	1	5	7	10
# Facilities reporting[12]	221	222	210	235	258
% Data completeness[13]	97.3%	96.3%	98.1%	98.3%	98.7%

1. Number of patients presenting with signs or symptoms possibly due to malaria (e.g., fever). 2. RDT or microscopy, all ages, outpatient and inpatient. 3. Total reported malaria cases; all ages, outpatient and inpatient, confirmed and unconfirmed cases. 4. Diagnostically confirmed; all ages, outpatient and inpatient. 5. Clinical/presumed/unconfirmed; all ages, outpatient and inpatient. 6. # confirmed cases divided by total # cases. 7. Confirmed cases divided by # patients receiving a diagnostic test for malaria (RDT or microscopy). 8. Outpatient and inpatient, confirmed and unconfirmed. 9. Total # <5 cases divided by total # of cases. 10. Severe cases are defined in a patient with *P. falciparum* asexual parasitemia and no other obvious cause of symptoms, the presence of one or more of the following clinical features: behavioral changes, prostration/extreme weakness, coma, respiratory distress, convulsions, vomiting everything, inability to drink or breastfeed, circulatory collapse/ shock, pulmonary edema, bleeding tendency/disseminated intravascular coagulation, jaundice, acute renal failure, and hemoglobinuria. 11. All ages, outpatient, inpatient, confirmed, and unconfirmed. 12. Total # of health facilities reporting data into the HMIS/DHIS2 system that year. 13. # monthly reports from health facilities divided by # health facility reports expected.

III.   OVERVIEW OF PMI'S SUPPORT OF ZANZIBAR'S MALARIA STRATEGY

PMI supports a comprehensive package of malaria elimination interventions in support of ZAMEP's *2018–2023 Strategic Plan IV*. The plan identifies three major strategies to achieve this goal:

1. Malaria Diagnosis and Treatment: Ensure quality assured diagnosis and appropriate case management in all health facilities and at community level to 100 percent by 2023.
2. Integrated Malaria Vector Control: Increase appropriate vector control measures to the population at risk of malaria to 100 percent by 2023.
3. Surveillance, Monitoring, and Evaluation
   a) Actively investigate and classify 100 percent of all confirmed cases of malaria and initiate entomological surveillance in malaria foci from 0 percent in 2017 to 100 percent by 2023.
   b) Conduct entomological surveillance in 100 percent of malaria foci areas by 2023.

The plan also identifies three supporting strategies:

- Social Behavioral Change and Communication: Advocacy, behavior, and mobilization reaches 90 percent of the general population by 2023.
- Operational Research: Appropriate operational research is undertaken to evaluate and optimize interventions to eliminate malaria.
- Program Management and Coordination: Strengthen coordination structures for malaria elimination at different operational levels by 2023.

Zanzibar implemented a Malaria Case Notification (MCN) system in 2011. This system requires that the Council Malaria Surveillance Officers (CMSOs) follow every case to household level and test all household members. In addition, the CMSOs take the coordinates of each case and collect sufficient information on cases to classify foci as active, non-active, or potential. The goal is to follow up every case to the household level within 24 hours of notification of a confirmed case of malaria. In 2014, ZAMEP updated its case management guidelines to include a single low-dose primaquine treatment to reduce transmission, a policy that was implemented beginning in 2016. PMI supports ZAMEP's PBO ITN keep-up approach to maintain high net coverage and use via community-based and health facility-based distribution of ITNs through ANC/EPI. IRS reaches hotspot areas across Unguja and Pemba, and new approaches to larviciding are being tested. In spite of high coverage with interventions to reduce indoor transmission, about 3,000 and 4,500 cases are still reported annually. There is evidence that a significant proportion (~60 percent) of these cases may be imported and other evidence to suggest that outdoor transmission may play a major role in transmission.

PMI currently provides support to all aspects of the ZAMEP strategy across all geographic areas of both islands, Unguja and Pemba, including technical assistance (TA) for monitoring and informing larviciding protocols with this MOP. To assist Zanzibar in its efforts to eliminate malaria, PMI has supported ZAMEP to organize and convene a Zanzibar Malaria Elimination Advisory Committee (ZMEAC), comprised of international and local malaria experts. This independent group has met regularly beginning in 2018 to review progress and provide guidance to ZAMEP.

Figure 4. Map of target areas for PMI interventions (2021)

Legend

PMI-supported Case Management and MiP
[H]

PMI-supported IRS

Global Fund Procured and Distributed ITNs through Health Facilities

Global Fund Procured and PMI Distributed ITNs through Health Facilities; and PMI Procured and Distributed ITNs through School Net Program

PMI Procured and Distributed ITNs through Health Facilities; PMI-supported IRS
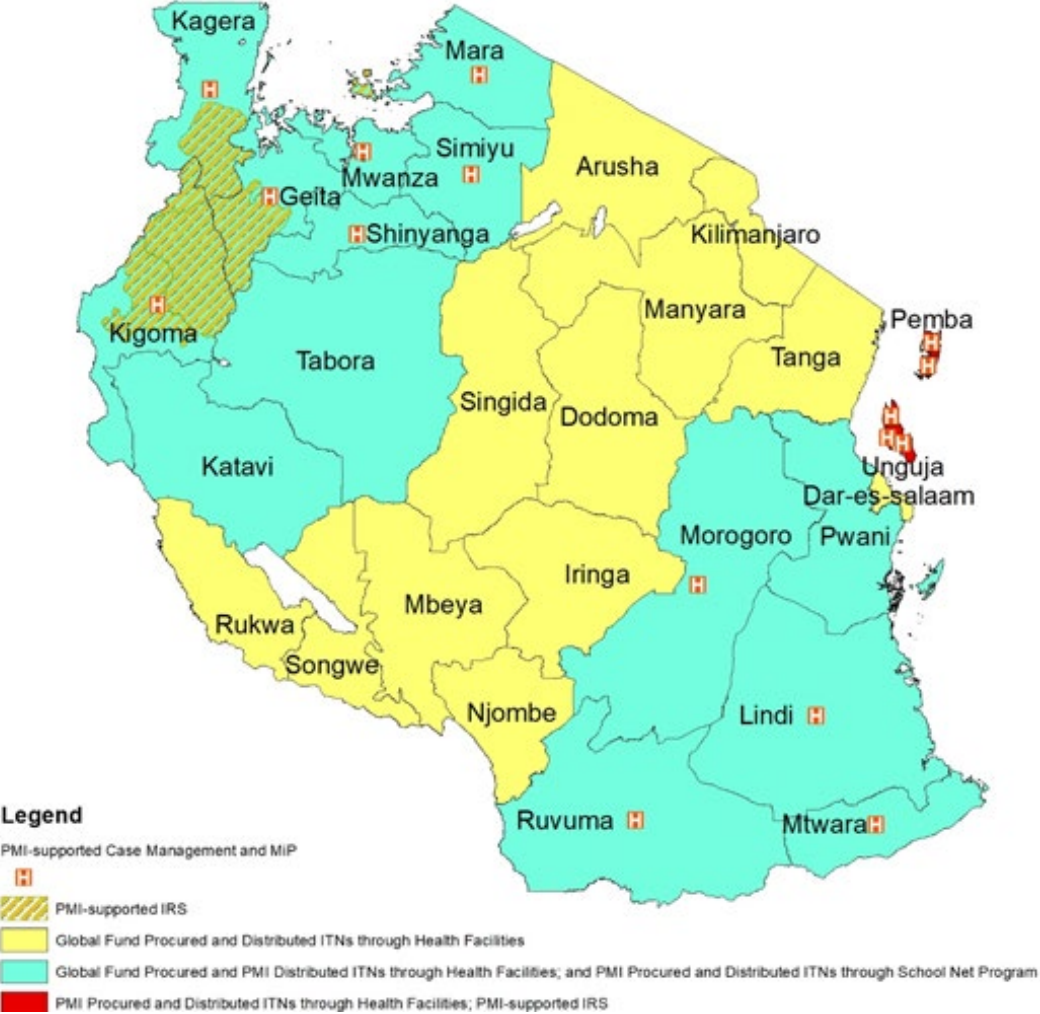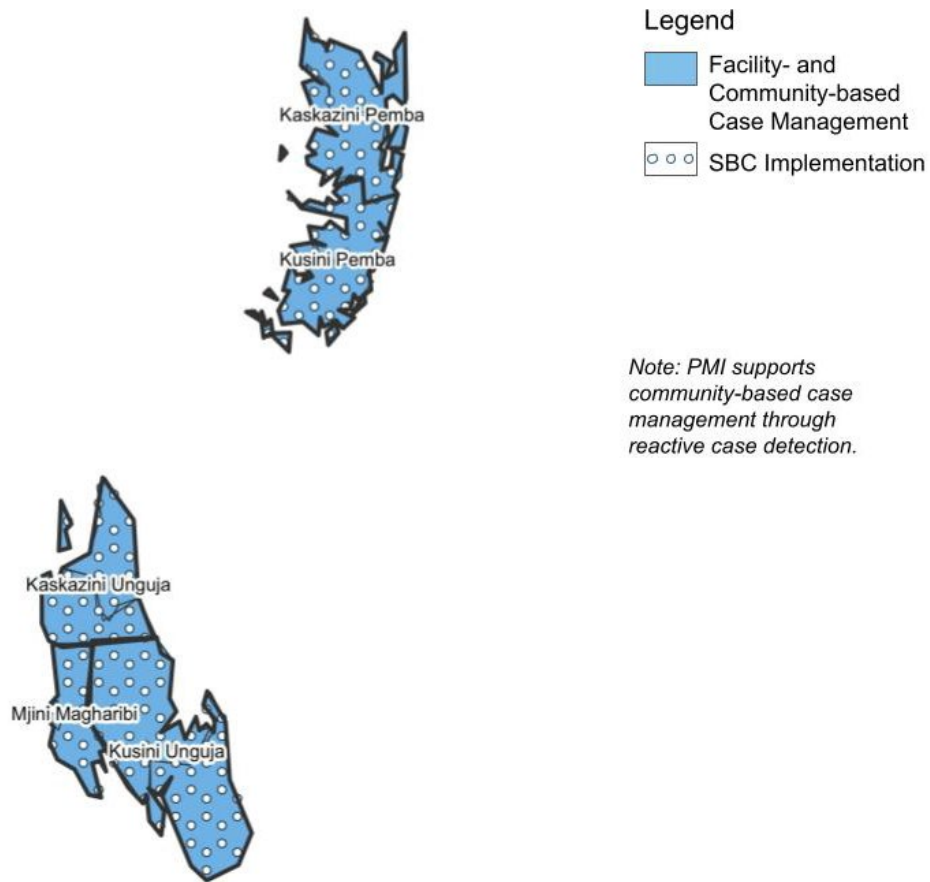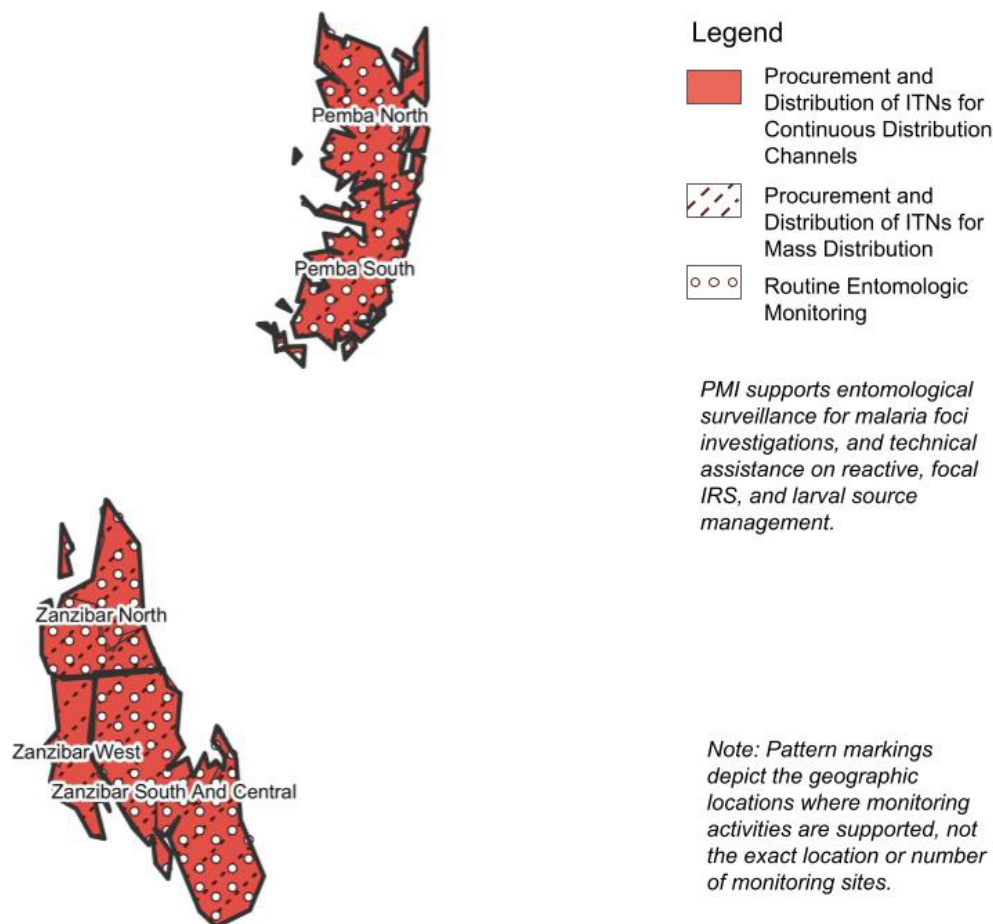
Figure 5. PMI-supported service delivery and social and behavior change activities in Tanzania (Zanzibar)

Source: Tanzania MOP Funding Table 2, Fiscal Year 2021 Malaria Data Integration and Visualization (M-DIVE).

Figure 6. PMI-supported vector control activities in Tanzania (Zanzibar)

Legend

- ▮ Procurement and Distribution of ITNs for Continuous Distribution Channels
- ▨ Procurement and Distribution of ITNs for Mass Distribution
- ▢ Routine Entomologic Monitoring

PMI supports entomological surveillance for malaria foci investigations, and technical assistance on reactive, focal IRS, and larval source management.

Note: Pattern markings depict the geographic locations where monitoring activities are supported, not the exact location or number of monitoring sites.

Source: Tanzania MOP Funding Table 2, Fiscal Year 2021 Malaria Data Integration and Visualization (M-DIVE).

IV.   PARTNER FUNDING LANDSCAPE

Note: Partner Funding Landscape applies to all of Tanzania (Mainland and Zanzibar).

PMI emphasizes the importance of partner alignment for malaria control, recognizing that different partners bring complementary expertise and resources. In recent years, PMI, the Global Fund, and the Bill & Melinda Gates Foundation (BMGF) have harmonized financial, supply chain, and programmatic data. In particular, PMI and the Global Fund agreed to a harmonized financial taxonomy to aid comparison of our investments to better identify potential overlap or gaps.

Due to the U.S. Government fiscal year budget cycle and approximate timing of annual appropriations, PMI MOP resources fund activities that largely occur during the following fiscal year. For example, this FY 2022 MOP is anticipated to largely fund implementation of activities starting in 2023. Global Fund resources are based on the

calendar year (CY) and planned for a three-year grant cycle. Most partner country governments and other partners also budget based on the calendar year.

The tables below summarize contributions by key external partners and partner country governments in calendar years 2020–2022, providing insight into total country investments. Because new grants funded through the Global Fund 2021–2023 grant cycle are just beginning, or will begin later in 2021, Global Fund country investments may still evolve in some countries. The partner country government invests substantial funding into the national-to-local infrastructure and service delivery that benefits malaria programs and many others. However, it is not always possible to attribute funding for malaria specifically from the partner country government without a standardized method. There may be similar challenges for attributing other partner funds.

In some cases, Global Fund's funding may come in partway through the calendar year. Funding levels in "Section IV: Partner Funding Landscape" and commodity procurement amounts listed in "Annex A: Intervention-Specific Data" may differ given the lag between the year that funding was planned and the year when procurement orders were placed. Differences may reflect timing and/or based on changes in commodity consumption levels at country level, changes in commodity costs, or other donor orders.

Table 3a. Annual budget by Level 1 category for FY 2019/CY 2020

Funder	Vector Control	Case Manage-ment	Drug-Based Prevention[1]	Supply Chain[2]	Monitoring, Evaluation & Research	Cross-cutting and HSS[3]	Total Per Funder
PMI	$28.1M	$5.2M	$1.0M	$1.1M	$3.8M	$4.7M	$43.9M
Global Fund	$18.0M	$27.1M		$0.7M	$1.5M	$14.3M	$61.6M
Gov[4]							
SDC-STPH[5]	$145,000						$145,000
Total Per Category	$46.2M	$32.3M	$1.0M	$1.8M	$5.3M	$19.0M	$105.6M

Table 3b. Annual budget by Level 1 category for FY 2020/CY 2021

Funder	Vector Control	Case Manage-ment	Drug-Based Prevention[1]	Supply Chain[2]	Monitoring, Evaluation & Research	Cross-cutting and HSS[3]	Total Per Funder
PMI	$27.8M	$5.5M	$0.4M	$0.8M	$2.5M	$5.1M	$42.1M
Global Fund	$7.3M	$21.1M		$0.5M	$2.7M	$34.4M	$66.0M
Gov[4]	0	0	0	0	0	0	$0.0M
SDC-STPH[5]	$145,000	0	0	0	0	0	$145,000
Total Per Category	$35.2M	$26.6M	$0.4M	$1.3M	$5.2M	$39.5M	$108.1M

Table 3c. Annual budget by Level 1 category for FY 2021/CY 2022

Funder	Vector Control	Case Manage-ment	Drug-Based Prevention[1]	Supply Chain[2]	Monitoring, Evaluation & Research	Cross-cutting and HSS[3]	Total Per Funder
PMI	$26.8M	$4.0M	$0.5M	$1.0M	$2.7M	$5.2M	$40.2M
Global Fund	$5.3M	$20.1M		$0.5M	$3.7M	$30.6M	$60.2M
Gov[4]	0	0	0	0	0	0	$0.0M
SDC-STPH[5]	$145,000	0	0	0	0	0	$145,000
Total Per Category	$32.2M	$24.1M	$0.5M	$1.5M	$6.4M	$35.8M	$100.3M

1. Drug-based prevention, including seasonal malaria chemoprevention (SMC) and MIP where applicable. 2. Covers management of in-country warehousing and distribution of malaria commodities, except for ITNs, which are separately captured under Vector Control. 3. HSS = health systems strengthening. 5. SDC = Swiss Development Corporation, STPH = Swiss Tropical Public Health Institute.

Table 4a. Annual budget, breakdown by commodity, FY 2019/CY 2020

Funder	ITNs Continuous Distribu-tion	ITNs Mass Distribu-tion	IRS[1] Insecticide	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related*	Total
PMI[2]	$8.1M		$9.4M						$17.5M
Global Fund[3]	$12.6M			$7.9M	$9.6M	$3.6M			$33.7M
Gov[4]	0	0	0	$3,572			0	0	$3,572
Other[5]									$0.0M
Total	$20.7M	$0.0M	$9.4M	$7.9M	$9.6M	$3.6M	$0.0M	$0	$51.2M

Table 4b. Annual budget, breakdown by commodity, FY 2020/CY 2021

Funder	ITNs Continuous Distribu-tion	ITNs Mass Distribu-tion	IRS[1] Insecticide	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related*	Total
PMI[2]	$10.6M		$8.2M	$1.5M	$0.0M	$1.0M	$0.0M		$21.3M
Global Fund[3]		$2.8M		$6.2M	$8.5M				$17.5M
Gov[4]	0	0	0	$4,765	0	0	0	0	$4,765
Other[5]									$0.0M
Total	$10.6M	$2.8M	$8.2M	$7.7M	$8.5M	$1.0M	$0.0M	$0.0M	$38.8M

Table 4c. Annual budget, breakdown by commodity, FY 2021/CY 2022

Funder	ITNs Continuous Distribu-tion	ITNs Mass Distribu-tion	IRS[1] Insecticide	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related*	Total
PMI[2]	$10.6M		$7.7M						$18.3M
Global Fund[3]		$2.9M		$5.4M	$7.8M				$16.1M
Gov[4]	0	0	0	$4,087	0	0	0	0	$4,087
Other[5]									$0.0M
Total	$10.6M	$2.9M	$7.7M	$5.4M	$7.8M	$0.0M	$0.0M	$0	$34.4M

*IPTp = Intermittent preventive treatment for pregnant women.
Note: Categories reflect the harmonized financial taxonomy (Levels 1-3) developed by BMGF, Global Fund, and PMI in 2019, as part of a broader data harmonization initiative but may continue to evolve. 1. IRS insecticide: for PMI, commodity costs may be inextricable from IRS implementation costs in historical data; field identified as ND where this is the case. 2. PMI commodity costs are fully loaded, including costs for the ex-works price of the commodity, quality control, freight, insurance, and customs. 3. Global Fund commodity costs in the table above only include ex-works commodity value.

V.   ACTIVITIES TO BE SUPPORTED WITH FY 2022 FUNDING

The FY 2022 budget tables contain a full list of activities that PMI proposes to support in Tanzania (Mainland and Zanzibar) with FY 2022 funding. Please visit www.pmi.gov/resource-library/mops for these FY 2022 budget tables. Key data used for decision-making for this MOP planned investments is provided in Annex A of this document.

ANNEX A: INTERVENTION-SPECIFIC DATA

This section outlines key data that helped inform decision-making around FY 2022 MOP funding allocations to PMI-supported activities.

1. VECTOR CONTROL

ZAMEP Objective

The Zanzibar Malaria Strategic Plan IV 2018/2019–2022/2023 includes Integrated Malaria Vector Control as one of four major strategies for malaria elimination and sets as the objective to increase appropriate vector control measures to the population at risk for malaria to 100 percent by 2023. PMI supports three of the four activities identified to achieve this objective:

- IRS in identified areas, targeting all areas that have an annual malaria incidence of >1 case/ 1,000 population or in areas where entomological investigations indicates the need for an IRS intervention.
- Maximization of ITN ownership and use.
- Larval source management.
- Vector surveillance in hotspot areas.

ZAMEP Approach

The Vector Control Guidelines for Malaria Elimination in Zanzibar 2017 articulated the choice of the most appropriate method or combination of malaria vector control that will accelerate the ZAMEP moving toward becoming the pre-elimination country. The core strategies/interventions are deployment of targeted or focalized IRS, use of ITNs, entomological monitoring, and complementary methods for larval source management, all implemented in parallel with SBC.

The last ITNs mass replacement campaign was completed in June 2020 covering 52 *shehias*/wards. ZAMEP has been continuously distributing ITNs through ANC/EPI and community channels.

PMI Objective in Support of NMCP

PMI's support for ITN coverage includes procurement and distribution of ITNs via RCH/EPI and community-based distribution and distribution of Global Fund- or PMI-procured ITNs through RCH/EPI channels at all primary health facilities. Procurement of insecticides for IRS is supported in Zanzibar by both Global Fund and PMI. In addition, PMI supports spray operation logistics for reaching between 40,000 and 60,000 households per year. Site selection is based on the incidence of malaria the previous year. The IRS operation adheres to high standards for the protection of the environment and safe disposal of waste, in accordance with the approved Pesticide Evaluation Report and Safe Use Action Plans. Environmental inspection visits are conducted regularly to assess compliance with U.S. Government and Tanzanian national environmental standards.

PMI support for entomological monitoring in Zanzibar consists of the following:

- Yearly monitoring of resistance to insecticides used for vector control and testing for insecticide resistance mechanisms.
- Monthly cone bioassay monitoring of residual insecticidal activity on sprayed walls.
- Monitoring of vector species abundance and distribution, resting behavior, blood feeding, and sporozoite rates at established sentinel sites.

PMI/Tanzania does not currently support actual implementation of larval source management (LSM) activities. However, TA to improve targeting, monitoring, and evaluation of LSM will be supported under this MOP.

PMI-Supported Recent Progress (FY 2020)

- PMI procured and distributed 154,077 PBO ITNs through ANC/EPI and community channels, as well as distributing 136,523 Global Fund-procured PBO nets through RCH/EPI and community channels.
- PMI supported SBC and provided TA for the distribution of 197,031 PBO ITNs through mass campaigns in 52 *shehias/*wards. Mass campaign PBO ITNs were procured by Global Fund.
- PMI supported reintroduction of the Chandarua Kliniki dashboard to monitor ITNs that are distributed through ANC/EPI, and integrated it with the electronic logistics management and information system (eLMIS).
- PMI supported ZAMEP to conduct entomological monitoring at sentinel sites that included insecticide resistance testing, longitudinal monitoring, and insecticide efficacy evaluations for IRS. PMI supported entomological assessments specifically on hotspot areas.
- PMI supported community activities that were focused on correct and consistent ITN use and care and acceptance of IRS.
- PMI supported targeted IRS reaching approximately 94,339 structures and protecting about 225,374 people, under leadership from ZAMEP.
- PMI supported the routine monitoring and supportive supervision in school malaria clubs, community health management teams, etc.

PMI-Supported Planned Activities (FY 2021 with currently available funds)

- Rapid assessment surveys to determine the ITN coverage across Zanzibar. NetCalc, or other suitable software programs, will be used to determine the ITN input required to maintain population coverage.
- PMI will support the procurement and distribution of PBO nets for the community-based and RCH/EPI distribution channels. This will include projection of ITN needs, tracking, accountability, and maintenance of the Zanzibar *Chandarua Kliniki* dashboard. PMI will also support the distribution of Global Fund-procured ITNs.
- PMI will support ZAMEP to conduct IRS in hotspot areas, covering about 45,000 structures and protecting about 230,000 people.
- PMI will procure insecticide and provide technical and logistic assistance for the 2020–2021 IRS round.
- PMI will support SBC activities to combat malaria cases imported by travelers, promote the acceptance of IRS, and promote correct and consistent use of ITNs.
- PMI will continue to support ZAMEP in entomological monitoring including insecticide resistance testing, longitudinal monitoring, and insecticide efficacy evaluations for IRS.
- Based on the latest entomological and epidemiological data, PMI will support the ZAMEP advanced molecular and immunodiagnostic laboratory for analysis of samples for entomological and epidemiological monitoring (including reagents, supplies, and maintenance costs).
- PMI will provide annual guidance on effectiveness of vector control interventions used in Zanzibar including the Revolutionary Government of Zanzibar (RGOZ) and stakeholders are well informed of new

promising, evidence-based vector control approaches that may be appropriate for the epidemiological, ecological, and human behavior settings.

- PMI will provide TA to improve targeting, monitoring, and evaluation of LSM activities. The implementation of LSM is supported by the RGOZ.

1.1. ENTOMOLOGICAL MONITORING

Key Goal

Determine the geographic distribution, bionomics, and insecticide resistance profiles of the main malaria vectors in the country to inform vector control decision-making.

Key Question 1

Where is entomological monitoring taking place, what types of activities are occurring, and what is the source of funding?

Supporting Data

Table A-1. Entomological monitoring activities

Location	Site	Activities	Supported by
Unguja	7 (Stonetown, Bumbwini, Donge, Mwera, Muyuni, Cheju, Shakani) 5 (Mwera, Donge, Cheju, Muyuni, Bumbwini)	Longitudinal monitoring (6) Insecticide residual efficacy (1) Insecticide Resistance (5)	PMI
Pemba	7 (Bopwe, Uwandani, Wambaa, Tumbe, Makangale, Gando) 4 (Bopwe, Tumbe, Uwandani, Wambaa)	Longitudinal monitoring (4) Insecticide residual efficacy (3) Insecticide Resistance (4)	PMI

From October 2019 to September 2020, PMI-supported longitudinal monitoring activities in 10 districts with a total of 10 sentinel sites, six in Unguja and four in Pemba Island (Table A-1). Insecticide resistance testing was conducted for samples from nine of these 10 sites, five in Unguja and four in Pemba. Residual efficacy testing for clothianidin used in the 2019–2020 IRS campaign were conducted at one site (Shakani) in Unguja and three sites (Tumbe, Makangale, and Gando) in Tumbe. For the longitudinal monitoring, mosquitoes were collected by human landing collections (indoor/outdoor), pit traps, indoor light traps, and pyrethrum spray collections. Laboratory analysis of the mosquito specimens were carried out at the molecular- immunodiagnostic laboratory at Unguja.

A total of 2,781 female *Anopheles* mosquitoes were collected, 1,651 in Pemba and 1,130 in Unguja. Molecular identification of 1,054 mosquitoes from Unguja showed that *An. arabiensis* (87 percent) is the predominant vector in both IRS and non-IRS areas, followed by *An. merus* (4.4 percent); 4.3 percent were from the *An. funestus* complex (*An. lessoni*, *An. vaneedeni,* and *An. rivulorum*). Molecular

identification of 1,617 mosquitoes from Pemba showed that *An. arabiensis* (86 percent) is also the predominant vector at all sites, followed by *An. merus* (6 percent) and *An. gambiae* s.s. (0.6 percent). Low numbers from the *An. funestus* complex (3.5 percent) were also collected (*An. lessoni, An. vaneedeni*, *An. parensis,* and *An. rivulorum*). Outdoor biting of *An. gambiae* s.l. is higher throughout the year than indoor biting in both IRS and non-IRS areas in both Pemba and Unguja. However in Unguja indoor biting densities are higher than in Pemba.

Figure A-1. Ten sentinel districts for longitudinal entomological monitoring and resistance testing in Unguja and Pemba, Zanzibar
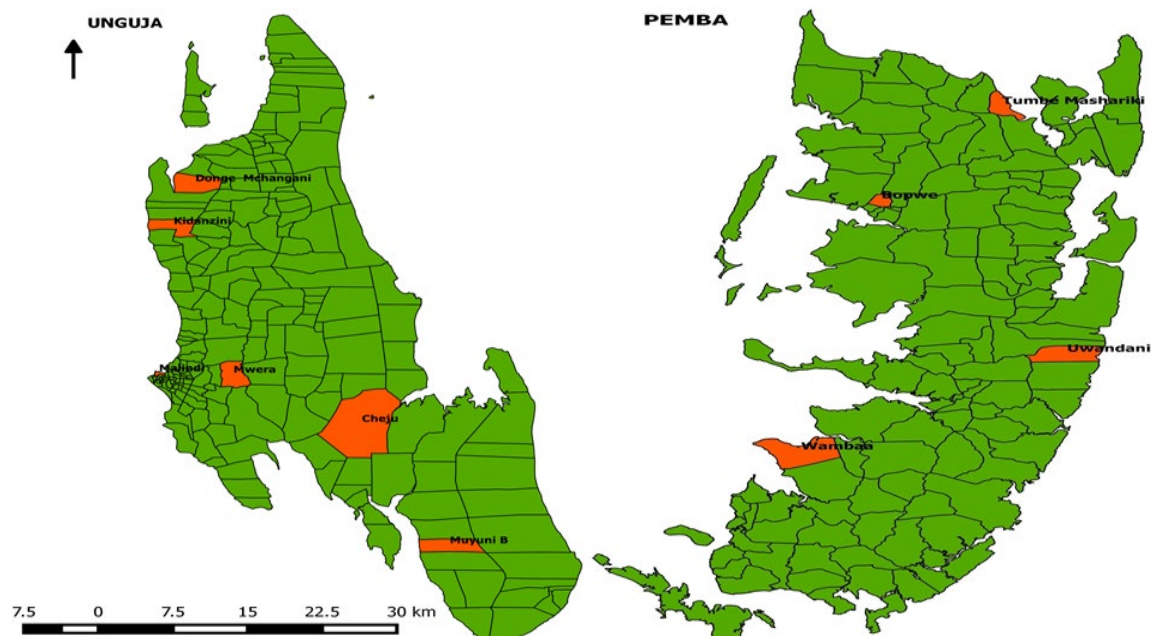
Table A-2. Distribution and bionomics of malaria vectors in Unguja and Pemba

Site/District	Vector*	Peak Season (month)	Preferred Biting Location (Indoor/Outdoor)	Peak Biting Time	Preferred Resting Location**	Preferred Host	Annual EIR†
StoneTown/ Mjini (Non-IRS)	*An. gambiae* s.l.	Undeter-mined	Undeter-mined	Undeter-mined	Undeter-mined	N/A	Undeter-mined
Bumbwini/ Kaskazini B (IRS)	*An. gambiae* s.l.	*An. gambiae* s.l. (Oct, April, June)	*An. gambiae* s.l. (0.02/0.05)	*An. gambiae* s.l. (I=7 p.m.–5 a.m.) (O=8 p.m.–5 a.m.)	*An. gambiae* s.l. (Outdoors)	N/A	0
Donge/ Kaskazini A) IRS)	*An. gambiae* s.l.	*An. gambiae* s.l. (Oct, April, June)	*An. gambiae* s.l. (0.03/0.03)	*An. gambiae* s.l. (I=midnight–3 a.m.) (O=7 p.m.–11 p.m.	*An. gambiae* s.l. (Outdoors)	N/A	0
Cheju/Kait (IRS)	*An. gambiae* s.l.	*An. gambiae* s.l. (Oct, April, June)	*An. gambiae* s.l. (0.15/019)	*An. gambiae* s.l. (I=7 p.m.–11 p.m.) (O=6 p.m.–midnight)	*An. gambiae* s.l. (Outdoors)	N/A	0.04
Muyuni/ Kusini (IRS)	*An. gambiae* s.l.	*An. gambiae* s.l. (Oct, April, June)	*An. gambiae* s.l. (Undetermined)	*An. gambiae* s.l. (Undeter-mined)	*An. gambiae* s.l. (Outdoors)	N/A	0
Mwera/ Magharibi (IRS)	*An. gambiae* s.l.	*An. gambiae* s.l. (Oct, April, June)	*An. gambiae* s.l. (Undeter-mined)	*An. gambiae* s.l. (Undeter-mined)	*An. gambiae* s.l. (Outdoors)	N/A	0
Tumbe/ Micheweni (IRS)	*An. gambiae* s.l. *An. funestus* s.l.	*An. gambiae* s.l. (Oct, March–April) *An. funestus* s.l. (Oct, Dec)	*An. gambiae* s.l. (0.14/1.17) *An. funestus* s.l. (0.001/0.004)	*An. gambiae* s.l. (I=6 p.m.–10 p.m.) (O=6 p.m.–midnight) *An. funestus* s.l. (Undetermined)	*An. gambiae* s.l. (Outdoors) *An. funestus* s.l. (Outdoors)	N/A	1.39

Site/District	Vector*	Peak Season (month)	Preferred Biting Location (Indoor/ Outdoor)	Peak Biting Time	Preferred Resting Location**	Preferred Host	Annual EIR†
Wambaa/ Mkoani (IRS)	*An. gambiae* s.l. *An. funestus* s.l.	*An. gambiae* s.l. (Oct, March– April) *An. funestus* s.l. (Mar)	*An. gambiae* s.l. (0.03/1.38) *An. funestus* s.l. (0/0.011)	*An. gambiae* s.l. (I=6 p.m.– midnight) (O=6 p.m.–10 p.m.) *An. funestus* s.l. (O=6 p.m.–8 p.m.)	*An. gambiae* s.l. (Outdoors) *An. funestus* s.l. (Undetermined)	N/A	5.2
Uwandani/C hake Chake (Non-IRS)	*An. gambiae* s.l. *An. funestus* s.l.	*An. gambiae* s.l. (Oct, March– April) *An. funestus* s.l. (Mar)	*An. gambiae* s.l. (0.005/0.03) *An. funestus* s.l. (Undeter- mined)	*An. gambiae* s.l. (I=7 p.m.–9 p.m.) (O=8 p.m.– 11p.m.) *An. funestus* s.l. (Undetermined)	*An. gambiae* s.l. (Outdoors) *An. funestus* s.l. (Outdoors)	N/A	0
Bopwe/ Wete (Non-IRS)	*An. gambiae* s.l. *An. funestus* s.l.	*An. gambiae* s.l. (Oct, March– April) *An. funestus* s.l. (Oct, Dec)	*An. gambiae* s.l. (0.07/0.92) *An. funestus* s.l. (0/0.009)	*An. gambiae* s.l. (I=6 p.m.–10 p.m.) (O=6 p.m.–10 p.m.) *An. funestus* s.l. (O=7 p.m.–8 p.m.)	*An. gambiae* s.l. (Outdoors) *An. funestus* s.l. (Outdoors)	N/A	0.93

*Primary vector listed first, in bold, followed by secondary vectors.

** Marked as N/A if simultaneous indoor and outdoor collections are not conducted.

Undetermined: Mosquito collection too low to reach any conclusions.

I = Indoor, O = Outdoor.

N/A; No data was collected.

† EIR = Entomological inoculation rate

Key Question 2

What is the current insecticide resistance profile of the primary malaria vectors?

Supporting Data

Between April and June 2020, PMI supported insecticide resistance monitoring in nine of the sites where longitudinal entomological monitoring takes place, five in Unguja and four in Pemba (Figure A-1 and Table A-2). Insecticide resistance tested was carried out using the WHO susceptibility assay, on *An. gambiae* s.l. adults from larval collections. Following WHO resistance assay guidelines, mortalities between 98 percent and 100 percent indicate that mosquitoes are susceptible, mortalities between 90-97 percent indicate possible resistance, while anything below 90 percent mortality indicates resistance.

There is widespread resistance of *An. gambiae* s.l. to pyrethroids (permethrin, deltamethrin, lambda-cyhalothrin, and alpha-cypermethrin) across all sites, with the resistance higher in Pemba than Unguja. However *Anopheles gambiae* s.l. from both IRS and non-IRS sites in Pemba and Unguja were fully susceptible to pirimiphos-methyl, clothianidin, and bendiocarb. In Pemba, intensity of resistance was carried out in Bopwe for permethrin, deltamethrin, lambda-cyhalothrin, and alpha-cypermethrin) and Uwandani for deltamethrin. There were insufficient mosquitoes to carry out the intensity testing for all the insecticides in Uwandani. For the same reason, no insecticide resistance intensity testing was carried out in Unguja. Figure A-1 shows that there is a high intensity of resistance in *An. gambiae* s.l. populations to 5x and 10x the diagnostic concentrations of pyrethroids in Bopwe and Uwandani, with mosquitoes surviving 10x concentrations of pyrethroids. The mechanism for pyrethroid insecticide resistance was tested in Unguja and Pemba (Table A-3). The use of PBO synergist restored the susceptibility of *An. gambiae* s.l. to 99 percent to 100 percent mortality.

Table A-3. Insecticide resistance from WHO insecticide resistance of adult *An. gambiae* s.l. from larval collections to a range of insecticides at respective diagnostic concentrations in Unguja and Pemba

Location	Site	Resistance (% Mortality)						
		Permethrin	Delta-methrin	Alpha-cypermethrin	Lambda-cyhalothrin	Pirmiphos-methyl	Bendio-carb	Clothiani-din
Unguja	Mwera	95	98	86	81	100	100	100
	Donge	90	81	86	87	100	100	100
	Cheju	46	Not tested	66	Not tested	100	100	100
	Muyuni	60	89	89	Not tested	100	100	100
	Bumbwini	89	96	82	87	97	100	100
Pemba	Bopwe	43	22)	34	27	100	100	100
	Tumbe	52	35	49	48	100	100	100
	Uwandani	46	15	10	40	100	100	100
	Wambaa	60	77	30	68	100	100	100

Not tested: Insufficient number of mosquitoes collected to perform assays.

Footnotes:

98–100%	= Susceptible	97–90%	= Suspected resistance	<90%	= Confirmed Resistance

Figure A-2. Intensity of insecticide resistance from WHO intensity assays of adult *An. gambiae* s.l. to 1×, 5×, and 10× the diagnostic concentrations to a range of pyrethroids at Bopwe and Uwandani, Pemba
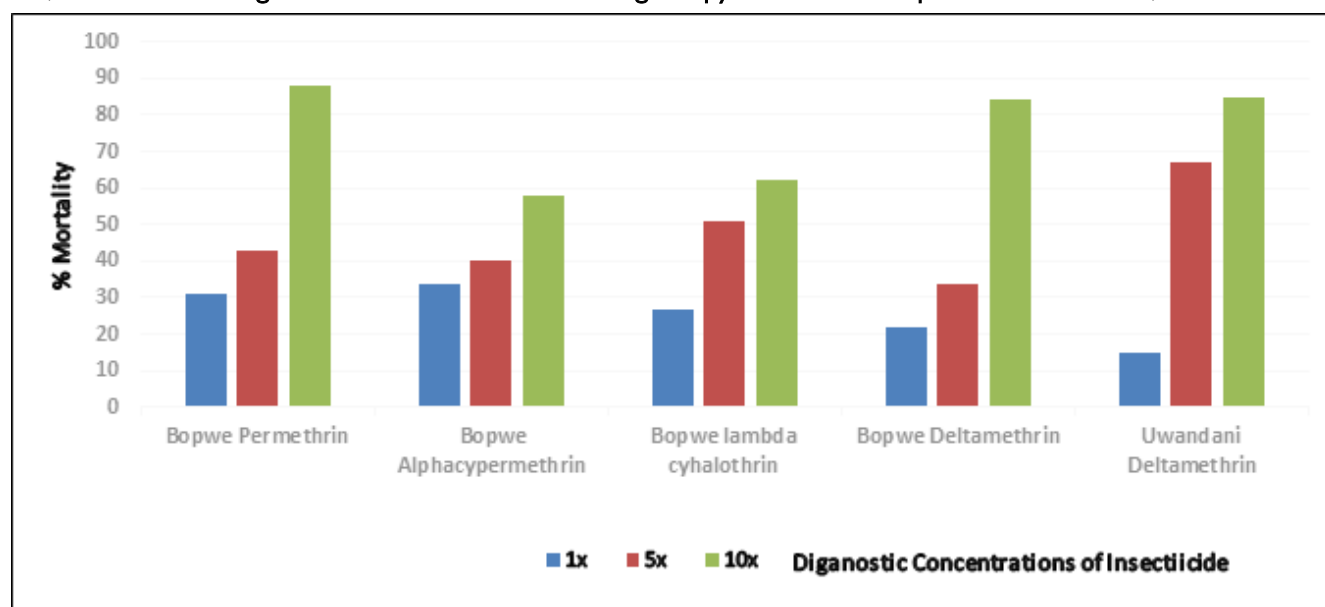

Table A-4. Mechanism of pyrethroid insecticide resistance in adult An. gambiae s.l. bioassays with PBO in Unguja and Pemba

		Permethrin (% Mortality)		Deltamethrin (% Mortality)		Alpha-cypermethrin (% Mortality)	
Location	Site	I	I + PBO	I	I + PBO	I	I + PBO
Unguja	Mwera	95	100	N/A	N/A	N/A	N/A
	Donge	92	100	81	99	87	99
	Cheju	88	99	88	100	87	99
	Bumbwini	89	99	82	100	97	100
Pemba	Bopwe	36	99	19	99	13	99

I = Insecticide; PBO = Piperonyl butoxide synergist.

Conclusions for Entomological Monitoring Investments

PMI will continue to support entomological monitoring and insecticide resistance surveillance in Zanzibar. Although ZAMEP has implemented rotations of insecticides for the IRS program, widespread pyrethroid resistance remains and in certain areas, with high-resistance intensity. The reduction of coverage in IRS (from blanket to targeted and now focal IRS) and the expansion of ITNs may have contributed to the continuing trend of high pyrethroid resistance. Assessment of vector biting shows that there is considerable outdoor biting risk from *An. arabiensis,* the predominant vector in IRS and non-IRS areas and with human nighttime outdoor activities, may have implications for IRS and ITNs as vector control tools. Data indicating that pyrethroid efficacy can be restored with PBO synergist was used in the ZAMEP strategy to expand PBO ITN implementation. ITNs

and IRS are still effective vector control tools; however, other vector control interventions should be considered to address the issue of residual transmission driven by outdoor biting vectors. As part of the RGOZ strategic plan for implementation of nationwide LSM for malaria vector control, ZAMEP has scaled up LSM activities in its drive toward elimination. This may assist to address the issue of outdoor biting vectors. PMI plans to provide TA for protocol development for targeting, for monitoring and evaluation of larval source management activities, including data analysis with the FY 2021 and FY 2022 MOP.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

1.2. INSECTICIDE-TREATED NETS (ITNs)

Key Goal

Achieve high ITN coverage and use targets with effective nets, based on insecticide resistance data and maintain high coverage and use with consistent ITN distribution (via campaigns and/or continuous channels).
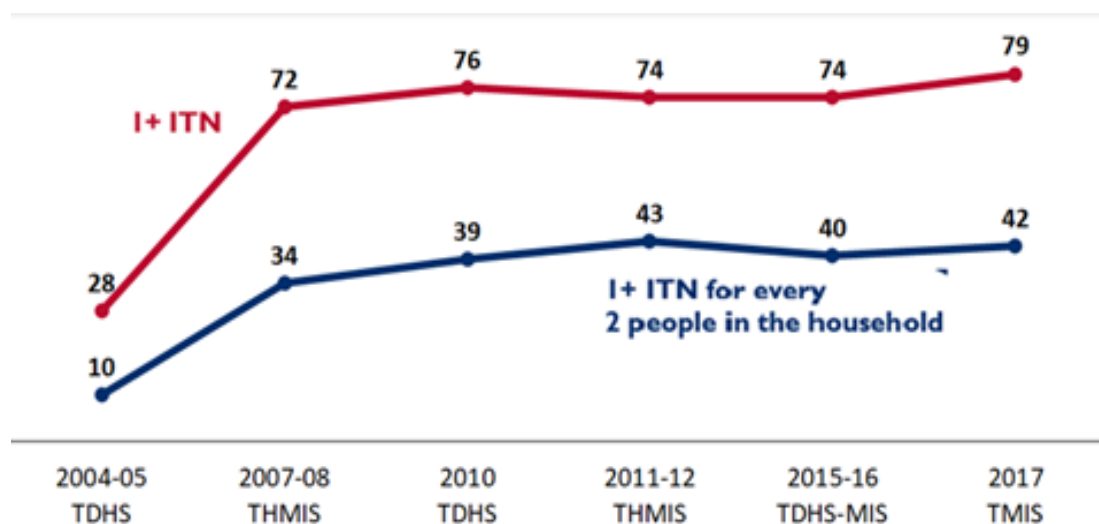
Key Question 1

How has net ownership evolved since the start of PMI in the country?

Supporting Data

Figure A-3. Trends in ITN ownership
Percentage of households that own ITNs. Line graph shows households owning at least one ITN increased from 74 percent in the 2015–2016 DHS-MIS to 79 in the 2017 MIS. Full household ITN coverage, as measured by the percent of households with at least one ITN for every two people in the household, increased from 40 percent in the 2015–2016 DHS-MIS to 42 percent in the 2017 MIS.

Household ITN ownership has remained consistent since 2007–2008, with approximately three-quarters of households owning at least one ITN. However, less than half of households have enough ITNs to cover all household members.

Key Question 2a

What proportion of the population has access to an ITN? Of those who have access, what proportion of the population reports using an ITN?

Supporting Data

Figure A-4. Trends in ITN access and use

Percentage of household population with access to an ITN and percentage of those who slept under an ITN the night before the survey. Line graph shows that population access to an ITN increased from 57 percent in the 2015–2016 DHS-MIS to 62 percent in the 2017 MIS. Use of ITNs among the household members with access increased from 47 percent in the 2015–2016 DHS-MIS to 59 percent in the 2017 MIS.
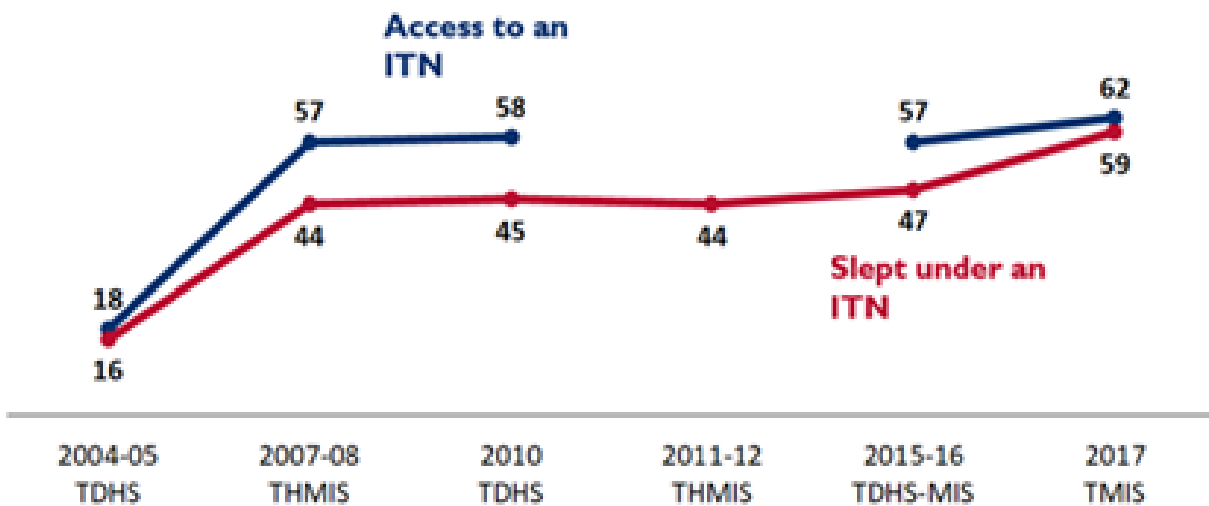
DHS surveys are generally fielded during the dry season, as opposed to MIS surveys, which are deliberately fielded during the high-transmission season, which should be taken into consideration when interpreting the ITN use indicator.

Figure A-5. Zanzibar ITN use:access ratio. This map shows that the ratio of net use to net access is very good across Zanzibar (ranging from 0.91 in Kaskazini Unguja to 0.99 in Kaskazini Pemba)
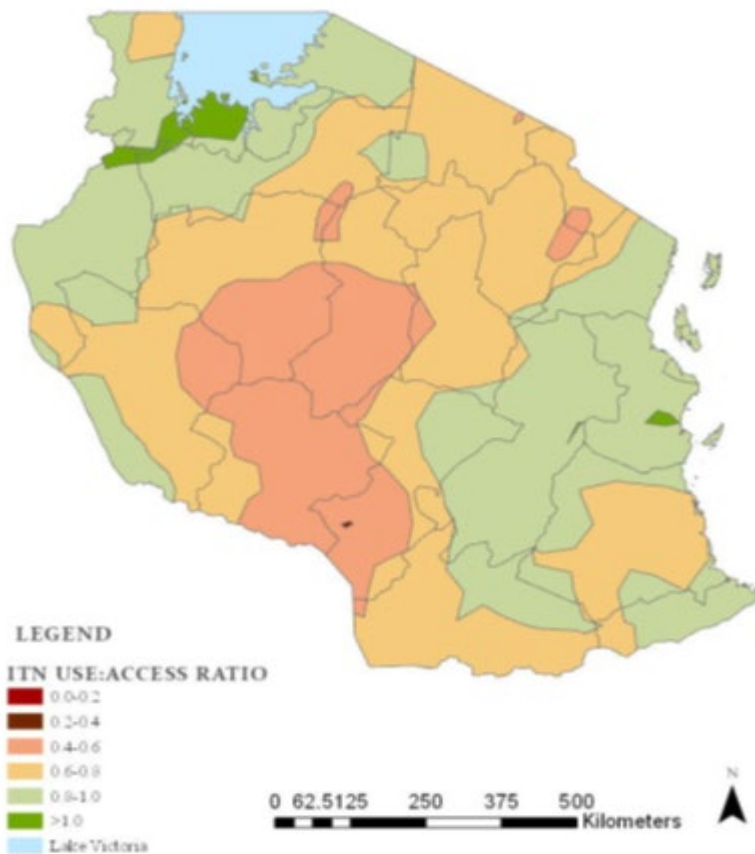
The high ratio of net access to use indicates that when nets are available, they are being used.

Key Question 2b

What percent of pregnant women and children under five years of age report sleeping under an ITN?

Figure A-6. Trends in ITN use among children and pregnant women in Zanzibar

Children under five years of age and pregnant women 15 to 49 years of age who slept under an ITN the night before the survey. Line graph shows that ITN use among children increased from 56 percent in the 2015–2016 DHS-MIS to 67 in the 2017 MIS. ITNs use among pregnant women has increased from 52 percent in the 2015–2016 DHS-MIS to 63 percent in the 2017 MIS.

Percent of children under 5 and pregnant women age 15-49 who slept under an ITN the night before the survey
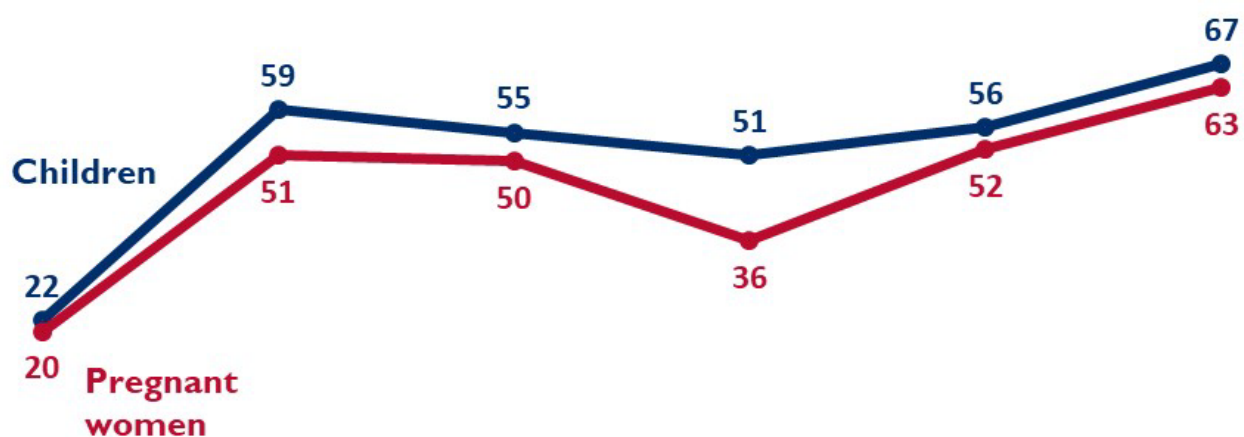
2004-05 TDHS	2007-08 THMIS	2010 TDHS	2011-12 THMIS	2015-16 TDHS-MIS	2017 TMIS

DHS surveys are generally conducted during the dry season, as opposed to MIS surveys, which are deliberately conducted during the high-transmission season, which should be taken into consideration when interpreting these indicators.

The 2017 MIS shows that approximately two-thirds of children under five years of age and pregnant women slept under an ITN the night before the survey. This has increased since 2011–2012 even though net ownership has remained stable, indicating success in SBC efforts targeting these groups.

Key Question 3

If ITN access is high but use is low, what significant structural and/or behavioral challenges affect the adoption and maintenance of ITN use and care behaviors?

Supporting Data

Table A-5. Key Barriers and Facilitators to ITN Use

Facilitator	Type of Factor	Data Source	Evidence
High rate of long-lasting ITN ownership	Environmental	Zanzibar Malaria Knowledge, Attitudes, Practices, and Behavior (KAPB) Study, 2017	Three-quarters of households (74.1%) had at least one bed net for every two people who slept in the household the night before the survey.
Barrier	Type of Factor	Data Source	Evidence
Low risk perception of malaria	Internal	Zanzibar Malaria KAPB Study, 2017	Almost half of respondents (48.4%) were not worried about malaria because they knew it could be easily treated.
Belief about effectiveness of bed nets	Internal	Zanzibar Malaria KAPB Study, 2017	Only 56.8% of respondents believed that sleeping under a bed net was the best way to avoid malaria.
Belief about effectiveness of bed nets	Internal	Zanzibar Malaria KAPB Study, 2017	40% of respondents had a misconception that their chances of getting malaria is the same whether or not sleeping under a bed net.

MIS 2017 data indicates that net use given access in Zanzibar is very high (ranging from 91 percent to 99 percent); however, recently (over the past one year), there has been an increase in the number of malaria cases (ranging from 1 percent to 3 percent prevalence) in five districts. Based on that, SBC interventions focusing on ITN use need to be intensified to ensure malaria prevention methods continue to be used consistently, particularly behaviors around ITN use in communities experiencing a resurgence of malaria cases. PMI will continue to focus on SBC activities that promote the use of ITN to both Zanzibaris and travelers to address behavioral determinants such as risk perception, attitudes toward ITN use and sustaining self-efficacy. PMI also proposes promoting net care to increase the useful life of ITNs.

Please refer to Section 3.4 for information on how SBC interventions will be directed to address the challenges identified above.

Key Question 4

What type of nets are being distributed via which channels?

Table A-6. Insecticide-treated net (ITN) distribution

Level Nationwide & Shehia/Ward	Mass Campaign [April–June 2020]	ANC/EPI	Community
PBO ITNs – 52 *Shehias*/Wards	197,031		
PBO ITNs – Nationwide		99,931	115,962

Key Question 5

What is the estimated need for ITNs during calendar years 2021–2023? How many, and what types, of ITNs will be procured, and by what partners? Through what channels will ITNs be distributed? Are there any projected ITN gaps?

Supporting Data

The ITN gap analysis table is showing the deficit on the support of ITNs as per quantification. The identified gap is being addressed.

Table A-7. ITN Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	1,717,608	1,762,989	1,807,581
Total population at risk for malaria	1,717,608	1,762,989	1,807,581
PMI-targeted at-risk population	1,717,608	1,762,989	1,807,581
Population targeted for ITNs	1,717,608	1,762,989	1,807,581
Continuous Distribution Needs			
Channel 1: ANC	68,704	70,520	72,303
Channel 2: EPI	68,704	70,520	72,303
Channel 3:			
Channel 4:			
Additional ITNs required to avoid ITN stockouts			
Estimated Total Need for Continuous Channels	137,409	141,039	144,606
Mass Campaign Distribution Needs			
Mass distribution campaigns	629,216	0	341,465
Estimated Total Need for Campaigns	629,216	0	341,465
Total ITN Need: Continuous and Campaign	*766,625*	*141,039*	*486,071*
Partner Contributions			
ITNs carried over from previous year	30,244	0	0
ITNs from Government			
ITNs from Global Fund	376,887	0	147,660
ITNs from other donors			
ITNs planned with PMI funding	252,123	140,884	162,000
Total ITNs Contribution Per Calendar Year	*659,254*	*140,884*	*309,660*
Total ITN Surplus (Gap)	*-107,371*	*-155*	*-176,411*

Key Question 6

What is the current status of durability monitoring?

Supporting Data

N/A. Durability monitoring is not supported by PMI in Zanzibar.

Conclusions for ITN Investments

The deployment of PBO nets in Zanzibar started in August 2019. These PBO nets are distributed through ANC/EPI, community, and mass campaign channels. The move from standard long-lasting ITNs to PBO nets was due to the documented high level of pyrethroid resistance with metabolic resistance mechanism observed. After a careful analysis of the available data, these decisions were made during the first ZMEAC meeting in early 2019. Zanzibar expects that by December 2021 it will be able to cover all sleeping spaces with PBO nets. PMI and Global Fund will support procurement of mass campaign nets.

Because Zanzibar is scaling up the universal coverage of PBO nets, PMI will continue to support the procurement and distribution of PBO nets for the primary health facilities (ANC/EPI). This will include support for assessing the net coverage, projecting ITN needs, tracking, accountability, and the Zanzibar *Chandarua Kliniki* dashboard.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

1.3. INDOOR RESIDUAL SPRAYING (IRS)

Key Goal

Ensure high spray quality and coverage, with an appropriate insecticide, in targeted endemic PMI-supported areas, in alignment with the national insecticide resistance management strategy.

Key Question 1

What areas are targeted for IRS and why?

Supporting Data

Figure A-7. Map of targeted indoor residual spraying in Unguja and Pemba by shehia
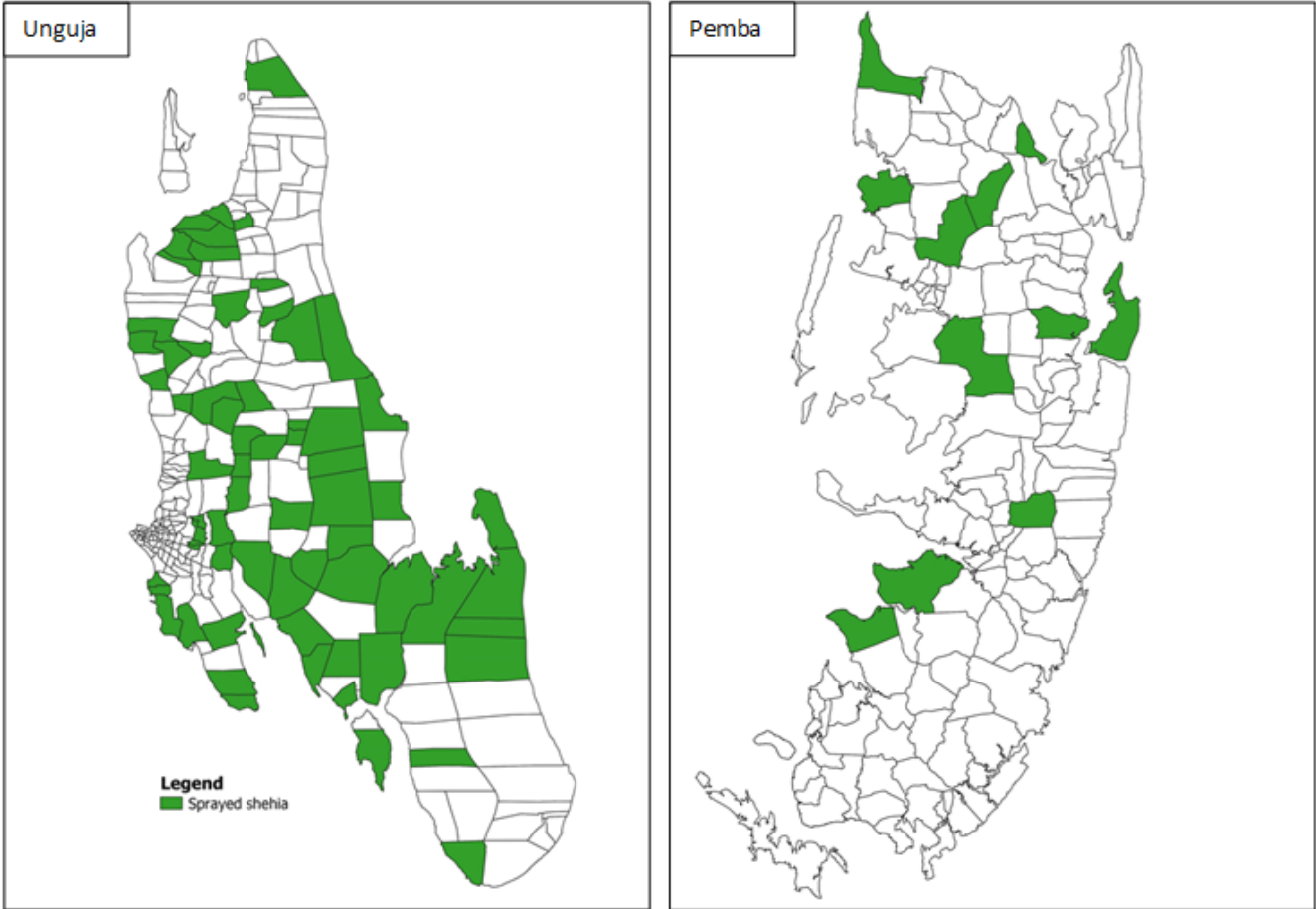
In 2020, PMI implemented targeted spraying in 153 *shehias* across nine districts within the islands of Unguja and Pemba: Central, North A, North B, South, West A, and West B on Unguja Island and Micheweni, Mkoani, and Wete on Pemba Island with clothianidin. The insecticide for the 2020 campaign was procured by PMI. ZAMEP and PMI reviewed malaria incidence data from October 2018 to September 2019 for all *shehias*. *Shehias* were ranked by incidence and those with the highest incidence selected, up to the project's target of 41,231 structures. The IRS target *shehias* totaled 127:101 from six districts in Unguja and 26 from three districts in Pemba. The selected *shehias* had a malaria incidence of ≥ 3.4 cases per 1,000 population.

Key Question 2

In PMI-supported areas, what spray coverage rates have been achieved in the past three years and what are the plans for 2021?

Supporting Data

Table A-8. IRS Coverage

Calendar Year	Districts Sprayed (#)	Districts	Structures Sprayed (#)	Coverage Rate (%)	Population Protected (#)
2018	8	Central, Chakechake, Micheweni, North A, North B, South, West, and Wete	67,450	95%	334,715
2019	10	Central, Chakechake, Micheweni, Mkoani, North A, North B, South, West A, West B, and Wete	94,339	95%	477,243
2020	9	Central, Micheweni, Mkoani, North A, North B, South, West A, West B, and Wete	44,532	97%	225,374
2021*	10	Central, Chakechake, Micheweni, Mkoani, North A, North B, South, West A, West B, and Wete	45,965	TBD	232,341

*Denotes targets for current year.

For each IRS round, household coverage for areas selected for IRS was over 90 percent. Low malaria prevalence, combined with robust and reliable surveillance and entomological monitoring systems, has allowed Zanzibar to adopt an entirely focal spraying approach since 2014. Malaria incidence at shehia levels is used as the criteria for selecting sites for IRS.

Key Question 3

What is the residual efficacy of the insecticides used for IRS in PMI-supported areas?

Supporting Data

Residual efficacy testing, using WHO cone wall bioassay tests to monitor IRS effectiveness, was carried out within the first seven days post-IRS application of clothianidin in February 2020 to assess the quality of IRS applications. Thereafter residual efficacy was monitored on a monthly basis until the effectiveness was <80 percent. The monitoring was carried out in one district in Unguja and three districts in Pemba (Figure A-7). Clothianidin is a slow-acting insecticide formulation, therefore the WHO protocol for cone bioassays was modified so that

mortality was recorded every 24 hours for six consecutive days after exposure, with the exposure time remaining at 30 minutes. The susceptible colonies of *An. gambiae* s.s. (R-70 strain) from the insectaries at Unguja and Pemba were used for monitoring the insecticide efficacy on five types of wall surfaces (mud, cement, oil-paint, water-paint, and stone block). The results show that the insecticide application was of high quality at all sites, as the assays conducted immediately post-IRS indicated 100 percent mortality. Clothianidin maintained a >80 percent mortality for nine months on all wall surface types.

Table A-9. IRS insecticide residual efficacy of clothianidin in Unguja and Pemba

Location	Site/District	Year	Insecticide	Average Residual Efficacy (months)
Unguja	Shakani/Kati	2020	Clothianidin	9
Pemba	Tumbe/Micheweni	2020	Clothianidin	9
	Makangale/Micheweni	2020	Clothianidin	9
	Gando/Wete	2020	Clothianidin	9

Key Question 4

What is the insecticide rotation plan in PMI-supported areas?

Supporting Data

Table A-10. Insecticide plan

Target Spray Area	2020	2021	2022*	2023*
Nationwide targeted/focal spray	Clothianidin	Clothianidin	Clothianidin + deltamethrin	TBD

*Denotes planned insecticide classes.

Zanzibar has used clothianidin for the IRS program between 2020 and 2021. In 2022 ZAMEP is expected to use a clothianidin + deltamethrin for focal spraying/response activity in active foci areas.

Conclusions for IRS Investments

Since August 2019 Zanzibar has been deploying PBO nets in Zanzibar though RCH/EPI and community-based distribution channels. In 2020 ZAMEP conducted a mini mass campaign by distributing PBO nets in 52 *shehias*. Based on funding available from (PMI and Global Fund) Zanzibar is expecting to have the universal coverage of PBO nets by December 2021. ZAMEP will use resources from Global Fund to support focal IRS or response in active foci areas. In CY 2022 and 2023 PMI will not support the targeted IRS in Zanzibar. PMI will continue to support ITN continuous distribution through ANC/EPI channels, entomological monitoring activities, and technical support/assistance in larval source management including interpersonal communication activities, which leverage the community platform to increase utilization of the PBO nets.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

2. HUMAN HEALTH

2.1. CASE MANAGEMENT

ZAMEP Objective

The case management goal of the ZAMEP Malaria Strategic Plan IV 2018–2023 is to achieve universal access to high-quality malaria diagnostic testing and treatment in all health facilities and the community. The target in Zanzibar is to ensure quality-assured diagnosis and appropriate case management in all health facilities and the community level to 100 percent by 2023.

ZAMEP Approach

The Zanzibar Malaria Diagnosis and Treatment Guidelines 2018 call for parasitological confirmation for all patients with signs or symptoms of malaria. Malaria microscopy and mRDT are the principal diagnostic tools used in the 169 public and 112 private health facilities. Microscopy is available at hospitals and larger health facilities and mRDTs are available in all public and most private health facilities.

Malaria microscopy quality assurance and quality control (QA/QC) were established in 2005, and by September 2019 expanded to 96 public and private health facilities (72 in Unguja and 37 in Pemba). ZAMEP collects slides from health facilities on a monthly basis, and 10 percent of negative and 100 percent of positive slides are reexamined in a blinded manner by the ZAMEP laboratory. In 2020, a total of 8,922 slides were reexamined, and microscopy testing sensitivity was 95.5 percent and specificity was 99.9 percent. Overall, 96.6 percent of positive slides were *Plasmodium falciparum*. In 2019 following recommendations from the Zanzibar Malaria Elimination Advisory Committee, ZAMEP began implementation of a process to confirm, speciate, and quantify malaria infections identified by combination mRDT at health facilities and the community (through active and reactive case detection) by microscopy. In 2020, positive mRDT were collected from 29 health facilities from three districts (Mjini, Magharibi, and Micheweni) for microscopy by ZAMEP. Establishment of the ZAMEP slide bank was finalized in 2016.

Malaria RDTs are being used in 169 public health facilities. ZAMEP maintains a system of quarterly mRDT QC, which documented 98.7 percent achievement of key quality indices in 2020. ZAMEP conducts quarterly mRDT supervisory visits to all public district hospitals and health centers and holds semiannual stakeholder meetings to provide feedback to the districts about both microscopy and mRDT performance. The ZAMEP target is to scale up malaria diagnosis QA/QC for private health facilities from 32 percent in 2016 to 100 percent by 2023.

ACTs were deployed in Zanzibar in 2003, and the current first-line treatment for uncomplicated malaria is artesunate-amodiaquine (ASAQ), with artesunate as the drug of choice for severe malaria. Serial ZAMEP assessments have shown that ACTs are widely available in health facilities. The Zanzibar Malaria Diagnosis and Treatment Guidelines 2018 include the WHO recommendation for the use of single low-dose (0.25 mg base/kg) primaquine for all patients with confirmed uncomplicated *P. falciparum* infection in areas pursuing elimination. Primaquine distribution began in October 2016, and by the end of 2017 all public health facilities were stocked. Starting in 2018, ZAMEP began to scale up availability of primaquine in 112 private health facilities, and currently is exploring options to monitor the stock and provision of primaquine. Private facilities are not linked to eLMIS.

The guidelines call for referral of patients with severe malaria from lower-level facilities to the nearest health center with ability to administer artesunate intravenously after first giving the patient an intramuscular injection of artesunate. Intramuscular artemether or quinine can be used as second-line drugs if artesunate is not available. Use of pre-referral rectal artesunate at peripheral health facilities is also permitted if injection is not available yet in practice does not occur as rectal artesunate is not procured by either the RGOZ or its partners.

Adopting lessons learned from the successes of the Malaria Services and Data Quality Improvement (MSDQI) process used in Mainland Tanzania, ZAMEP developed seven comprehensive tablet-based electronic MSDQI modules (checklists) to evaluate the quality of case management at health facilities and provide immediate onsite feedback for improvement and mentorship to HCWs. In addition to mRDT and microscopy QA/QC, the MSDQI process also focuses on improving the clinical skills of individual HCWs and adherence to established malaria diagnostic and treatment guidelines. In total, the MSDQI process includes modules for outpatient department, inpatient department, ANC, mRDT, microscopy, SM&E, and logistics and supply. MSDQI is intended to be implemented by district supervisors; facility baseline MSDQI assessments begin in early 2021 and should be completed by April 2021. The data collected during MSDQI health facility supervisory visits are summarized by a score and are automatically uploaded to and available in DHIS2.

PMI Objective in Support of ZAMEP

PMI supports all aspects of ZAMEP's case management approach.

PMI-Supported Recent Progress (FY 2020)

In 2020, 96 health facility laboratories were targeted and received malaria microscopy QA/QC supervision visits. A total of 8,922 slides were collected from health facilities for mMQAQC. In addition, 60 laboratorians were targeted; 40 received training on mMQAQC and also attended feedback meetings. An additional 380 HCWs were targeted and 100 received training on microscopy slide preparations for outpatient and inpatient departments at health facilities.

Malaria RDT QC supervision visits were conducted in 169 health facilities, 260 HCWs were targeted and received mRDT training and attended feedback meetings. Among 252 microscopy slides created from positive mRDT collected in 2020, the proportions of *Plasmodium* species by microscopy were *Pf* 85.3 percent, *Pm* 5.1 percent, mixed *Pf* and *Pm* 7.7 percent, and *Po* 1.9 percent. No *Pv* was reported.

With support from PMI, ZAMEP continued to distribute single low-dose primaquine in 112 private health facilities. The main challenges were the lack of consumption data and a mechanism to trigger requests from private facilities.

With support from PMI, the electronic application of the MSDQI checklists, including the electronic system used to manage the data and link it to DHIS2, and procurement of tablets were finalized in 2019. Following an initial MSDQI training and pilot in three health facilities, in 2020 ZAMEP conducted MSDQI in 28 health facilities in Kati District. Key findings were shortages of case management reference materials, especially in private facilities, inadequate knowledge on management of pregnant women with malaria, and inadequate knowledge on how to reconstitute artesunate injection. Through the MSDQI process, 75 HCWs received on-the-job malaria case management training.

PMI partners continued to support case management feedback meetings attended by ZAMEP, Chief Medical Officers, District Pharmacists, District Councils and Municipal Management Teams, and Council Malaria Surveillance Officers (CMSOs).

PMI partners developed guidelines for providing malaria case management services in the context of COVID-19; created, printed, and distributed 600 of these pocket guidelines to health facilities; and conducted training for 212 HCWs on the guidelines.

PMI-Supported Planned Activities (FY 2021 with currently available funds)

PMI will continue to support the maintenance of the microscopy and mRDT QA/QC systems in public as well as private facilities in Zanzibar as ZAMEP simultaneously transitions from the monthly (microscopy) or quarterly (mRDT) supportive supervision training for HCWs to the MSDQI checklists conducted at health facilities. PMI will support case management training and supervision as ZAMEP scales up the MSDQI process conducted at health facilities.

PMI will also support ZAMEP to continue microscopy training and capacity-building for all public laboratories in Zanzibar with invitations to participants in the private sector to expand the capacity of microscopy QA/QC to the private facilities in both Pemba and Unguja. PMI support for microscopy will include provision of the supplies needed to maintain the malaria slide bank in Pemba, and slide bank and reference laboratory at ZAMEP.

PMI will continue to provide guidance and support the training to expand the availability, use, and monitoring of primaquine in private health facilities.

PMI will support SBC activities to combat imported malaria cases by travelers, promote preventative and curative malaria-related behaviors during ACD activities, and promote prompt care-seeking upon onset of signs and symptoms of malaria.

PMI will support SBC activities during ACD response, which will engage and empower households with suspected malaria to take the steps necessary to protect the household, to seek care within 24 hours of onset of fever, and to ensure testing is conducted when there is a fever.

Key Goal

Improve access to and use of timely, quality, and well-documented malaria testing and treatment by providing facility-based health workers and CMSOs with training, supervision, and malaria commodities to provide quality, effective care.
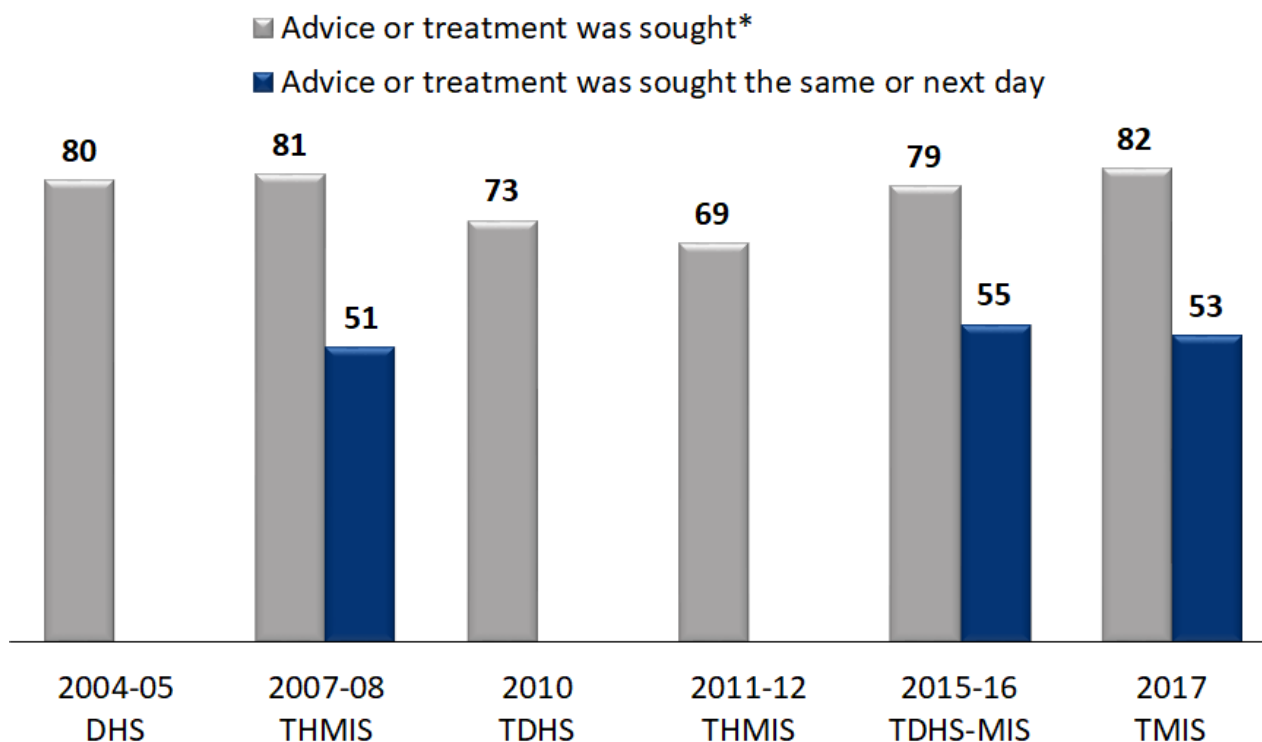
Key Question 1a

What is the status of care-seeking and/or access to care for children under five years of age with fever?

Despite a relative decrease in 2011–2012, care-seeking for children 6 to 59 months of age with fever has remained high, with care being sought for 8 in 10 children with fever (range 69 percent to 82 percent). However, prompt care (i.e., within 24 hours) is sought for just over half of febrile children 6 to 59 months of age (range 51 percent to 55 percent). This might be addressed programmatically with SBC efforts for prompt care-seeking.

Figure A-8. Trends in care-seeking for fever

This figure is a histogram showing the proportion of children 6 to 59 months of age with fever who sought advice or treatment the same or next day and in the two weeks before the DHS or MIS survey completed by caretakers of children 6 to 59 months.

*Note that, wherever possible, this indicator has been recalculated according to the newest definition, care or treatment from any source, excluding traditional practitioners.

Key Question 1b

What significant structural and/or behavioral challenges affect prompt care-seeking?

Zanzibar is progressing toward malaria elimination. To achieve the elimination goal, it is critical that all individuals promptly seek care and treatment at the first sign of a fever, even as malaria prevalence remains low and people become less accustomed to malaria occurring in the community. It is also crucial that all suspected cases are tested and confirmed to have malaria infection prior to obtaining treatment to ensure the provision and completion of the full course of appropriate treatment to prevent resurgence and onward transmission. PMI programming will focus on SBC activities targeting both individuals and health providers to reinforce prompt, appropriate care-seeking, as well as adherence to clinical protocols. Furthermore, PMI will incorporate SBC activities targeting travelers, both visitors to Zanzibar and Zanzibaris returning from areas where malaria is endemic, such as Mainland Tanzania, to reinforce adoption of malaria prevention behaviors.

Please refer to Section 3.4 for information on how SBC interventions will be directed to address the challenges identified below.

Supporting Data

Table A-11. Structural and/or behavioral challenges affect prompt care-seeking

Facilitator	Type of Factor	Data Source	Evidence
Knowledge about malaria signs and symptoms	Internal	Zanzibar Malaria KAPB Study, 2017	85% of respondents in Zanzibar know that malaria is caused by mosquito bites.
Attitude toward service providers and health facilities	Internal	Zanzibar Malaria KAPB Study, 2017	65% of respondents perceived that a health provider is the best person to talk to when a child has malaria.
Barrier	Type of Factor	Data Source	Evidence
Low risk perception about threat of malaria	Internal	Zanzibar Malaria KAPB Study, 2017	Only 40% of respondents indicated they worried that every case of malaria could potentially lead to death.
Low knowledge of malaria treatment	Internal	Zanzibar Malaria KAPB Study, 2017	Only 27% of respondents were aware that there are medicines that can be used to treat malaria.

Key Question 2a

What proportion of patients are being tested and appropriately treated for malaria?

According to household survey data, although 82 percent sought treatment and 52 percent did so on the same or next day after onset of fever, only 31 percent of children 6 to 59 months of age with fever had blood taken from a finger or heel, a proxy indicator for malaria testing in the two weeks before the 2017 MIS survey. This indicates a need for support for provider training and supervision around adherence to universal diagnostic confirmation.

Figure A-9. Trends in diagnosis of fever among children 6 to 59 months of age

This figure is a histogram that shows the proportion of children 6 to 59 months with fever who received a blood stick for testing in the two weeks before the THMIS 2011–2012, DHS-MIS 2015–2016, and MIS 2017.

Percent who had blood taken from a finger or heel for testing

■ 2011-12 THMIS   ■ 2015-16 TDHS-MIS   ■ 2017 TMIS
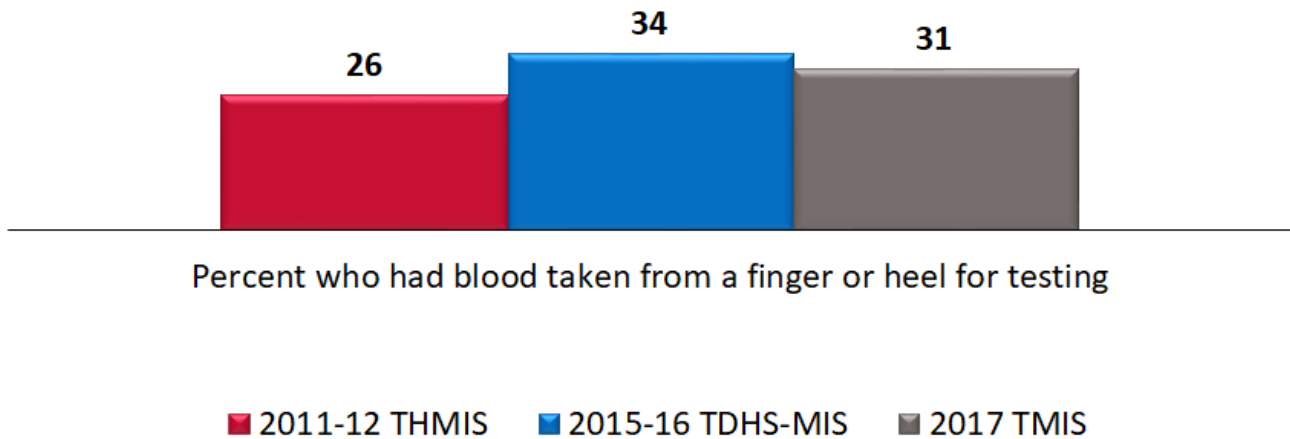
Key Question 2b

What significant structural and behavioral challenges affect testing and treatment practices among providers?

Health provider adherence to the malaria treatment protocol is critical in improving malaria case management. PMI programming will focus on behavior change interventions such as focused job aids and tools to address health providers attitudes and practices that can be integrated into the existing national SBC platform for health facilities. PMI programming might also support efforts to increase the understanding of the role that behavioral factors play in the testing and treatment practices in Zanzibar, and to address those factors through continued training, mentorship, and supportive supervision.

Please refer to Section 3.4 for information on how SBC interventions will be directed to address the challenges identified below.

Supporting Data

Table A-12. Challenges affect testing and treatment practices among providers

Facilitator	Type of Factor	Data Source	Evidence
Accessibility of malaria treatment commodities	Environmental	ZAMEP Project Reports	Most of the public health facilities in Zanzibar have not experienced a stockout of malaria medicines in the past 12 months.
Barrier	Type of Factor	Data Source	Evidence
Some providers don't follow diagnosis and treatment guidelines	Environmental	ZAMEP Supportive Supervision Reports	During supportive supervision, ZAMEP observed some private health facilities prescribed antimalarial to patients with malaria negative test results.
Lack of adequate systems and practices to ensure the delivery of quality health services	Environmental	PMI partner and ZAMEP Project Reports	Project data suggests there is a lack of quality assurance systems. (ZAMEP began to scale up MSDQI to monitor and improve the quality of malaria services at facilities in March 2021.)

Key Question 3

What is the current and planned support for case management at health facilities and in the communities by CHWs?

PMI supports ZAMEP to cover all public health facilities across both islands of Zanzibar. PMI supports improvement of malaria case management with an emphasis on service delivery with other major health priorities in all public health facilities in Zanzibar. PMI funds will be used to support the continued implementation and scale-up of the MSDQI process including the electronic tablet-based system for recording, reporting, and using data.

The main activity in the community is SBC on awareness of malaria and early health-seeking behavior. However, Zanzibar does implement a malaria reactive case detection (RCD) system, whereby CMSOs provide diagnosis by mRDT and treatment in community households. Ensuring the quality of case management by CMSOs is addressed through their assigned health facility. For a description of and PMI support for the RCD system, see the SM&E section.

Key Question 4

What is the estimated need for RDTs during calendar years 2021–2023? Are there any projected RDT gaps based on anticipated partner contributions compared to estimated needs?

Zanzibar procures combination mRDTs. PMI does not procure combination mRDTs. In CY 2023, ZAMEP estimates a gap of 179,990 mRDTs. As in previous years, the Global Fund will supply the full mRDT need for Zanzibar.

Supporting Data

Table A-13. RDT Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	1,717,608	1,762,989	1,807,581
Population at risk for malaria	1,717,608	1,762,989	1,807,581
PMI-targeted at-risk population	1,717,608	1,762,989	1,807,581
RDT Needs			
Total number of projected fever cases	422,024	428,160	436,965
Percent of fever cases tested with an RDT	85%	85%	85%
RDT Needs (tests)	**358,720**	**363,936**	**371,420**
Needs Estimated based on HMIS Data			
Partner Contributions (tests)			
RDTs from Government			
RDTs from Global Fund	358,720	363,936	371,420
RDTs from other donors			
RDTs planned with PMI funding			
Total RDT Contributions per Calendar Year	*358,720*	*363,936*	*371,420*
Stock Balance (tests)			
Beginning Balance	5,720	5,720	5,720
- Product Need	358,720	363,936	371,420
+ Total Contributions (received/expected)	358,720	363,936	371,420
Ending Balance	5,720	5,720	5,720
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	179,360	181,968	185,710
Total Surplus (Gap)	*(173,640)*	*(176,248)*	*(179,990)*

Key Question 5

What is the estimated need for ACTs during calendar years 2021–2023? Are there any projected ACT gaps?

The RGOZ will procure the full quantities of ACT for Zanzibar. PMI has not procured ACTs for Zanzibar for several years.

In CY 2023, ZAMEP estimates a gap of 5,149 ACTs. The RGOZ is committed to procuring additional ACTs if needed. PMI will monitor ACT stock and procure ACTs if a gap still exists.

Supporting Data

Table A-14. ACT Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	1,717,608	1,762,989	1,807,581
Population at risk for malaria	1,717,608	1,762,989	1,807,581
PMI-targeted at-risk population	1,717,608	1,762,989	1,807,581
ACT Needs			
Total projected number of malaria cases	8,041	6,880	5,890
Total ACT Needs (treatments)	*9,247*	*7,912*	*6,774*
Needs Estimated based on Other (specify in comments)			
Partner Contributions (treatments)			
ACTs from Government	*6,808*	*5,839*	*5,012*
ACTs from Global Fund			
ACTs from other donors *[specify donor]*			
ACTs planned with PMI funding			
Total ACTs Contributions per Calendar Year	*6,808*	*5,839*	*5,012*
Stock Balance (treatments)			
Beginning Balance	4,151	1,712	0
- Product Need	9,247	7,912	6,774
+ Total Contributions (received/expected)	6,808	5,839	5,012
Ending Balance	1,712	-361	-1,762
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	4,624	3,956	3,387
Total Surplus (Gap)	*(2,912)*	*(4,317)*	*(5,149)*

Key Question 6

What is the estimated need for definitive treatment and pre-referral treatment for severe malaria during calendar years 2021–2023? Are there any anticipated gaps?

In CY 2023, ZAMEP estimates a gap of 635 vials of injectable artesunate. The RGOZ will procure the full quantity of injectable artesunate needed for Zanzibar. Injectable artemether is not routinely used at public health facilities in Zanzibar. Use of pre-referral rectal artesunate at peripheral health facilities is permitted if injection is not available yet in practice does not occur because rectal artesunate is not procured by either the RGOZ or its partners.

Table A-15. Inj. Artesunate Gap Analysis Table

Calendar Year	2021	2022	2023
Injectable Artesunate Needs			
Projected number of severe cases	835	1,004	1,205
Projected number of severe cases among children	42	50	60
Average number of vials required for severe cases among children	2	2	2
Projected number of severe cases among adults	793	954	1,145
Average number of vials required for severe cases among adults	4	4	4
Total Injectable Artesunate Needs (vials)	3,732	4,488	5,386
Needs Estimated based on HMIS Data			
Partner Contributions (vials)			
Injectable artesunate from Government	3,732	4,488	5,386
Injectable artesunate from Global Fund			
Injectable artesunate from other donors [specify donor]			
Injectable artesunate planned with PMI funding			
Total Injectable Artesunate Contributions per Calendar Year	*3,732*	*4,488*	*5,386*
Stock Balance (vials)			
Beginning Balance	2,059	2,059	2,059
- Product Need	3,732	4,488	5,386
+ Total Contributions (received/expected)	3,732	4,488	5,386
Ending Balance	2,059	2,059	2,058
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	1,866	2,244	2,693
Total Surplus (Gap)	*192*	*(185)*	*(635)*

Key Question 7

What is the estimated need for any other standard antimalarial drug used in the country (e.g., primaquine for *P. vivax*) during calendar years 2021–2023? Are there any anticipated gaps?

In Zanzibar, treatment for uncomplicated malaria includes single low-dose primaquine. The RGOZ will procure the full quantities of single low-dose primaquine needs for Zanzibar. ZAMEP estimates the need for 9,416 packs/100 of primaquine 15 mg and 650 blisters/14 of primaquine 7.5 mg for each year during 2021–2023.

Supporting Data

Key Question 8

Are first-line ACTs effective and monitored regularly?

ZAMEP conducted a therapeutic efficacy study (TES) in 2017, supported by the Global Fund, Karolinska Institute, Uppsala University, and Zanzibar MOH, with an overall aim to assess the therapeutic efficacy and safety of ASAQ combined with single low-dose of primaquine (0.25 mg/kg) for the treatment of uncomplicated *P. falciparum* malaria patients in Zanzibar. Polymerase chain reaction (PCR)-corrected cure rates were assessed by genotype analysis of the following *P. falciparum* genes: the merozoite surface protein 1 (msp1) and 2 (msp2), and the glutamine-rich protein (glurp) (WHO 2008). The genotypic profiles of parasite strains at enrollment (day 0) and at day of failure were compared in a stepwise manner to distinguish recrudescence from reinfection. A total of 146 patients were enrolled. Molecular findings showed no artemisinin resistance–associated genotypes and major increases in genotypes associated with high sensitivity/efficacy for amodiaquine compared to before ASAQ was introduced in Zanzibar.

There currently is no plan to conduct additional TES in Zanzibar. The Zanzibar Malaria Elimination Advisory Committee report 2018 recommended ZAMEP regularly review TES results from the mainland. Refer to the description and results of TES conducted in Mainland Tanzania.

Supporting Data

Table A-16. Recently completed antimalarial therapeutic efficacy studies

Year	Sites	PMI Funded Y/N	Treatment Arms	PCR-Corrected ACPR>90%	Location Molecular Resistance Work Completed or Planned
2017	Bububu, Micheweni, and Uzini	No	Amodiaquine + artesunate (ASAQ) + primaquine	Yes	Karolinska Institute

ACPR: adequate clinical and parasitological response

Key Question 9

Are there other areas (e.g., lab strengthening, private sector support, etc.) that should be considered for PMI-support?

N/A

Supporting Data

N/A

Conclusions for Case Management Investments

PMI will support improvement of malaria case management with an emphasis on service delivery in all public health facilities in Zanzibar. PMI funds will be used to support the continued implementation and scale-up of the MSDQI package including the electronic tablet-based system for recording, reporting, and using data. PMI will continue to support training for and the maintenance of the microscopy and mRDT QA/QC systems in public as well as private facilities in Zanzibar as ZAMEP simultaneously transitions supportive supervision training for HCWs to the MSDQI process. PMI will support SBC activities to combat imported malaria cases by travelers, promote preventative and curative malaria-related behaviors during ACD activities, and promote prompt care-

seeking upon onset of signs and symptoms of malaria. PMI will support the procurement of ACTs if gaps are identified.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

2.2. DRUG-BASED PREVENTION

ZAMEP Objective

Targets in the Zanzibar Malaria Strategic Plan IV 2018–2022/23 ZAMEP are to increase the use of long-lasting ITNs among pregnant women from 68 percent in 2016 to 95 percent in 2022–2023 through facility-level distribution of ITNs to pregnant women at their first ANC visit.

A description of ZAMEP and PMI's objectives, approaches, and progress on Zanzibar's case investigation and RCD program can be found in the SME section of the MOP.

ZAMEP Approach

- Strategies for prevention of malaria in pregnancy are integrated in the overall antenatal care (ANC) package for maternal health. They include the provision of long-lasting insecticidal nets at the first contact, provision of prompt testing of suspected cases and treatment of malaria positive cases, and health education on prevention and prompt treatment-seeking behavior.
- Zanzibar stopped the provision of IPTp in 2014 following many years of very low malaria prevalence.

PMI Objective in Support of ZAMEP

PMI supports the WHO recommended approach to reduce the burden of malaria infection among pregnant women: insecticide-treated nets and effective case management of malaria illness and anemia.

ZAMEP no longer implements intermittent preventive treatment for pregnant women (IPTp) and ended the intermittent screen and treat strategy in August 2016. ZAMEP has reviewed the diagnostics and treatment guidelines to include a chapter on MIP to focus on strengthening malaria case management for pregnant women including screening for symptoms, timely diagnosis and treatment, and effective referral.

PMI-Supported Recent Progress (FY 2020)

- PMI continued support of ITN continuous distribution through EPI and ANC clinics (more details in ITN section). PMI also supported ZAMEP to finalize the diagnostics and treatment guidelines to include a MIP chapter.
- PMI supported an ongoing process of developing a quality improvement tool, based on the MSDQI described in the case management section to encourage supervisors and providers to monitor the quality of malaria services, including MIP. The MSDQI process is being adapted for Zanzibar and will be used to observe providers' diagnosis, treatment, and ANC practices. Facilities will be selected as part of supportive supervision, with priority given to the low performers identified from previous rounds of supervision data. More information on MSDQI can be found in the case management section.

PMI-Supported Planned Activities (FY 2021 with currently available funds)

- PMI will support the rollout of the revised national case management guidelines that include an MIP chapter. PMI will continue support for the procurement and provision of long-lasting ITNs to pregnant women through continuous distribution at ANC (budget and more details in ITN section), and continue support for SBC to increase ITN use and ANC attendance (see SBC section).
- PMI supported an ongoing process of developing a quality improvement tool, based on the MSDQI described in the case management section to encourage supervisors and providers to monitor the quality of malaria services, including MIP. The MSDQI process is being adapted for Zanzibar and will be used to observe providers' diagnosis, treatment, and ANC practices. Facilities will be selected as part of supportive supervision, with priority given to the low performers identified from previous rounds of supervision data (see Case Management section).

Please see FY 2022 MOP budget tables for a detailed list of proposed activities with FY 2022 funding.

2.2.1. MALARIA IN PREGNANCY (MIP)

Key Goal

Support the national strategy for MIP, which includes provision of ITNs at the first antenatal care (ANC) visit and effective case management of malaria illness and anemia. ZAMEP no longer implements IPTp and ended the intermittent screen and treat strategy in August 2016. ZAMEP has reviewed the diagnostics and treatment guidelines to include a chapter on MIP to focus on strengthening malaria case management for pregnant women including screening for symptoms, timely diagnosis and treatment, and effective referral.

Key Question 1a

What proportion of pregnant women are accessing ANC early and frequently (as recommended by national and/or WHO strategies) during their pregnancy?

Supporting Data

Figure A-10. Trends in ANC coverage
Women 15 to 49 years of age with a live birth in the five years before the survey (most recent birth)

Skilled provider includes doctor/assistant medical officer (AMO), clinical officer, assistant clinical officer, nurse/midwife, assistant nurse, and maternal and child health (MCH) aide.

The proportion of women receiving at least one ANC visit from a skilled provider is very high, yet only half make four or more visits, and only 15 percent make their first visit during the first trimester, indicating significant gaps in knowledge about the importance of, or access, to early and frequent ANC.

Key Question 1b

Are there important health system and/or behavioral barriers to ANC attendance at health facilities?

In Zanzibar, pregnant women face some barriers to ANC attendance, particularly in attending early ANC before 12 weeks. Increasing early ANC attendance is important especially for ITN distribution and detection of malaria during pregnancy. PMI will continue working with ZAMEP and the Maternal and Child health section of the Ministry of Health to support SBC initiatives in Zanzibar, especially mobilizing pregnant women to attend ANC as early as possible. This will be done through an integrated SBC campaign that promotes the benefits of early ANC attendance to mothers and their unborn babies. The SBC activities will be positioned to create community pressure and support for pregnant women to attend ANC. This will be done through radio and mass media (in interactive and entertaining ways), as well as community-based interventions such as *shehia* health committees.

For additional information on key barriers and facilitators to ANC attendance, refer to the MIP section of the Mainland Tanzania MOP.

Figure A-11. Trends of ANC attendance
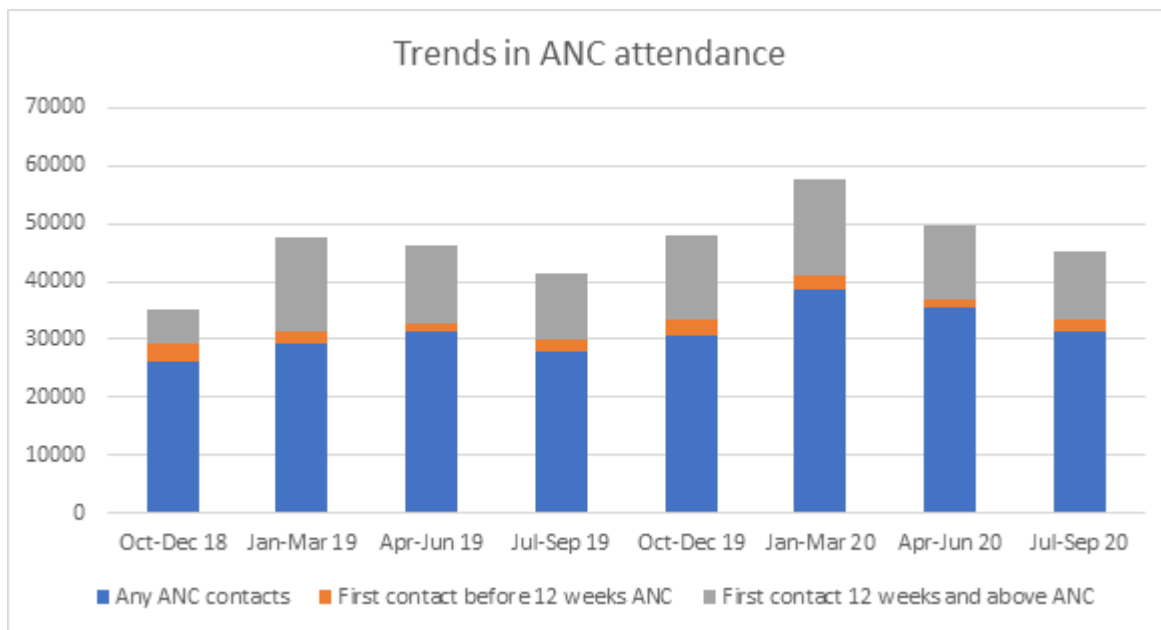
In March 2020, COVID-19 was declared in Tanzania, and a slight decline in the number of pregnant women attending ANC was observed from April to June 2020 and July to September 2020; however, the number is higher than April–June 2019 and July–September 2019.

Zanzibar has adopted the 2016 WHO ANC guidelines systematically but gradually and has finalized the guidelines in 2021. The ANC package comprises the national guidelines covering all five WHO categories around nutrition, maternal and fetal assessment, preventive measures, dealing with common physiological symptoms, and health system strengthening for quality care. Other core components are guides for trainers and trainees.

Supporting Data

Please refer to Section 3.4 for information on how SBC interventions will be directed to address the challenges identified above.

Table A-17. Key factors affecting ANC attendance

Facilitator	Type of Factor	Data Source	Evidence
Perceived confidence to attend ANC	Internal	USAID Tulonge Afya Annual Sentinel Survey 2020	A sentinel survey from 2020 indicates that 76% of pregnant women feel confident to attend ANC early and at least four times, compared with 72% in 2019.
Partners Support	Social	USAID Tulonge Afya Annual Sentinel Survey 2020	An increase in the number of partners who have positive attitudes toward provision of support (accompaniment and provision of resources) to their pregnant partners to attend ANC increased slightly from 61% in 2019 to 64% in 2020. This may also contribute to the increase in early ANC attendance noted above.
Barrier	Type of Factor	Data Source	Evidence
Women are often unable to participate in household decision-making	Social	USAID Tulonge Afya Maternal, Newborn, and Child Health (MNCH) Audience Insights: Summary Report 2018	Most surveyed women highlighted that the decision of pregnant women to attend ANC entirely depends on their husband or male partner and the monetary support to access health services.
Mistreatment of pregnant patients by providers	Structural	USAID Tulonge Afya MNCH Audience Insights: Summary Report 2018	During a focus group discussion some women reported mistreatment of pregnant patients (neglect, extortion, and verbal abuse) by providers.

While achievement of ANC4 has seen notable improvements from 80.5 percent in 2019 to 90.1 percent in 2020, there remain gaps in achievement of early ANC visits which indicates there is an important opportunity to increase uptake of this behavior. More is needed to build pregnancy women's confidence, increase ability to act and encourage partners support in ANC accompaniment and provision of resources to increase early ANC.

Key Question 2

What proportion of pregnant women are receiving the recommended doses of IPTp?

Supporting Data

N/A – According to Zanzibar guidelines, provision of the IPTp is not among the preventive strategies.

Key Question 3a

What is the gap between ANC attendance and IPTp uptake (i.e., missed opportunities for giving IPTp at ANC)?

N/A – According to Zanzibar guidelines, provision of the IPTp is not among the preventive strategies.

Supporting Data

N/A – According to Zanzibar guidelines, provision of the IPTp is not among the preventive strategies.

Key Question 3b

What significant health system and/or behavioral challenges affect provider delivery of MIP services (e.g., IPTp and ITN distribution at ANC)?

Pregnant women behaviors toward malaria interventions are critical for the uptake of MIP services including ITNs and case management. PMI will continue supporting Zanzibar to implement behavior change activities including prompt care-seeking for symptoms of malaria, use of ITNs, and addressing gender barriers to accessing health services. For more details, please refer to SBC, Case Management, and ITN sections.

Supporting Data

Please refer to Section 3.4 for information on how SBC interventions will be directed to address the challenges identified above.

Key Question 4

Does the national ANC program or health information system collect data and track the proportion of pregnant women with fever, those tested for malaria, those found to have malaria infection, and those who are treated?

Figure A-12. Overall malaria testing and positivity rate in ANC
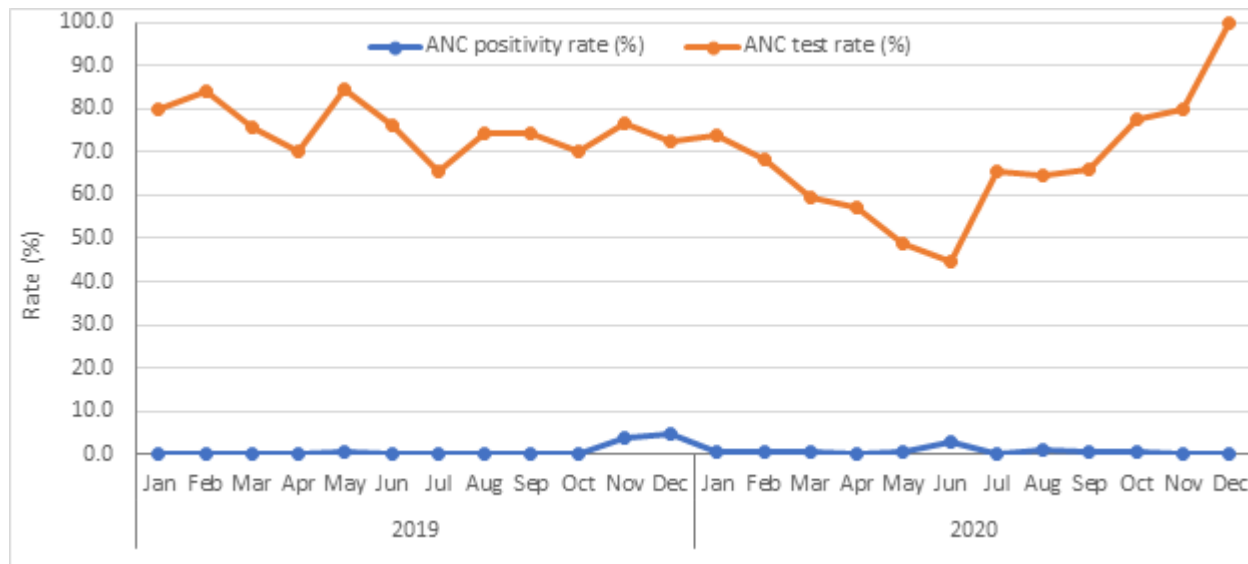
No data are available; self-reported or measured fever is not an indicator captured by HMIS. However, the above graphs shows malaria testing rates among pregnant women have increased over time, and this could be attributed to the improved availability of malaria commodities and adherence to diagnostic and treatment guidelines.

Supporting Data

See above.

Key Question 5

What is the estimated need for sulfadoxine-pyrimethamine (SP) during 2021–2023? Are there any anticipated SP gaps? Are there gaps in other IPTp commodities?

N/A – According to Zanzibar guidelines, provision of the IPTp is not among the preventive strategies.

Supporting Data

N/A – According to Zanzibar guidelines, provision of the IPTp is not among the preventive strategies.

Table A-18. SP Gap Analysis Table

Calendar Year	2021	2022	2023
Total Country Population	1,717,608	1,762,989	1,807,581
Total Population at Risk for Malaria	1,717,608	1,762,989	1,807,581
PMI Targeted at Risk Population	1,717,608	1,762,989	1,807,581
SP Needs			
Total Number of Pregnant Women	68704	70520	72303
Proportion of women expected to attend ANC1 at 13 weeks or greater	100%	100%	100%
Proportion of women expected to attend ANC2			
Proportion of women expected to attend ANC3			
Proportion of women expected to attend ANC4			
Total SP Needs (treatments)	*68704.32*	*70519.56*	*72303.24*
Select Data Source			
Partner Contributions (treatments)			
SP from Government			
SP from Global Fund			
SP from Other Donors			
SP planned with PMI funding			
Total SP Contributions per Calendar Year	*0*	*0*	*0*
Stock Balance (treatments)			
Beginning balance		0	0
- Product Need	68,704	70,520	72,303
+ Total Contributions (Received/expected)	0	0	0
Ending Balance	-68,704	-70,520	-72,303
Desired End of Year Stock (months of stock)			
Desired End of Year Stock (quantities)	0	0	0
Total Surplus (Gap)	*(68,704)*	*(70,520)*	*(72,303)*

Conclusions for MIP Investments

Funding for MIP is included in case management, ITN, and SBC budgets. PMI will continue supporting ITN distribution for pregnant women attending ANC and provision of prompt case management.

- PMI will continue to support MIP efforts in Zanzibar including ANC supervisory visits by ministry staff using the MSDQI process.
- PMI will support the rollout and orientation of the revised national case management guidelines which include a MIP chapter.
- PMI will continue support for the procurement and provision of long-lasting ITNs to pregnant women through continuous distribution at ANC.
- PMI will support SBC initiatives focusing on preventing and treating MIP.

Please see FY 2022 MOP budget tables for a detailed list of proposed activities with FY 2022 funding.

2.2.2. SEASONAL MALARIA CHEMOPREVENTION (SMC)

SMC is not a recommended intervention for Zanzibar.

2.2.3. ADDITIONAL DRUG-BASED PREVENTIVE STRATEGIES

Country Goal

Zanzibar prioritizes malaria surveillance capacity to actively investigate and classify 100 percent of confirmed malaria cases. Zanzibar implemented a Malaria Case Notification system (MCN) in 2011. This system requires that the Council Malaria Surveillance Officers (CMSOs) follow every case diagnosed at a facility to the household level and tests all household members. In addition, the CMSOs take the coordinates of each household and collect sufficient information on cases to classify foci as active, non-active, or potential. The goal is to follow up every case to the household level within 24 hours of notification of a confirmed case of malaria. In 2014, ZAMEP updated its case management guidelines to include a single low-dose primaquine treatment to reduce transmission, a policy that was implemented beginning in 2016. To assist Zanzibar in its efforts to eliminate malaria, PMI has supported ZAMEP to organize and convene a Zanzibar Malaria Elimination Advisory Committee, comprised of international and local malaria experts. This independent group has met regularly beginning in 2018 to review progress and provide guidance to ZAMEP.

PMI Goal

Support the national strategy for pre-elimination or elimination addressing relevant geographic areas in accordance with WHO recommendations.

PMI-Supported Recent Progress (FY 2020)

For a description of proactive activities recently supported by PMI, refer to the Surveillance, Monitoring, and Evaluation section.

PMI-Supported Planned Activities (FY 2021 with currently available funds)

PMI currently provides support to all aspects of the ZAMEP strategy across all geographic areas of both islands, Unguja and Pemba.

PMI supports the ZAMEP strategy to identify, investigate, and classify all cases of malaria utilizing the passive and active (reactive) surveillance systems and affiliated electronic tools in Zanzibar.

Key Question 1

What specific drug-based preventive or proactive strategies are directed toward pre-elimination and/or elimination in the near term? Which of these merit PMI support for FY 2022 funding with consideration of existing or planned national or other partner funding?

For a description of PMI planned support for proactive activities, refer to The Surveillance, Monitoring, and Evaluation section.

Supporting Data

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

Conclusions for Other Preventive Drug-Use Investments

To improve ZAMEP's approach to SM&E for malaria elimination, PMI will support activities to strengthen malaria case surveillance and RCD, including the data collection and management systems that enables the identification of new cases of malaria and trigger investigation and response measures. PMI will continue to support and transition the use of the malaria early epidemic detection system (MEEDS), the malaria case notification (MCN) system, and HMIS/DHIS2.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

3. CROSS-CUTTING AND OTHER HEALTH SYSTEMS

3.1. SUPPLY CHAIN

ZAMEP Objective

ZAMEP's 2018–2023 Strategic Plan IV is to eliminate malaria by 2023 by providing quality, equitable, affordable, cost-effective, and sustainable antimalarial interventions in collaboration with all stakeholders at all levels of implementation for the benefit of the general population.

The ZAMEP objectives includes ensuring quality-assured diagnosis and appropriate case management in all health facilities and at the community level to 100 percent by 2023; ensuring accurate quantification, timely delivery, and routine monitoring and distribution of commodities; and increasing appropriate vector control measures to the population at risk of malaria to 100 percent by 2023 (including availability of ITNs).

ZAMEP Approach

To improve continuous accessibility to diagnostics and medicines, the supply chain and logistics system will be strengthened, from quantification and procurement process up to service delivery points.

Specifically, the ZAMEP approach will include the following:

- Ensure malaria commodities are procured, stored, and distributed to all health facilities.
- Ensure accurate quantification, forecasting, and efficient procurement of the commodities; good storage; and timely distribution to all health facilities.
- Accessibility and availability of malaria commodities data for decision-making will be consolidated and used through the existing electronic platforms DHIS2 and the Zanzibar Integrated Logistics System (ILS, through the eLMIS) and regular stock verification at the zonal CMS level.

PMI Objective in Support of ZAMEP

PMI will support ZAMEP to collect consumption and logistics data needed for annual quantification and procurement planning, strengthen the ILS that manages antimalarials and mRDTs to improve data quality, and strengthen the transitioned Logistics Management Unit (LMU) capacity in Zanzibar.

PMI-Supported Recent Progress (FY 2020)

- Quantification and supply chain analyses: PMI funding provided TA on quantification of all malaria commodities managed by the ZAMEP.
- Enhanced data security and visibility of ITNs at *Chandarua Kliniki*: PMI partners revived the *Chandarua Kliniki* dashboard in Zanzibar (collaborated with HMIS, ZAMEP, and LMU). This tool is used to manage ITNs at all levels. The support included orientation of high-level officials from the MOH, programs on the revived *Chandarua Kliniki,* and training of 169 participants that included Central Medical Stores (CMS) staff, health facility workers, district malaria focal persons, HMIS district coordinators, district managers, national program coordinators, and program managers.

Figure A-13. Screenshot of ITN accountability dashboard tracking bed nets issued during ANC visit obtained
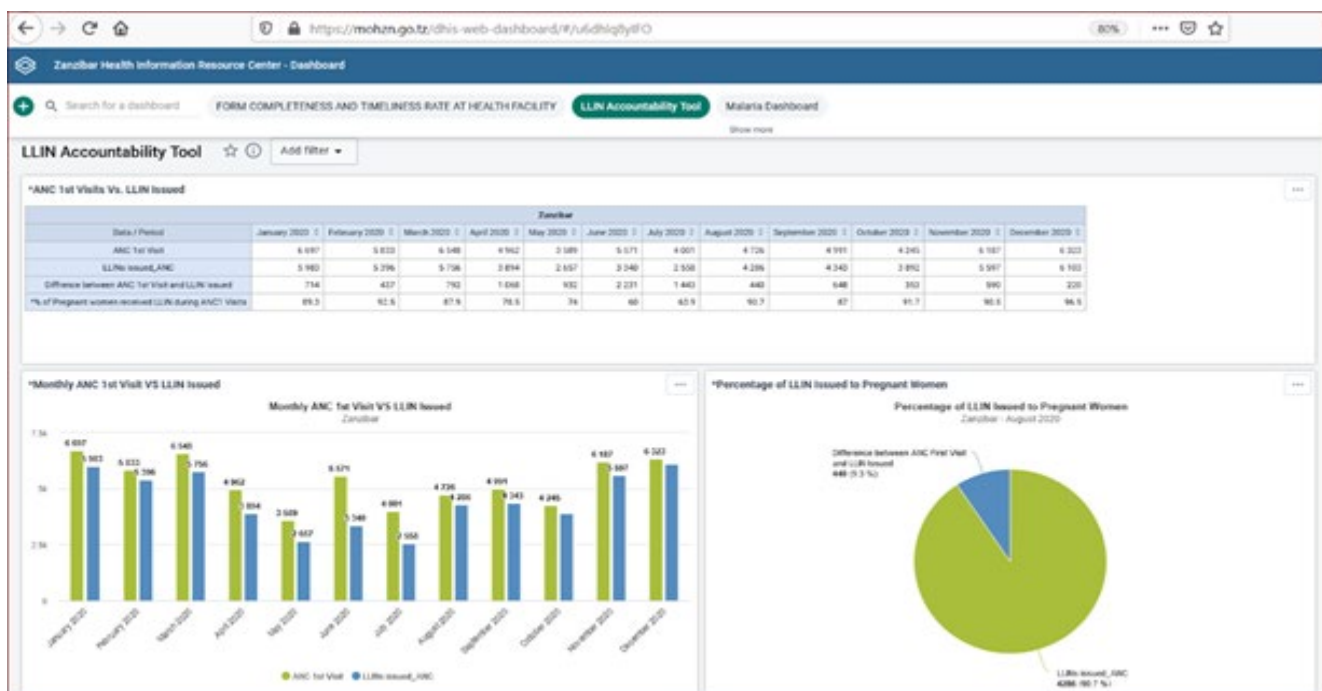
from the revived Chandarua Kliniki showing data up to December 2020)

- Analyzed, tracked, and discussed distribution issues of ITNs with key stakeholders including CMS. For example, the period July to September 2020 showed that most health facilities from both Unguja and Pemba were adequately stocked with ITNs with an exception of 6 percent and 5 percent of health facilities from Unguja and Pemba, respectively, which had a stockout.

- PMI supported analysis of the performance of the supply chain system and identified performance issues that need corrective actions (e.g., improve forecast accuracy of malaria commodities, regularly monitor pipeline data, update procurement plans, and regularly monitor ITN distribution data).
- PMI funds also supported Zanzibar MOH to review the Zanzibar Supply Chain Action Plan, which defines key supply chain interventions.
- PMI supported revision of the ILS, which includes malaria commodities to support monthly distribution and monthly reporting by last mile health facilities.
- Collaborated with key stakeholders to improve ITN availability by participating and sharing supply chain information and created awareness in various task forces/forums/workshops such as ZAMEP and Zanzibar Joint Performance Planning Meetings.

PMI-Supported Planned Activities (FY 2021 with currently available funds)

- Support quantification of malaria commodities in Zanzibar.
- Regularly monitor supplies and risks related to availability of malaria commodities.
- Conduct in-depth analysis of supply chain performance.
- Provide TA and build capacity and ownership of the quantification process by counterparts.
- Track availability of ITNs, conduct quarterly performance based on set indicators and build capacity to stakeholders.
- Facilitate a holistic supply chain review with MOH in Zanzibar to inform decision-making and policy implementation, and recommend key areas within the country's supply chain for improvement.

Key Goal

Ensure continual availability of quality products needed for malaria control and elimination (ACTs, mRDTs, SP, Art. Inj., and ITNs) at health facilities and community level.

Key Question 1

Has the central level (or subcentral level, if appropriate) been stocked according to plan for ACTs, mRDTs, SP, and Art. Inj. over the last year (2020)? If not, have they been under, over, or stocked out?

- CMS keeps limited stocks centrally; there are few malaria cases in Zanzibar and consignments arriving at CMS are sent directly to health facilities. Therefore, although stocks were generally not between minimum and maximum over the past year at CMS, facilities were generally well stocked.
- Artesunate 60 mg injection, used for severe cases of malaria, was above maximum for most of the year. This might be due to few severe malaria cases at health facilities and thus facilities are not requesting resupply.
- PMI will continue to support ZAMEP in pipeline monitoring and updating, highlighting required shipments or changes to existing shipments to ensure the stocks are maintained between minimum and maximum.

Key Question 2

What are the trends in service delivery point stockout rates for ACTs (including ability to treat), mRDTs, Art. Inj., and SP over the last year (if tracked)? Is there a seasonal or geographic difference in stockout rates?

- Overall, malaria commodities were in stock at facilities over the past year, and the target stockout rate (≤5 percent) was met.
- For two quarters, mRDT supply was challenging but stabilized by the end of the year.
- Supply at CMS is not reflective of availability at health facilities. This is due to immediate shipment of consignments to facilities after arrival at CMS.
- PMI will continue to collaborate with ZAMEP and CMS through PMI's supply chain TA partner to ensure stock levels are within maximum/minimum policy levels, and will continue to support monitoring of stock availability at CMS through regular quantifications reviews, pipeline monitoring, and conducting joint supportive supervision.

Key Question 3

What is the difference between quantities for ACTs consumed and malaria cases, and mRDTs consumed and numbers tested? What is driving any differences seen?

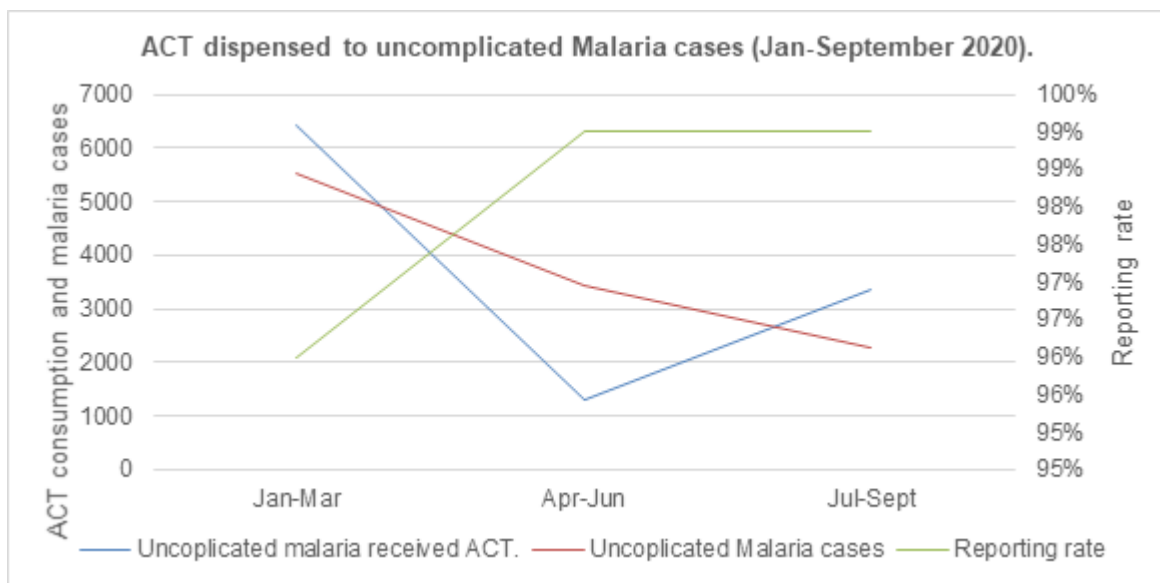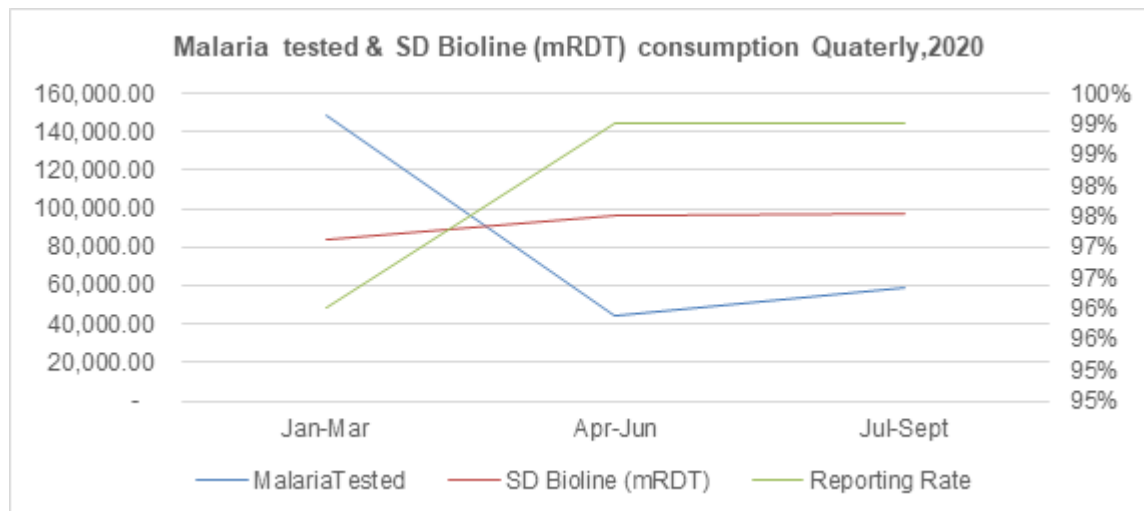## Supporting Data

Figure A-14. ACTs consumed and malaria

ACT dispensed to uncomplicated Malaria cases (Jan-September 2020).

Figure A-15. mRDTs consumed and numbers tested

Malaria tested & SD Bioline (mRDT) consumption Quaterly, 2020

- Data above are from DHIS2. Uncomplicated cases that received ACT closely match uncomplicated malaria cases, except for the April–June quarter, when more uncomplicated malaria cases were reported than uncomplicated cases receiving ACTs. PMI is aware of this discrepancy and will continue to work to find out root causes.
- There is a mixed picture on malaria tested and malaria mRDT usage as reported by DHIS2 and eLMIS over the three quarters. Data shows that the quantities of mRDTs used are higher than tests conducted, except for the January–March quarter. The reason might be data quality issues from eLMIS and DHIS2 where these data were pulled. The eLMIS system considers out-of-stock days and adjusts accordingly, taking into account that there was a shortage of mRDT. This is not the case on DHIS2, where if an item is not available, tests cannot be done. Also eLMIS considers proxy consumption data. The difference might also be attributed by some of the hospitals using mRDT in emergencies and wards that are not captured in DHIS2
- The differences in the above two figures may be attributed to data quality issues. A verification of data at point of generation through more supportive supervision may help to determine the key issue and identify a solution.
- PMI will continue to support and strengthen systems that will improve data visibility.

Key Question 4

To what extent does a functional LMIS provide visibility into timely and quality logistics data from various levels of the system? To what extent is commodity data visibility dependent on surveys or supervisory data rather than routine data reported by an LMIS?

- The LMIS provides visibility of logistics data, down to the service delivery point level. Reporting rates are high, and have improved over time.
- PMI efforts will be directed to maintain the improvement in reporting rates and put more emphasis on improving timeliness through supportive supervision activities. PMI, through the supply chain TA partner, will work specifically with the Zanzibar team to improve reporting rates in areas where challenges have been identified.

Key Question 5

What are the main supply chain TA functions supported by PMI? Are there additional investments that PMI should make (e.g., increasing visibility of demand at health facilities) to ensure continual availability of quality products needed for malaria control and elimination at health facilities and the community level? In areas performing well, is it dependent on PMI/donor funding (e.g., PMI and Global Fund pay for warehousing and distribution)? Should more be done to foster self-reliance in domestic systems and, if so, what approaches should be considered?

Supporting Data

Figure A-16. Global health supply chain TA-TZ FY 20 PMI investments
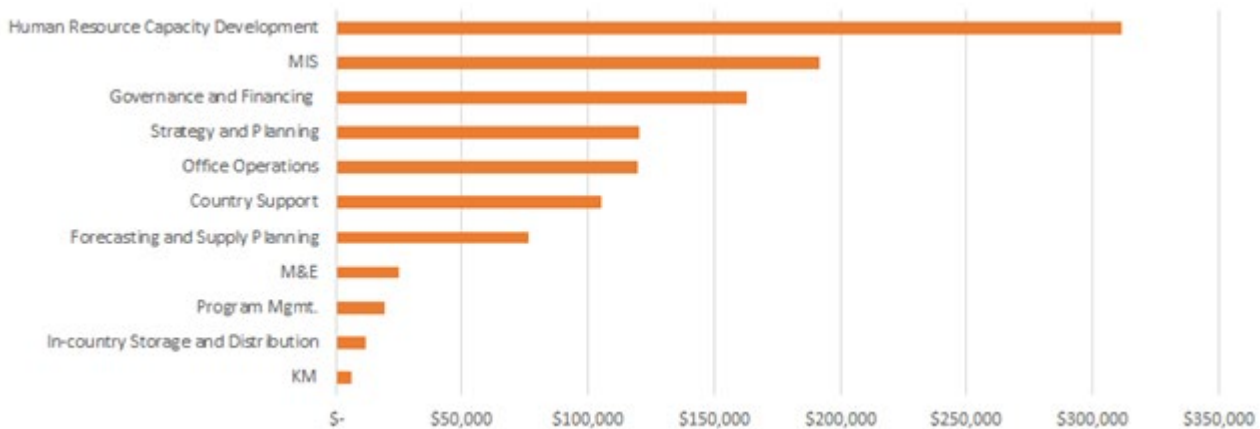
- PMI will continue supporting efforts to strengthen forecasting, supply planning, strategy and planning, in-country storage and distribution, monitoring and evaluation, human resources capacity-building, and management information systems such as LMIS.
- PMI will continue efforts to strengthen the transitioned LMU to continue monitoring stock levels of all malaria commodities at CMS and health facilities through reviewing submitted LMIS reports and routine physical counts.
- PMI will continue to support ZAMEP to conduct quantification exercises and the quarterly review of the supply plan to improve coordination and procurement planning across development partners
- PMI will continue to support the improvement of data quality within the eLMIS to ensure increased data visibility and use for routine supply chain decision-making.

Key Question 6

Are there any other considerations that impact funding allocation in this category? If there is a specific budget line item in Table 2 that is not covered by the above questions, address here.

Supporting Data

PMI funding has been directed to support human resources capacity development, management information system, governance and financing, strategy and planning, forecasting and supply chain management, and in-country storage and distribution.

Conclusions for Supply Chain Investments

- PMI will continue supporting efforts to strengthen forecasting, supply planning, strategy and planning, in-country storage and distribution, monitoring and evaluation, human resources capacity-building, and management information systems such as eLMIS.
- PMI will continue with efforts to strengthen the transitioned LMU unit to continue with monitoring of stock levels of all malaria commodities at central medical store and health facilities through routine physical counts.
- PMI will continue to support ZAMEP to conduct quantification exercises and the quarterly review of the supply plan to improve coordination and procurement planning across development partners.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

3.2. SURVEILLANCE, MONITORING, AND EVALUATION (SM&E)

ZAMEP Objective

The SM&E priority objective in the ZAMEP Malaria Strategic Plan IV 2018–2023 is to reinforce malaria surveillance capacity for malaria elimination to actively investigate and classify 100 percent of confirmed malaria cases by 2023.

ZAMEP Approach

ZAMEP's approach to SM&E for malaria elimination is to maintain and strengthen malaria case surveillance and RCD, including a data collection and management system that enables the identification of new cases of malaria and triggers investigation and response measures. ZAMEP achieves this through the use of the malaria early epidemic detection system (MEEDS), the malaria case notification (MCN) system, and HMIS/DHIS2.

MEEDS includes a strategy to collect daily data for three key indicators (total visits, confirmed malaria-positive cases, and confirmed malaria-negative cases) among outpatients from all health facilities (public and private). Weekly aggregated data are transmitted from each health facility using a customized cell phone menu. Text messages with a weekly data summary are sent to cell phones of key ZAMEP staff and District Medical Officers, and longitudinal weekly aggregated data are made available for viewing over a secure website.

Health facilities also collect and report monthly aggregate malaria indicators for the routine HMIS through the DHIS2 platform. While key malaria indicators are collected and reported through separate systems within health facilities, annual comparisons of data completeness on the key malaria indicators have revealed significant differences between MEEDS and HMIS. Both the Zanzibar malaria elimination feasibility study and ZMEAC recommended maintaining MEEDS as a separate system until the capacity of HMIS has been improved for malaria-related surveillance data. However, ZAMEP utilizes the HMIS/DHIS2 data on severe malaria cases, inpatient department admissions, and mortality related to malaria.

The aim of the MCN system is to conduct a household investigation of every confirmed case of malaria infection within 24 hours of notification and conduct RCD. In this system, a CMSO travels to the case household to interview and test household members and occasionally those of neighboring households when specific hotspots

are identified and investigated. Individual case clinical and epidemiological data are collected by CMSOs during the investigation through tablet-based devices and transmitted to the same server used for MEEDS. In 2020, the overall proportion of cases investigated at the household level was 73 percent, and within 48 hours of notification was 64 percent.

As part of the investigation, CMSOs also classify cases according to the WHO Framework for Malaria Elimination 2017. In 2020, 76 percent of cases were classified by CMSOs. The MCN tablet tool has functions that allow ZAMEP to assess the accuracy of CMSOs in performing case investigation and classification.

On a weekly basis, the MCN system generates automated data outputs describing malaria case notifications, classifications, and distribution (location) that is accessible in DHIS2. Using this data, ZAMEP completes village mapping to highlight foci of transmission (hotspots) in relation to implementation of various malaria interventions.

In addition, CMSOs provide SBC materials at the household level on the need for early malaria testing and adherence to antimalarial treatment. CMSOs ascertain ITN use and provide coupons for a free ITN when needed, as well as identify visible mosquito larval sources and provide information on environmental management.

PMI Objective in Support of ZAMEP

PMI supports the ZAMEP strategy to identify, investigate, and classify all cases of malaria utilizing the passive and active (reactive) surveillance systems and affiliated electronic tools in Zanzibar.

PMI-Supported Recent Progress (FY 2020)

PMI partners continued to support data management and analysis, such as data reviews, learning agenda data analyses, development of malaria bulletins, stratification analysis, and updating the program and PMI regularly on the malaria epidemiological situation through weekly notifications and monthly dissemination meetings.

With support from PMI partners and in collaboration with the HMIS unit of the Zanzibar health ministry, ZAMEP completed the integration of MEEDS with routine HMIS, including linking both MEEDS and MCN data within the DHIS2 platform. Integration efforts also included the migrating of MCN data from 2012 to 2020 into DHIS2 and the development of a dashboard for malaria indicators. A total of 41 participants were trained on the MCN functionality and IT troubleshooting to build capacity within ZAMEP and the HMIS unit to sustain the system.

With support from PMI partners, ZAMEP continued to capture information to enhance the classification of individual malaria cases and their associated foci according to definitions in the WHO Framework for Malaria Elimination. In 2020, 39.4 percent of investigated cases were classified as imported, with the majority of cases reporting travel originating from Dar es Salaam, Morogoro, Tanga, Bagamoyo, and the Lake Victoria region. ZAMEP is exploring interventions focusing on screening travelers and monitoring imported cases, alongside other interventions for residual active foci.

PMI partners conducted a virtual six-week "Foundation of R Language" course for four ZAMEP staff. R is an open-source statistical software package that is widely used in the fields of public health and epidemiology. PMI partners facilitated training for 50 participants in data analysis, interpretation, QGIS (geographic information system app) mapping, and technical report writing skills for presentations and conference abstracts.

PMI-Supported Planned Activities (FY 2021 with currently available funds)

PMI will support the maintenance of MEEDS at all government and private health facilities until it is determined that MEEDS will be transitioned to routine HMIS. If, and when, MEEDS is transitioned to routine HMIS, PMI will support the strengthening of malaria-related surveillance data collection and analysis within HMIS.

PMI will continue to support and strengthen the MCN system, including solving system failures, and RCD among household and neighborhood contacts of confirmed cases. Epidemic confirmation procedures will be maintained and response systems further strengthened to allow ZAMEP to deploy a small cadre of trained staff to investigate all suspected epidemics. PMI partners will customize thresholds to reflect transmission levels for each shehia that trigger the sending of an email and short message service (SMS) message to relevant response entities.

PMI will support the continued integration of data generated from MCN to DHIS2 and building capacity among ZAMEP and HMIS unit staff for basic IT system maintenance and troubleshooting IT issues related to MCN. In addition, PMI will support the updates to existing system documentation to accommodate recent software system updates. This will include the user manual, system documentation, and data analysis guidelines to incorporate new system capabilities and provide training to ZAMEP and MOHZ staff.

PMI will support the development of an operational data dashboard to visualize entomological monitoring data and foci investigation findings in the new MCN/DHIS2 malaria dashboard.

PMI partners will finalize the Zanzibar malaria epidemiological stratification and develop intervention for each strata to be adapted by the program.

PMI will continue to strengthen ZAMEP's ability to analyze and disseminate SM&E-related information for decision-making, hold regular meetings, attend TWG meetings to review and discuss SM&E activities, and make regular SM&E supervisory visits to the field.

PMI will support the inclusion of malaria indicators in periodic national representative household surveys (i.e., DHS and Malaria Behavioral Survey [MBS]) planned in CY 2021.

PMI will support participants for the Field Epidemiology Training Program (FETP) Frontline (Basic) course with an emphasis on selecting participants working in malaria, such as surveillance officers, malaria focal persons, and data quality improvement liaisons. For a description of FETP activities, see the health system strengthening section.

For a description of PMI support for entomological surveillance and insecticide resistance monitoring, see the Vector Control section. For a description of PMI support for therapeutic efficacy studies, see the Case Management section. For a description of PMI support for operational research and program evaluation, see the Operational Research section.

Key Goal

To support ZAMEP to build its capacity to conduct surveillance as a core malaria intervention using high-quality data from both surveys and routine health information systems.

Key Question 1

Which data sources are available to inform estimates of intervention coverage, service availability and readiness, and morbidity and mortality?

Supporting Data

Table A-19. Available malaria surveillance sources

Source	Data Collection Activity	2019	2020	2021	2022	2023	2024
Household Surveys	Demographic Health Survey (DHS)			P			
Household Surveys	Malaria Indicator Survey (MIS)			P			
Household Surveys	Multiple Indicator Cluster Survey (MICS)						
Household Surveys	EPI survey						
Health Facility Surveys	Service Provision Assessment (SPA)						
Health Facility Surveys	Service Availability Readiness Assessment (SARA) survey						
Health Facility Surveys	Other Health Facility Survey						
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies (TES)						
Malaria Surveillance and Routine System Support	Support to Parallel Malaria Surveillance System	X	X	P	P		
Malaria Surveillance and Routine System Support	Support to HMIS			P	P	P	P
Malaria Surveillance and Routine System Support	Support to Integrated Disease Surveillance and Response (IDSR)						
Malaria Surveillance and Routine System Support	Electronic Logistics Management Information System (eLMIS)	X	X	P	P	P	P
Malaria Surveillance and Routine System Support	Malaria Rapid Reporting System						
Other	End-use Verification (EUV) Survey						
Other	School-based Malaria Survey						
Other	Knowledge, Attitudes, and Practices Survey; Malaria Behavior Survey			P			
Other	Malaria Impact Evaluation						
Other	Entomological Monitoring	X	X	P	P	P	P

*Asterisk denotes non-PMI funded activities, X denotes completed activities, and P denotes planned activities.

Key Question 2

What HMIS activities have been supported? What current priorities will be supported with FY 2022 MOP funding?

Support HMIS/DHIS2:

- MCN-DHIS2 integration, including syncing selected indicators across both systems, and migrating data from MCN from 2012 to present
- Development of malaria dashboard with indicators from MEEDS and MCN
- Capacity-building to end-users from ZAMEP, CMSOs, and the HMIS unit
- MCN implementation and weekly data reviews

PMI will support the continued integration of data generated from MCN to DHIS2 and building capacity among ZAMEP and HMIS unit staff for basic IT system maintenance and troubleshooting IT issues related to MCN. In addition, PMI will support the updates to existing system documentation to accommodate recent software system updates. This will include the user manual, system documentation, and data analysis guidelines to incorporate new system capabilities and provide training to ZAMEP and MOHZ staff.

PMI will continue to support the secondment of an SM&E expert at the ZAMEP epidemiology unit.

Supporting Data

N/A

Key Question 3

Are there specific outcomes of past/current HMIS strengthening efforts that can be identified?

See description above for support of HMIS/DHIS2.

Supporting Data

N/A

Table A-20. Outcomes of HMIS strengthening efforts

	Indicator	2019	2020
Timeliness	% of reports received on time	86.8%	91.0%
Completeness	Confirmed malaria cases for children under five years of age was reported from 196 facilities	90.6%	98.7%
Accuracy	Populate with most recent DQA data	N/A	N/A

Are there any other considerations that impact your funding allocation in this category (e.g., strategic information or capacity-building in-country)?

N/A

Supporting Data

N/A

Conclusions for Surveillance, Monitoring, and Evaluation Investments

To improve ZAMEP's approach to SM&E for malaria elimination, PMI will support activities to strengthen malaria case surveillance and RCD, including the data collection and management systems that enables the identification of new cases of malaria and trigger investigation and response measures. PMI will continue to support and transition the use of the malaria early epidemic detection system (MEEDS), the malaria case notification (MCN) system, and HMIS/DHIS2.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

3.3. OPERATIONAL RESEARCH

ZAMEP Objective

The priority objective for OR in the ZAMEP Malaria Strategic Plan IV 2018–2023 is to evaluate and optimize malaria program management and coordination.

ZAMEP Approach

ZAMEP addresses potential OR/PE topics during the program and data reviews conducted during the various thematic technical working groups (e.g., vector control, case management, SM&E, SBC, etc.) prioritizing proposals to evaluate and optimize malaria interventions, to update national strategies and guidelines, and address new challenges as well as guide scale-up of proven strategies in collaboration with research institutions.

PMI Objective in Support of ZAMEP

PMI works jointly with ZAMEP, implementing partners, other donors and research institutions to identify and support relevant OR/PE.

PMI-Supported Recent Progress (FY 2020)

PMI supported an OR study titled, "Operational research to increase the effectiveness of the malaria surveillance and response system in Zanzibar," between April 2017 and October 2018, with secondary analysis and results still underway as of March 2021. The objectives of the original study were to evaluate the effective coverage of the surveillance-response system (MEEDS and MCN) in terms of the proportion of the intended target

population actually covered by the intervention; identify modifications to the system that could improve performance, especially in regard to the probability of infection detection; and estimate the cost and cost-effectiveness of the surveillance-response system approach utilized in Zanzibar, as well as the marginal cost of adding additional households during RCD.

Results published in a 2020 study, linked here, (Stuck, et al. Int J Infect Dis.) showed that mRDT prevalence was 3.2 percent among index household members and 0.4 percent among members of neighboring households. Logistic regression analyses showed that the odds of being PCR-positive as a member of an index household were 7.1 times that of those in surrounding households. These heightened odds of infection reflect evidence in support of visiting the index household for the detection of new cases, and demonstrates much lower marginal return to expanding searches beyond the index household. Within households of index cases defined as imported, odds of qPCR-positivity among members reporting recent travel were 1.4 times higher than among those without travel history, indicating that travelers represent a higher risk population. Sensitivity of RDTs to detect qPCR-detectable infections was 34 percent, indicating that the high prevalence of low-density infections results in an RCD system missing a large proportion of the parasite reservoir. Results also indicated that the MEEDS/MCN system in Zanzibar achieves a high coverage of case notifications through public health facilities.

Additional recent analysis has shown that qPCR prevalence in index household members is closer to 11 percent than the 3.2 percent detected by mRDT, suggesting that approaches like reactive focal MDA of index household members may be more effective and cost-effective than RCD using RDT.

PMI-Supported Planned Activities (FY 2021 with currently available funds)

PMI is currently supporting the use of genetic sequencing methods applied to samples collected during the rolling cross-sectional survey in the RCD OR study title, "Operational research to increase the effectiveness of the malaria surveillance and response system in Zanzibar," to further understand parasite population genetic diversity and multiplicity of *Plasmodium falciparum* infections in Zanzibar. Over 30 genetic markers have been optimized for detection, even from very low parasite density samples. These markers will be characterized in approximately 500 of the samples collected in the previous cross-sectional survey. The genetic patterns might help ZAMEP observe differences between cases classified as local and imported, and between index cases and secondary cases found in the same clusters within and across islands, and whether such patterns correspond with data such as reported travel, demographic factors related to clusters, or other predictor variables. Based on these results, future studies to compare genetic data between Mainland Tanzania and Zanzibar will be considered.

PMI Goal

PMI will conduct PE/OR that helps to evaluate coverage of population at risk, intervention quality, or delivery efficiency; study reducing malaria transmission and disease burden; test effectiveness of new or evolved priority interventions and strategies; or explore new metrics and mechanisms to assess intervention impact.

Key Question 1

In consultation with the ZAMEP, have technical challenges or operational bottlenecks in program interventions been identified that require PE/OR? How have they been prioritized?

A number of bottlenecks have been identified as part of ZMEAC consultations (outlined in ZMEAC meeting reports) and in technical discussions with ZAMEP, some of which are being addressed in the research activities

outlined below. Some of the recently highlighted bottlenecks/opportunities include delays in completing case and foci investigations particularly with the recent increases in cases, inefficiencies in detecting infections through RCD and the potential benefits of reactive focal MDA, the need for community SBC for returning travelers and for ITN use in a setting of low transmission, and the utility of evaluating LSM. Partners and donors work together with ZAMEP to address the most pressing needs.

Supporting Data

Table A-21. Ongoing program evaluation and operational research

Funding Source	Implementing Institution	Research Question/Topic	Status/Timeline
Various	Karolinska Institutet, Sweden	Randomized controlled trial on MDA, trend analysis of intervention implementation and malaria burden, antimalarial resistance marker monitoring	Completed with follow on work planned (TBD)
TBD	Swiss TPH/ University of Basel	Feasibility of malaria "screen and treat" at Zanzibar port – ("Ferry study") to understand the travel patterns of the persons entering and exiting Zanzibar through its main seaport, determine what proportion of travelers entering Zanzibar are infected with malaria parasites, and assess feasibility of screening and treating individuals for malaria at Zanzibar port of entry	Proposed for implementation in 2021

Key Question 2

Are there specific challenges in any intervention areas that merit further exploration or research with the potential of establishing strategies or interventions applicable in the near future?

Supporting Data

PMI will consider reprogramming FY 2021 funding to support evaluation of reactive focal MDA as an alternative to RCD, based on the recent results of the secondary analysis of surveillance and response OR reported above. Discussions are currently underway with ZAMEP and partners to shape this activity.

Key Question 3

Are there any other considerations that impact your funding allocation in this category?

N/A

N/A

Conclusions for Program Evaluation and Operational Research Investments

Please see description of genetic epidemiology study and response to Key Question 2 above for conclusions about next steps/avenues of research.

No OR/PE activities are proposed with FY 2022 funding.

3.4. SOCIAL AND BEHAVIOR CHANGE (SBC)

ZAMEP Objective

The Zanzibar Malaria Elimination SBC Strategy 2018–2023 directly supports achievement of Zanzibar Malaria Strategic Plan 2018–2023 with the overarching aim of eliminating malaria in Zanzibar by 2023. The SBC strategy seeks to achieve changes in behavioral factors including knowledge, attitudes, beliefs, perceived risk and severity, self-efficacy, skills, access, and norms among priority audiences, which will contribute to the achievement of the priority behavioral objectives. The Zanzibar Malaria Elimination SBC strategy also informs the design, implementation, and monitoring and evaluation of effective, targeted SBC activities—including SBC, advocacy, and social mobilization—to increase adoption of malaria elimination priority behaviors in Zanzibar.

The overall goal of the strategy is to increase utilization of appropriate malaria interventions at the household level to 85 percent through well-coordinated malaria advocacy, communication, and social mobilization activities. The specific objectives of the strategy are as follows:

- Influence positive behavior change among target audiences with regard to malaria elimination behavior that will help to reduce the incidence of malaria in Tanzania.
- Strengthen coordination and linkages of SBC interventions and improve the dissemination of information to key target audiences at national, district, community, and household levels through a planned and systematic series of activities and channels.
- Harmonize malaria SBC activities implemented by the different partners. All malaria SBC activities are coordinated by the ZAMEP SBC Unit.

ZAMEP Approach

ZAMEP's approach to malaria SBC is guided by the Zanzibar Malaria Elimination SBC Strategy 2018–2023, which provides a framework for advocacy, communication, and social mobilization activities in support of the Zanzibar Malaria Elimination Strategic Plan 2018–2023. The SBC strategy emphasizes implementation at the national, regional, district, and community levels and is intended to promote different identified behavioral objectives that cut across service delivery, community, and individual levels.

The Zanzibar Malaria Elimination SBC Strategy 2018–2023 also outlines the following SBC approaches and channels that should be used to support achievement of the above objectives:

- Interpersonal communication and community mobilization, including community dialog, community theater/roadshows, public spot announcements (PSA), HCW talks at facility and community levels, mobile cinema shows, School Health Club events.
- Mass media, including radio (regional and community), TV, outdoor messages, videos targeting travelers to be shown at ports of entry and on ferries, SMS reminders.
- SBC materials, including print materials, provider job aids and orientations.
- Advocacy activities, including meetings, events, facility scorecards, etc.

All malaria SBC activities are coordinated by the ZAMEP SBC unit. The SBC unit holds biannual (and ad hoc) TWG meetings at which all existing SBC implementing partners review progress of activities and review and approve all new activities.

PMI Objective in Support of ZAMEP

PMI supports ZAMEP in its effort to eliminate malaria in Zanzibar by 2023. PMI provides support for these efforts at the national, district, and community levels. Nationally, PMI Tanzania provides TA to the ZAMEP SBC unit to build knowledge, skills, and capacity for development of materials, activities and relevant guidelines/strategies, and monitoring of activities. At the district level, PMI support is focused on building capacity and providing tools to district malaria surveillance officers and community health committees. At the community level, PMI support is focusing on interpersonal communication and community-wide events, including theater. PMI supports increasing correct and consistent ITN use, acceptance of IRS, and prompt care-seeking.

PMI continues to support the design and implementation of SBC activities to address imported malaria cases. TV spots are aired at the airport and the seaport, and print materials are placed at all points of entry and exit in Zanzibar. Key messages that are communicated include the declining prevalence of malaria in Zanzibar, the significance of a traveler's travel history, the importance of sleeping under an ITN every night, and the importance of being tested for malaria after feeling malaria symptoms.

Currently, PMI is the only development partner supporting malaria SBC activities in Zanzibar.

PMI-Supported Recent Progress (FY 2020)

- PMI conducted audience insights gathering activities with heads of households, parents and caregivers of children under five years of age, pregnant women, community leaders (Shehas and their representatives) and facility-based health workers to identify key factors associated with ITN use to inform tailoring of SBC activities. Insights gained from the activity included identification of the following barriers to net access: low awareness of the availability of coupons to access free ITNs in their communities, perceptions of biases and favoritism on the part of Shehas and community leaders related to net access, long waiting times and queues at the health facility, and limited availability of coupons and ITNs as a result of restocking issues.
- PMI provided rapid TA to Zanzibar to respond to an increase in the number of malaria cases that was observed between July and September 2019. Support included:

- Broadcasting 234 PSAs across nine priority districts reaching 51,335 individuals with messages that promoted ITN distribution channels, as well as uptake of ITN use and care behaviors.
  - Staging 447 community theater performances, which reached 98,062 individuals and focused on promoting ITN access, care, and repair.
  - Adapting, printing, and distributing 400 ITN access and use leaflets through PSAs and community theater.
- PMI conducted a stakeholders meeting to categorize ITN access issues that should be addressed by SBC versus those to be addressed by service delivery partners. Those identified to be addressed through SBC activities were awareness of coupon availability, procedures to receive a net, and *Shehas'* biases and perceptions.
- PMI supported SBC activities tied to the ITN mass campaign during the COVID-19 pandemic. The campaign took place across 52 *shehias* in three districts, during which 197,031 ITNs were distributed to bridge persistent net access, ownership, and use gaps in priority locations requiring intensified focus. SBC activities focused on informing people about the campaign, promoting the importance of net use, and assuring community members that COVID-19 precautions (such as using hand sanitizer, wearing face masks, and maintaining social distance) would be observed during all net distribution activities. PMI support under this campaign included:
  - Developing, printing, and distributing 110,000 stickers across houses that received a net.
  - Implementing 504 PSAs before, during, and after distribution of the ITNs, reaching approximately 50,000 individuals.
  - Developing posters, vehicle stickers, and two radio spots promoting ITN access and use.
  - Developing billboards and a hotel reminder card that promote net use, testing for malaria at the onset of a high fever, and dose completion among travelers.
  - Refining and producing three radio spots, IRS poster, tear-off sheet, FAQ informational brochure, and leaflet that increase IRS awareness and promote positive attitudes toward IRS.

Challenges encountered during implementation include:

- Among three of the most popular radio stations in Zanzibar, two are broadcasted from the mainland. This makes it challenging to reach community members with messages that are tailored to the Zanzibar context. PMI-supported projects engaged mainland stations with good reach in Zanzibar to tailor messages to Zanzibar residents to increase message reach, instead of relying only on Zanzibar radio stations.
- Because the risk of malaria in Zanzibar remains low, attitudes related to malaria shift, especially among younger generations who do not remember when malaria was a serious risk. Therefore, activities need to find new ways to adapt to these shifting attitudes.

PMI-Supported Planned Activities (FY 2021 with currently available funds)

During FY 2021, PMI will continue to support SBC interventions addressing the following key behavioral and communication objectives in Zanzibar:

Table A-22. Key behavioral and communication objectives

Behavioral Objectives	Communication Objectives
Increase the proportion of the population who seek prompt and appropriate care for symptoms of malaria.	• Increase the proportion of people who have accurate knowledge of the signs and symptoms of malaria. • Increase the proportion of people who believe that they are at risk of malaria year-round.
Increase the proportion of the population who are tested for malaria before taking malaria medication.	• Increase the proportion of patients who believe it is important to test before using a malaria medication. • Increase the proportion of travelers who believe it is important to be tested for malaria at the point of entry.
Increase the proportion of the population who sleep under an ITN every night.	• Increase the proportion of people who believe that ITNs are effective at preventing malaria when used consistently and correctly. • Increase the proportion of people who believe that ITNs should be used consistently every night in all seasons. • Increase the proportion of people who believe that using ITNs will help them to get a better night's sleep. • Increase knowledge among travelers that ITNs should be used every night in Zanzibar. • Increase knowledge among Zanzibaris that they should use ITNs every night when traveling to malaria endemic areas. • Increase the proportion of people who know how to properly care for their ITN and replace it when damaged.
Increase the proportion of the population who comply with entomological surveillance activities in the community.	• Increase the proportion of people who have positive attitudes toward entomological surveillance activities.

- PMI will also support use of multiple, reinforcing channels to reach target audiences in support of the above behavioral objectives. This will include the following:
    - Airing 720 radio spots, 600 DJ presenter mentions, and 18 interviews across three radio stations with higher listenership in Zanzibar, with airing intensified during the rainy season. Key behaviors promoted will be consistent use of ITN, early care-seeking for fever, ANC attendance and compliance with surveillance activities.
    - Through targeted mass media to trigger discussions around ITN use, early care-seeking, and ANC attendance, PMI will support 600 PSAs to reach at least 60,000 people across 43 *shehias.*
- PMI is supporting the Malaria Behavioral Survey (MBS) in Zanzibar in CY 2021. ZAMEP is expecting to use the findings of the MBS to identify the knowledge gap and programmatic shift on SBC interventions.

Key Goal

Through the use of SBC interventions and in alignment with a country's national malaria control communication strategy, PMI supports the uptake and correct and consistent use of malaria interventions, thereby improving the overall quality of malaria control efforts that will contribute to reductions in malaria.

Key Question 1

What behaviors is PMI proposing to prioritize through its SBC programming? What data support this prioritization? Will support be geographically targeted or national?

Supporting Data

Table A-23. Prioritized behaviors with FY 2022 funds

Behavior	Target Population	Geographic Focus	Justification
Sleep under an ITN every night.	Individuals living in hotspot areas, travelers, pregnant women, caregivers of children under five years of age	Central, Urban, North A, West B, and Micheweni districts	MIS 2017 data indicates that net use given access in Zanzibar is very high (ranging from 91% to 99%); however, recently, there has been an increase in the number of malaria cases (ranging from 1% to 3% prevalence) in five districts. Based on that, more needs to be done to ensure malaria risk perception is raised and malaria prevention methods continue to be used consistently, particularly ITNs, in communities experiencing resurgence in numbers of malaria cases.
Seek prompt and appropriate care for symptoms of malaria.	Individuals living in hotspot areas, travelers, pregnant women, caregivers of children under five years of age	All districts in Zanzibar	Prompt care-seeking for symptoms of malaria is a critical priority because it has an impact on both malaria-related morbidity and mortality and is an essential component of preventing a resurgence in malaria cases as it initiates the process of case detection and case-based surveillance. This behavior needs to be promoted more broadly because cases may appear in other hotspots: • People think malaria is no longer a risk in Zanzibar (57% of respondents strongly agree there isn't much malaria in Zanzibar; ZAMEP 2017). • Insufficient knowledge of malaria signs and symptoms, particularly in rural areas (only 56% of respondents in rural areas identified fever as a symptom of malaria; ZAMEP 2017). • Belief that malaria is not serious because it can easily be treated (48% of respondents reported that they were not worried about malaria because it can easily be treated; ZAMEP 2017). • Reduced risk perception among the general population, particularly related to the risk of malaria being fatal for vulnerable groups (children, pregnant women) and that malaria

Behavior	Target Population	Geographic Focus	Justification
			is still possible year-round (27% of respondents strongly believe only weak children die from malaria and 33% of respondents strongly agree that people in their community only get malaria in the rainy season; ZAMEP 2017). • People fail to seek care immediately upon recognizing signs of malaria (22% of respondents reported waiting a few days before going to an HCW when their child has a fever; ZAMEP 2017).

Key Question 2a

For sleeping under an ITN every night, what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

Much deeper exploration is needed in Zanzibar to understand motivators for continued net use as malaria prevalence continues to be low and they get closer to elimination. In CY 2021, PMI is supporting the MBS, which will look into the above-mentioned behavioral priorities. The findings from the MBS will be used to refocus SBC activities and strategies through the identification of the behaviors and ideational factors most likely enable Zanzibar to move toward pre-elimination.

Supporting Data

N/A

Key Question 2b

For seeking prompt and appropriate care for symptoms of malaria, what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

More information is needed on barriers and motivators to seek prompt healthcare for symptoms of malaria in this environment where people believe malaria is no longer a risk. In CY 2021, PMI is supporting the MBS, which will look into the mentioned above behavioral priorities. The findings from the MBS will be used to refocus SBC activities and strategies through the identification of the behaviors and ideational factors most likely enable Zanzibar to move toward pre-elimination.

Supporting Data

N/A

Key Question 2c

For acceptance of IRS, what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

More information is needed on barriers and motivators to acceptance of IRS to targeted communities on the hot spot areas. In CY 2021, PMI is supporting the MBS, which will look into the above-mentioned behavioral priority.

The findings from the MBS will be used to refocus SBC activities and strategies through the identification of the behaviors and ideational factors most likely enable Zanzibar to move toward pre-elimination.

N/A

Key Question 3

What is the country's capacity to design, implement, and monitor SBC interventions at the national and subnational level?

Supporting Data

- ZAMEP has shown capacity in the SBC process, particular in the implementation process. There is still a need to strengthen intervention designing components and regular monitoring and evaluation of SBC indicators.
- ZAMEP demonstrated good practice by coordinating all stakeholders in Zanzibar through regular meetings to discuss the progress toward SBC, addressing challenges and identifying key areas to focus.
- There is still a need for support on coordination of SBC activities at national and district levels. Strengthening ZAMEP's capacity to conduct formative assessments for new activities and prioritize targeted behaviors will gain good results.

Conclusions for SBC Investments

- PMI will continue to support correct use and care of ITNs.
- PMI will support SBC activities focusing on prompt care-seeking behaviors targeting individuals living in hotspot areas, travelers, pregnant women, and caregivers of children under five years of age.
- PMI will support behavior around acceptance and withdrawal of IRS.
- PMI will support development of the revised malaria communication strategy.
- PMI will support a gathering of insight to understanding motivators for continued practice malaria promoted behaviors (i.e., ITN use, acceptance of IRS, and early care-seeking in the environment where people believe malaria is no longer risk).
- PMI will continue to support and strengthen SBC intervention designing components and regular monitoring and evaluation of SBC indicators.

PMI/Tanzania proposes to increase funding for SBC activities in Zanzibar. The increase will support ZAMEP to intensify the SBC activities that focus on behaviors that are related to uptake and use and care of PBO nets. Since ZAMEP is deploying PBO nets with a clear vision of withdrawing IRS, it is important to make sure that households/communities are replacing standard ITNs and using PBO nets as soon as they receive them. Also, with this funding, PMI/Tanzania proposes to continue many of its current SBC activities. Support will remain focused across the three behavioral objectives: ITN use and care, acceptance of IRS, and prompt care-seeking.

These funds also will be used for development of materials, printing, media buys, support to the SBC TWG, and national-level capacity-strengthening activities.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

3.5. OTHER HEALTH SYSTEMS STRENGTHENING

ZAMEP objective

Strengthen coordination structures for malaria elimination at different operational levels.

ZAMEP approach

- Strengthen planning, coordination, and implementation of malaria interventions.
- Establish malaria elimination advisory group.
- Strengthen technical working groups.
- Increase resource mobilization for malaria elimination.
- Exercise effective control on financial statement reporting, budgets, and effective utilization of resources to achieve value for money.
- Strengthen program procurement management systems.

PMI objective, in support of ZAMEP

- PMI and other malaria control partners support the Zanzibar MOH and ZAMEP to build and strengthen health systems to ensure malaria control efforts are sustainable, country-owned, and integrated into the health system. By supporting health systems interventions, PMI, ZAMEP, and malaria partners aim to sustain malaria control gains as Zanzibar moves toward elimination.
- PMI supported Zanzibar's MOH to contribute to ZAMEP's ability to improve HMIS for reporting malaria indicators and sustained MSDQI quarterly supportive supervision.
- New malaria guidelines were developed in the context of COVID-19 and standard operating procedures were distributed to health facilities to ensure malaria services continue—about 600 pocket size malaria guidelines were distributed.
- Supported the MOH to ensure recovery of lost data and enhance data security and governance and continued to train and engage key stakeholders for sustained HMIS/DHIS2.
- Newly developed maternal and child health/reproductive health visuals were added to the dashboard for easy mapping indicators and other metadata features.
- Conducted training in use of HMIS/DHIS2 and R-Stat software and the Integration of Coconut-app with DHIS2.

PMI-supported recent progress (FY 2020)

In the past 12 months, the ZAMEP has engaged in various activities to increase capacity of staff in various areas, including participation in international and national-level training in monitoring and evaluation including geographic information system mapping, malaria diagnostics, malaria field epidemiology and scientific writing techniques, including the following:

- MCN-DHIS2 data integration (migrate data, sync malaria indicators, develop dashboard)

- Trained and mentored five HMIS/information and communications technology ICT specialists, SME staff, and CMSOs (41 participants from Unguja and Pemba).
- Developed features in Coconut surveillance (weekly reporting, case classification, updated administrative boundaries for spatial analysis and foci classification).
- Provided technological and equipment support (CMSO motorbikes, tablets, improving functionality of software and hardware for MCN, MEEDS).
- Promoted data use for informed decision-making in both Zanzibar and Mainland Tanzania, particularly at the health facility and community level (i.e., establishing information systems with decision support, visual analytics).
- Developed an implementation plan within Zanzibar's malaria program to guide community-based malaria interventions.
- ZAMEP staff participated in international and local meetings such as virtual American Society of Tropical Medicine and Hygiene (ASTMH) 2020, TWGs, and feedback meetings with district leadership. Because of the COVID-19 pandemic ZAMEP staff were not able to attend short technical training/workshops.
- PMI supported ZAMEP to conduct two Zanzibar Malaria Elimination Expert Committee (ZMEAC) meetings.

PMI-supported planned activities (FY 2021 supported by currently available funds)

Reaching and sustaining malaria control and elimination goals requires effective and efficient local systems. Accordingly, PMI funds will be used to address key health system challenges to reaching and maintaining malaria results. In addition, PMI Tanzania will continue to support capacity-building for the ZAMEP and conducting ZMEAC meetings and following up on implementation of the recommendations of the expert meeting.

- Support for capacity-building of ZAMEP including staff attendance at conferences, participation in short-term trainings, study tours, other educational programs, and other needs as determined by the current training needs assessments. Includes the revision of malaria strategic plan and communication strategic plan, TWGs and Joint Performance and Planning meetings.
- Support to the public sector system in Zanzibar to strengthen the inclusion of malaria interventions in planning, budgeting, and financing from community, facility, and LGA levels. Provide support to LGAs to collect and use analyzed malaria data for planning and monitoring through strengthened systems.
- Support for managing health information in Zanzibar on the improvement of routine monthly and weekly collection, management, and reporting of malaria-related data from health facilities. Efforts will focus on improving data quality, completeness, and timeliness of the HMIS-related systems and capacity of HMIS staff to interpret and use HMIS-related data.

Key Goal

PMI's support for HSS is aligned with USAID's vision as stated in the PMI Strategy 2015–2020. Stronger health systems are necessary to extend access to health services to the most vulnerable, to deliver sustainable improvements in health outcomes, and ultimately to contribute to countries economic growth. Overall, the HSS support aligns with USAID's Vision for Health Systems Strengthening 2015–2019, which defines four strategic

outcomes to achieving universal health coverage (defined as a condition where all the people who need health services receive them without financial hardship):

- Financial protection: Reduce financial barriers to access lifesaving services for the poor.
- Essential services: Ensure that priority maternal, newborn, infectious disease services, etc. are included in the national essential benefits packages.
- Population coverage: Attain coverage for people in the bottom wealth quintile and for other marginalized people.
- Responsiveness: Improve the satisfaction of poor and marginalized people by providing essential services.

Key Question 1

Upon identifying specific goals, objectives, and actions for health systems strengthening focused on reducing malaria infection, morbidity, and mortality, can you outline these and consider relevant support?

Supporting Data

PMI will support capacity-building initiatives for ZAMEP staff to increase both technical and managerial skills through short-term training and participation in international meetings (including ASTMH and Roll Back Malaria TWGs). PMI will continue engaging FETP to support ZAMEP on addressing specific tasks/issues. There are no Peace Corps volunteers stationed in or supporting Zanzibar.

Conclusions for Additional Health Systems Strengthening Investments

Integration of health information systems is crucial for planning and targeting of malaria elimination strategies. PMI will co-fund with other USAID programs to ensure high quality of data are generated and visualized for decision-making. This will include support for overall strengthening of the HMIS systems. ZAMEP integrated malaria data sources within HMIS in Zanzibar. More details can be found in the SM&E section. In addition, PMI will continue to support health system strengthening initiatives which focus on capacity-building of local government authorities to implement and oversee malaria intervention in Zanzibar.

PMI will support capacity-building initiatives for ZAMEP staff to increase both technical and managerial skills through short-term training and participation in international meetings (including ASTMH and Roll Back Malaria TWGs).

Under this MOP, PMI will support review and development of the Malaria Strategic Plans document for 2023–2028.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.