



U.S. PRESIDENT'S MALARIA INITIATIVE



THE PMI VECTORLINK PROJECT TANZANIA

2018/2019 TANZANIA END OF SPRAY REPORT

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ACRONYMS

AIRS	Africa Indoor Residual Spraying project
BCC	Behavior Change Communication
CFV	Control Flow Valve
DCV	Data Collection Verification
DEC	Data Entry Clerk
DHIS2	District Health Information System 2
DHO	District Health Officer
DIECO	District Information, Education, and Communication Officer
DITT	District IRS Technical Team
DMFP	District Malaria Focal Person
DSET	Data Science, Surveys and Enabling Technology
DVCO	District Vector Control Officer
ECO	Environmental Compliance Officer
EE	Error Eliminator
ESIA	Environmental and Social Impact Assessment
GEFE	Gender Equality and Female Empowerment
IEC	Information, Education and Communication
IRS	Indoor Residual Spraying
M&E	Monitoring and Evaluation
mHealth	Mobile Health
NEMC	National Environment Management Council
NIMR	National Institute for Medical Research
NMCP	National Malaria Control Programme
PMI	President's Malaria Initiative
PMT	Performance Monitoring Tracker
PPE	Personal Protective Equipment
PSDQA	Post-Spray Data Quality Audit
Q&A	Question and Answer
RSL	Race to the Starting Line
SMS	Short Message Service
SOP	Spray Operator

TOT	Training of Trainers
TPRI	Tropical Pesticide Research Centre
USAID	United States Agency for International Development
WEO	Ward Executive Officer
WHO	World Health Organization
ZAMEP	Zanzibar Malaria Elimination Programme
ZEMA	Zanzibar Environmental Management Agency

EXECUTIVE SUMMARY

The President’s Malaria Initiative (PMI) VectorLink Tanzania Project, funded by the U.S. Agency for International Development (USAID) and implemented by Abt Associates, supports the implementation of indoor residual spraying (IRS) in mainland Tanzania and Zanzibar. The objective of the project is to further PMI’s goal to halve the burden of malaria in 70 percent of the at-risk populations in sub-Saharan Africa. The project fits into the Tanzania National Malaria Control Programme (NMCP) mission for the period 2014–2020, which aims to ensure that Tanzanians have access to quality, effective, safe, and affordable malaria interventions through timely and sustainable collaborative efforts with partners and stakeholders at all levels.

PMI VectorLink Tanzania conducted its 2019 IRS campaign between October 24, 2018, and March 17, 2019, originally targeting 604,751 structures for IRS; 516,396 on the mainland and 88,355 in Zanzibar. The 2018/2019 spray season started earlier than in previous years in an attempt to complete the spray campaign before the rains started. The campaign took place in two phases comprising 47 operational days, 27 on the mainland and 20 in Zanzibar. The first phase covered seven districts on the mainland: Bukoba Rural, Missenyi, and Ngara in Kagera Region; Buchosa in Mwanza Region; Kakonko in Kigoma Region; and Chato and Nyang’hwale in Geita Region. The second phase covered 10 districts in Zanzibar: Central, North A, North B, South, West A, and West B on Unguja Island and Chakechake, Micheweni, Mkoani, and Wete on Pemba Island. The project sprayed clothianidin (SumiShield 50WG) in all seven mainland districts and the organophosphate insecticide pirimiphos-methyl (Actellic 300CS) in all 10 districts in Zanzibar.

The following are achievements and highlights of the PMI VectorLink Tanzania 2018/2019 spray campaign (see also Table 1):

- Overall, the project sprayed 595,923 structures out of 624,348 structures found by spray operators (SOPs) in the targeted districts, a coverage rate of 95.4 percent. The project protected 2,404,010 residents, including 436,700 children under the age of five and 78,203 pregnant women.
- In mainland Tanzania, the project sprayed 501,584 structures out of 525,222 eligible structures, a coverage rate of 95.5 percent. The project protected 1,926,767 residents, including 353,983 children under five and 65,311 pregnant women.
- In Zanzibar, the project sprayed 94,339 structures out of 99,126 structures found, a coverage rate of 95.2 percent. The project protected 477,243 residents, including 82,717 children under five and 12,892 pregnant women.
- The project trained 2,899 individuals to deliver IRS in the 17 targeted districts. Of these, 2,442 were SOPs (949 females and 1,493 males), 69 were supervisors (19 females and 50 males), and 388 were team leaders (168 females and 220 males). Females accounted for 38.9 percent of the SOPs trained. Of all individuals trained for the October 2018–March 2019 IRS campaigns, 35.3 percent (1,360) were female.
- The project used 154,744 sachets of SumiShield 50WG insecticide to spray 501,584 structures in the seven mainland districts, for a utilization ratio of approximately 3.2 structures sprayed per sachet of insecticide.
- The project used 27,193 bottles of Actellic 300CS insecticide to spray 94,339 structures in the 10 districts in Zanzibar, for a utilization ratio of approximately 3.5 structures sprayed per bottle of insecticide.
- The project will safely dispose of all IRS insecticide contaminated wastes, including 154,744 empty SumiShield 50WG sachets, 27,193 high-density polyethylene bottles, and used masks. The project will use best management practices to dispose of other wastes, including damaged gloves, boots, and assorted plastic items.

TABLE I: 2018/2019 VECTORLINK TANZANIA CAMPAIGN SUMMARY

	Tanzania Mainland	Zanzibar	Total
Number of districts sprayed by PMI-supported IRS in 2018/2019	7 (Bukoba Rural, Missenyi, Ngara, Chato, Nyang'hwale, Buchosa, Kakonko)	10 (Central, Chakechake, Micheweni, Mkoani, North A, North B, South, West A, West B, Wete)	17
Insecticide	Clothianidin (SumiShield 50WG)	Pirimiphos-methyl (Actellic®300 CS)	
Number of structures targeted by PMI-supported IRS	516,396	88,355	604,751
Number of eligible structures found by SOPs	525,222	99,126	624,348
Number of structures sprayed by PMI-supported IRS	501,584	94,339	595,923
Spray coverage	95.5%	95.2%	95.4%
Total population protected by PMI-supported IRS:	1,926,767	477,243	2,404,010
Children under five	353,983	82,717	436,700
Pregnant women	65,311	12,892	78,203
Dates of PMI-supported IRS campaign	Oct. 24–Nov. 20, 2018	Feb. 23–Mar. 17, 2019	
Length of the campaign (in days)	27	20	47
Number of people trained with U.S. Government funds to deliver IRS*:	2,340	559	2,899
Supervisors	54	15	69
Team leaders	314	74	388
SOPs	1,972	470	2,442

* This is based on the PMI indicator definition. It includes only spray staff such as SOPs, team leaders, supervisors. It excludes data clerks, information, education and communication mobilizers, drivers, washers, porters, pump technicians, clinicians, and security guards.

The VectorLink Tanzania team experienced several challenges before and during the spray campaign:

- Environmental Compliance Certificate: Received the certificate from the Ministry of the Environment on the day that spraying was supposed to start, which delayed the start by a day.
- Early onset of the rainy season: SOPs were unable to meet their daily target on days when it rained.
- Refusals: A few community members in some of the sites refused to open their houses for spraying.
- Locked structures: Some structures that met eligibility requirements for spraying had no occupants to allow access to spray teams, as owners were residing in urban areas at the time of spray.
- Poor household preparation: Failure of communities and SOPs on both the mainland and Zanzibar to correctly prepare households for spraying, which decreased the pace of IRS activities.
- Low spray coverage in Kakonko District: Kakonko is a new mainland IRS district where actual spray coverage fell short of the target, which estimated a higher household-to-structure ratio than existed. This estimate was based on the neighboring district of Ngara as well as older census data; estimating this way was more cost effective than conducting a household enumeration in the short time the project had.

1. COUNTRY BACKGROUND

The United Republic of Tanzania has a total area of 947,480 km², with a 2018 mainland population estimated at 54.2 million¹ people. The country has two independent ministries of health, one for the mainland and one for the Zanzibar archipelago. Each ministry has full autonomy over a program for malaria control; the mainland's National Malaria Control Programme (NMCP) and the Zanzibar Malaria Elimination Programme (ZAMEP). Zanzibar's malaria control is currently at the pre-elimination phase.

1.1 MAINLAND TANZANIA

The malaria situation in mainland Tanzania has changed over time, and there is increasing evidence that malaria prevalence dropped significantly over the past decade following the scale-up of interventions, including indoor residual spraying (IRS). These efforts contributed to a decrease in malaria mortality, especially in children under the age of five, between 2005 and 2016. Malaria morbidity also declined, from 18 million cases in 2008 to 5.5 million in 2017, despite population growth. An analysis of health facility data from the national routine reporting system, the District Health Information System 2 (DHIS2), also shows decreasing malaria incidence and mortality rates for the period 2004–2018.²

Almost the entire population of mainland Tanzania is at risk for malaria. There are, however, considerable variations in the levels of transmission due to a range of factors, including geography and climate, access to prevention methods, and land-use patterns. The mosquito vector *Anopheles (An.) funestus* is distributed throughout the country whereas *An. arabiensis* and *An. gambiae* s.s. have been observed in different proportions in various regions of mainland Tanzania. *An. merus* is restricted to the coasts of both the mainland and Zanzibar.³

1.1.1 SELECTION OF INTERVENTION AREAS

The NMCP, in conjunction with the President's Malaria Initiative (PMI) and other key malaria vector control stakeholders, such as the National Institute of Medical Research (NIMR), selected seven districts for the 2018/2019 IRS campaign. These districts are: Ngara, Missenyi, and Bukoba Rural in Kagera Region; Chato and Nyang'hwale in Geita Region; Kakonko in Kigoma Region; and Buchosa in Mwanza Region.

1.2 ZANZIBAR

Zanzibar is an archipelago in the Indian Ocean, 25–50 kilometres (16–31 miles) off the northeast coast of the Tanzanian mainland. It consists of numerous small islands and two large ones: Unguja, the larger and formally referred to as Zanzibar, and Pemba. The islands constitute 2,461 square kilometres (950 square miles). The estimated population was 1.6 million in 2018.⁴

¹ National Bureau of Statistics (NBS) projections, 2018; <https://www.nbs.go.tz/nbstz/index.php/english/statistics-by-subject/population-and-housing-census/977-population-projections-for-the-period-of-2013-to-2035-at-national-level>

² WHO.AFRO 2018; <https://www.afro.who.int/news/who-recognizes-national-efforts-towards-malaria-elimination>

³ <https://www.intechopen.com/books/biological-control-of-pest-and-vector-insects/major-disease-vectors-in-tanzania-distribution-control-and-challenges>

⁴ National Bureau of Statistics (NBS) projections, 2018; <https://www.nbs.go.tz/nbstz/index.php/english/statistics-by-subject/population-and-housing-census/977-population-projections-for-the-period-of-2013-to-2035-at-national-level>

The two main islands experience differences in annual rainfall, temperature, and humidity. Similarly, there is variation of vegetation from the northern to the southern districts and between the western and the eastern coastlines. These ecological differences are associated with the distribution and density of the main malaria vector.

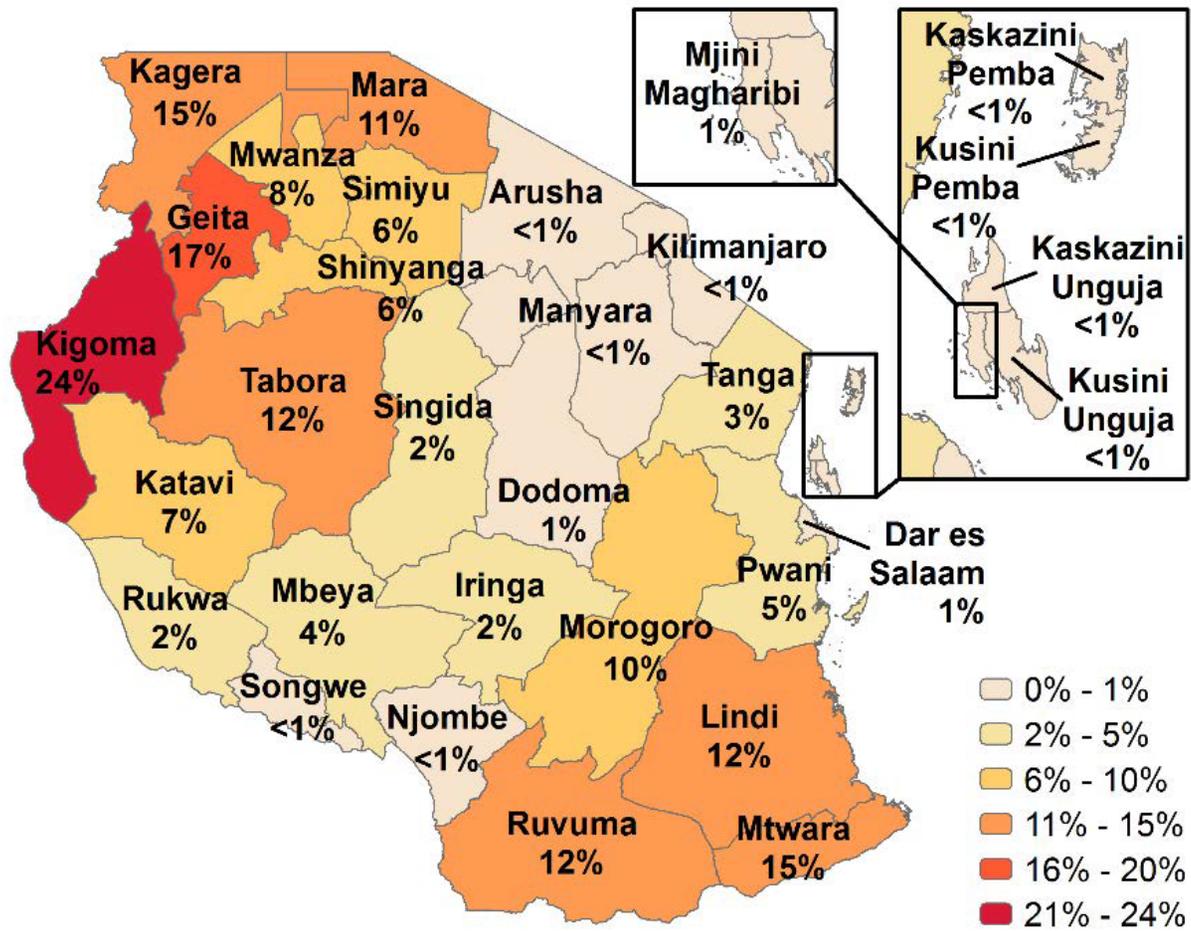
Through the implementation of the Malaria Early Epidemic Detection System and Malaria Case Notification, ZAMEP has been identifying *shebias*⁵ that are malaria hot spots with continued malaria transmission, which the project targets for IRS as Zanzibar pursues malaria pre-elimination.

I.3 SELECTION OF ZANZIBAR INTERVENTION AREAS

ZAMEP, PMI, and PMI VectorLink reviewed malaria incidence data from October 2017 to September 2018 for all shehias. Shehias were ranked by incidence and those with the greatest incidence selected, up to the project's target of 88,355 structures. The IRS target shehias totaled 127: 101 from six districts in Unguja and 26 from four districts in Pemba. The selected shehias had malaria incidence of ≥ 3.4 cases per 1,000 population.

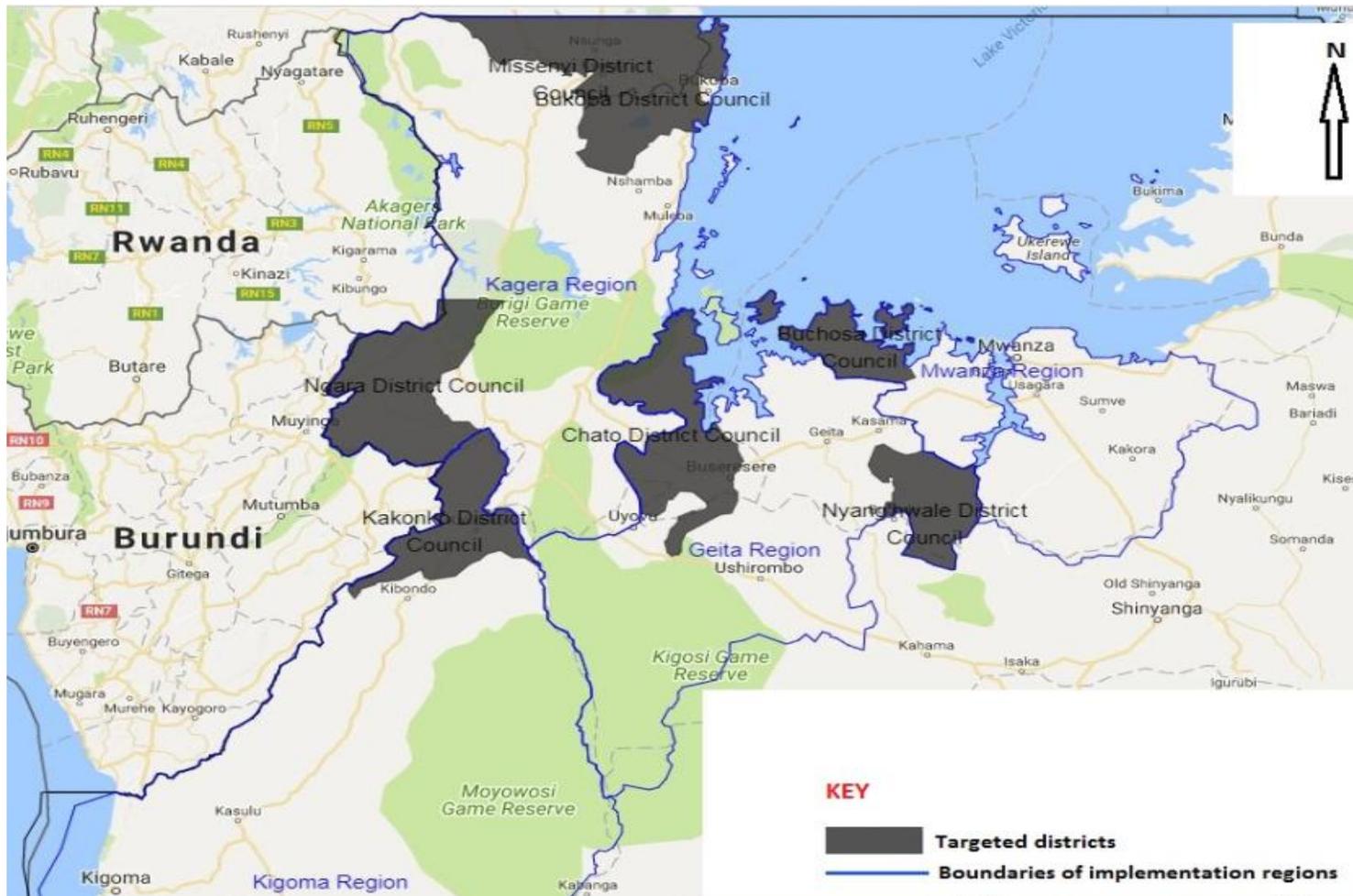
⁵ *Shehia* is the smallest administrative unit in Zanzibar.

FIGURE I: PREVALENCE OF MALARIA IN CHILDREN BY REGION IN TANZANIA, 2017



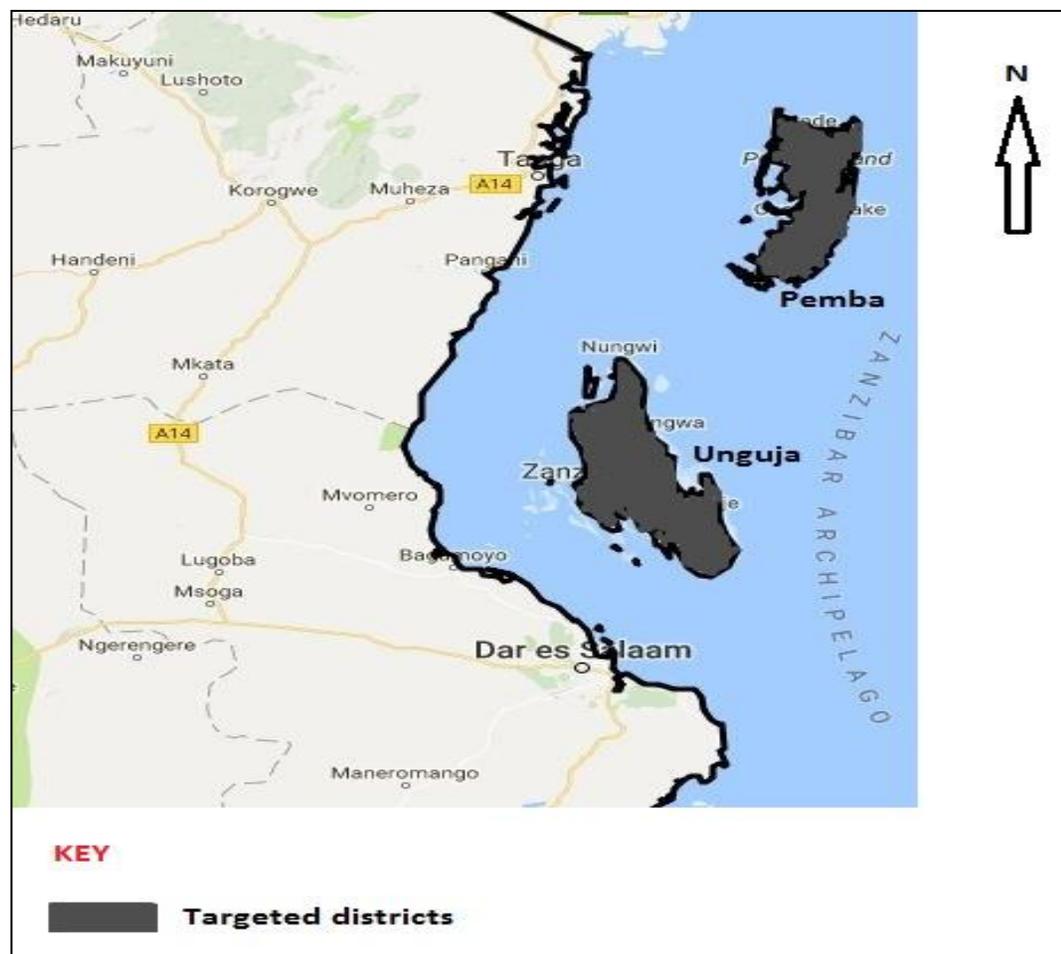
Source: Malaria Indicator Survey 2017, Pg. 58

FIGURE 2: MAP OF TANZANIA MAINLAND SHOWING IRS TARGETED DISTRICTS



Source: DHIS2 Tanzania, <https://dhis.moh.go.tz/>

FIGURE 3: MAP OF ZANZIBAR SHOWING IRS TARGETED ZONES



Source: DHIS2 Tanzania, <https://dhis.moh.go.tz/>

2. PRE-SPRAY ACTIVITIES

2.1 TARGET DISTRICTS AND APPROACH

The NMCP and PMI determined districts to spray in mainland Tanzania for the 2018/2019 campaign. The key selection criterion was high malaria incidence among the lake zone districts. ZAMEP and PMI determined the districts to spray in Unguja and Pemba based on malaria incidence data with a cutoff point of 3.4 cases per 1,000 population. The project conducted blanket spraying in each of the selected mainland districts, and targeted spraying in Zanzibar that covered the hot spots/shehias selected for spraying.

The NMCP and PMI chose clothianidin (SumiShield 50WG), a newly introduced insecticide of the neonicotinoid class, for the 2018/2019 IRS campaign in mainland Tanzania; Zanzibar continued to use pirimiphos-methyl (Actellic 300CS). The PMI Africa Indoor Residual Spraying (AIRS) Tanzania program piloted the use of SumiShield 50WG in 2018 with favorable results.

TABLE 2: TARGET STRUCTURES AND PROJECTED POPULATION IN THE 17 IRS DISTRICTS

Region/Zone	District	Population*	Number of Target Structures*
Kagera	Bukoba Rural	314,776	75,991
	Missenyi	229,268	62,164
	Ngara	288,949	86,164
Geita	Chato	347,753	119,726
	Nyang'hwale	197,220	57,327
Kigoma	Kakonko	188,909	47,586
Mwanza	Buchosa	230,785	67,438
Pemba	Chakechake	6,180	1,795
	Micheweni	22,154	6,497
	Mkoani	10,930	3,174
	Wete	16,557	5,499
Pemba	Central	43,878	12,211
	North A	24,831	8,075
	North B	43,535	11,518
	South	16,113	4,845
	West A	41,658	12,096
	West B	77,791	22,645
Total	17	2,101,287	604,751

*Based on district household records and National Bureau of Statistics

2.2 INSECTICIDE SELECTION

The NMCP, ZAMEP, and PMI chose clothianidin for the October/November 2018 IRS campaign in mainland Tanzania and pirimiphos-methyl (Actellic 300CS) for the Zanzibar February/March 2019 IRS campaigns. These choices aligned with the interim insecticide resistance monitoring and management plans for the two areas. Actellic 300CS continued to be effective against local mosquitoes in Zanzibar despite its continued use for almost four rounds and ZAMEP and PMI decided to continue using it for another year while awaiting SumiShield 50WG pre-qualification by the World Health Organization (WHO). The NMCP

and PMI decision to scale up the use of SumiShield 50WG in mainland IRS districts came after a successful pilot in Musoma Rural in 2018, in order to mitigate resistance after several years of IRS with Actellic 300CS in the lake zone.

The market price for SumiShield 50WG and Actellic 300CS is approximately \$26. Through the UNITAID-funded NgenIRS Project, the price of SumiShield 50WG and Actellic 300CS was subsidized to \$16.54 after the project met the required minimum volume guarantee. Actellic 300CS for Zanzibar was procured at the market price, using funds from the Global Fund to Fight AIDS, Tuberculosis and Malaria.

2.3 PLANNING AND PREPARATION

The PMI VectorLink project understands that planning is critical to the success of IRS. PMI VectorLink Tanzania in collaboration with PMI, the NMCP, and ZAMEP continued to use PMI VectorLink's Race to the Starting Line (RSL) document and an IRS activity schedule for all stakeholders to review and plan the IRS campaign. The RSL calls for a nine-week pre-spray countdown and shows deadlines for activities leading to the spray campaign. The IRS activity schedule lists activities and exact dates for implementing the activities. The RSL and the IRS activity schedule ensure harmonization of spray schedules to protect vulnerable populations during historic peak transmission seasons.

For the 2018/2019 campaign, the project and above-mentioned collaborators based the spray timing on DHIS2 malaria case data, which showed malaria peaks for the mainland IRS districts occurring in December/January as a result of the short rains in October/November. The project scheduled the Zanzibar campaign to start on February 23, 2019, because it wanted to take advantage of the residual efficacy of Actellic 300CS and address the malaria peaks that usually follow rains.

2.4 REGIONAL AND DISTRICT ADVOCACY AND SENSITIZATION MEETINGS

During spray preparation, PMI VectorLink Tanzania held regional- and district-level advocacy and sensitization meetings in both mainland Tanzania and Zanzibar. Because Kakonko was a new IRS district this year, the project also conducted advocacy meetings in all of its 13 wards. Ward, village, and hamlet leaders were invited to the meeting, to ensure community leaders at all levels were knowledgeable about IRS. In other districts, the project met with regional and district health management team members, regional and district administrative leaders, security officers, and representatives of the NMCP, ZAMEP, National Environment Management Council (NEMC), and Zanzibar Environmental Management Authority (ZEMA).

Meetings focused on the following agenda items:

- Inform stakeholders about the PMI VectorLink Tanzania project's objectives, goals, and planned activities
- Assess previous IRS campaign challenges and lessons learned. Make recommendations to improve performance during the 2018/2019 campaign
- Share and review the 2018/2019 IRS operational plan and gather feedback
- Explain how to engage and solicit community participation and involvement of local leaders, particularly hamlet leaders, before, during, and after the spray campaign
- Evaluate the effectiveness of the methods used in information, education and communication (IEC)/ behavior change communication (BCC) before and during the campaign
- Outline the role and involvement of community leaders, especially hamlet, village, district, and regional supervisors, in the IRS campaign
- Solicit commitment of district resources as the districts' contribution to the IRS implementation, for example, the provision of IRS storage spaces and warehouses

- Encourage participation of women in the IRS campaign. Explain the feasibility and benefits of women’s participation for the community at large
- Ensure that all stakeholders are aligned and engaged to work together to support successful IRS operations.

After the district advocacy meetings on the mainland, ward executive officers (WEO) returned to their communities to communicate the IRS messages to hamlet and village leaders so that they, in turn, would sensitize their communities.

In Zanzibar, PMI VectorLink Tanzania and ZAMEP organized three pre-spray regional advocacy meetings, one in Unguja and two in Pemba. The meetings were attended by the three respective regional commissioners. District officials from all 10 target districts also attended: district commissioners (DC), district administrative secretaries (DAS), officer commanding districts (OCD), district executive directors (DED), and district medical officers (DMO).

Microplanning meetings were also conducted for the 10 target districts in Unguja and Pemba. Similar to the advocacy meetings, DCs, DASs, DMOs, and ZAMEP technical officers attended the meetings. Also in attendance were representatives of 101 *shehas* (traditional leaders) in Unguja and 26 in Pemba. The meetings did the following:

- Informed district-level participants about the project’s objectives, goals, and planned activities
- Assessed previous IRS campaign challenges and lessons learned. Made recommendations to improve performance during the 2018/2019 campaign
- Shared and reviewed the 2018/2019 IRS operational plan and solicited feedback
- Explained how to engage and solicit community participation and involvement of local leaders, particularly hamlet leaders, before, during, and after the spray campaign
- Evaluated the effectiveness of the methods used in IEC/BCC before and during the campaign
- Outlined the role and involvement of community leaders, especially hamlet, village, district, and regional supervisors, during the IRS campaign

2.5 MICRO-PLANNING MEETINGS

After the regional and district advocacy and sensitization meetings, PMI VectorLink Tanzania conducted micro-planning meetings in all target districts. The main objective was to discuss roll-out and implementation of IRS operations in the districts. Meeting participants included DMOs, district malaria focal persons (DMFP), District Information, Education, and Communication Officers (DIECO), and district health officers (DHO). The people who hold these four officer positions in each district constitute the District Indoor Residual Spraying Technical Team (DITT) during the campaign. They discussed the following issues:

- IRS activity schedule
- Recruitment of temporary IRS staff
- Different ways to encourage more women to participate, for example, targeting them in recruitment announcements for temporary staff, and ensuring an equal number of female and male recruits are shortlisted at the village level for the final interview and are hired after the final interview, ensuring an equal number of each gender
- The district’s roles and responsibilities, such as providing stores and data centers in all district operations sites as well as vehicles for supervision
- Role of local leaders in the supervision of IRS activities during the operations

- Recommendations from the 2017/2018 post-spray data quality audit (PSDQA) and implications for the 2018/2019 spray campaign
- Feedback mechanism during IRS operations
- Renovation of IRS operations sites
- Community mobilization plan for IRS with emphasis on hamlet leaders and shehas working with site mobilizers
- IRS approaches to deploy
- IRS calendars and process to review them
- Administrative redistricting of some shehas

Participants agreed that regular feedback was the cornerstone for success at each stage of project implementation.

2.6 PROCUREMENT OF IRS MATERIALS AND EQUIPMENT

The project categorized procurement of IRS commodities into international and local procurement to ensure cost effectiveness and timely delivery of commodities.

2.7 LOCAL PROCUREMENT

Local procurement was an open, competitive tendering process that included a solicitation for quotes for services and materials. The PMI VectorLink Project Tanzania procurement committee made the selection based on the lowest cost and technically acceptable bid according to the criteria in the solicitation for quotations. The services/items procured locally included the following:

- Printed materials for IEC, IRS data collection, and commodity tracking
- Personal protective equipment (PPE) items
- Vendors for breakfast for the spray teams
- Transportation services for IRS distribution, operations, and supervision
- Operation site refurbishment materials, including materials for soak pits

Annex A lists local purchases, and quantities the project procured for each item.

2.8 INTERNATIONAL PROCUREMENT

The items procured internationally included the following:

- Gloves and nose masks (also called respirator masks)
- Face shields
- Insecticide (SumiShield 50WG)
- Goizper team leader kits
- Goizper tool to tighten the sprayer chamber

Annex B lists international purchases, and quantities procured for each item.

2.9 LOGISTICS AND STOCK MANAGEMENT

In 2019, PMI VectorLink Tanzania set up 93 operations sites for the mainland and Zanzibar IRS campaigns. The project hired 93 storekeepers to be the custodians of the operations site stores and one additional storekeeper for the Wete main warehouse in Pemba (Figure 4). Please see Annex C for details.

The project deployed two types of insecticides: SumiShield 50WG in mainland Tanzania and Actellic 300CS, procured by the Global Fund, in Zanzibar. It bought 161,374 SumiShield 50WG sachets and distributed them to mainland Tanzania sites. It sent six of the sachets to the Tropical Pesticide Research Centre (TPRI) for quality analysis. The IRS campaign consumed 154,744 of the sachets leaving a post-spray balance of 6,564 sachets; 18 were kept in the Mwanza warehouse, 1,733 in the Geita warehouse, and 4,813 in the Kagera warehouse. In Zanzibar, the project had 32,506 bottles of Actellic 300CS at the beginning of the spray campaign (21,823 bottles as old stock and 10,683 bottles as new stock). Three bottles of the new insecticide were sent to TPRI for quality analysis. The project distributed 27,193 bottles of Actellic 300CS for the spray campaign in Zanzibar. There was a post-spray balance of 5,310 bottles; 1,476 bottles were kept in the Wete warehouse and 3,834 bottles were kept in the Unguja warehouse.

FIGURE 4: BUKOBA IRS CENTRAL WAREHOUSE



The project distributed IRS materials to all operations sites seven days before the 2019 IRS campaign began. This enabled storekeepers to verify needed materials and actual receipts and store the materials as appropriate. The availability of the materials during spray operator (SOP) training enabled the spray teams and other temporary staff to hold dress rehearsals, and for the project to identify and promptly address all shortcomings. The project distributed insecticides to the sites the week of the campaign for verification and storage.

During the IRS campaign, regional and district supervisors, project staff, and visiting PMI, NMCP, ZAMEP, NEMC, and Abt home office staff inspected warehouses in all 93 operations sites. They monitored the movement of materials and insecticides and ensured environmental compliance. At the midpoint of operations, the project redistributed insecticide between the operations sites as needed. Supervisors ensured that storekeepers promptly updated their records and they conducted follow-up with storekeepers who were not compliant. All records matched physical stock counts in the stores at all times.

2.10 IRS TRAINING

During the planning period, PMI VectorLink Tanzania staff prepared and reviewed IRS training presentations and documents. It then shared the materials with national facilitators, who co-facilitated the training. Tables 3 and 4 provide details on the types of training, key topics covered, targeted cadres, and the number of participants from each region of mainland Tanzania and Zanzibar disaggregated by sex. The project held training for all cadres of staff, except water fetchers. It trained a 5 percent buffer in the SOP, storekeeper, and data entry clerk (DEC) cadres to accommodate any worker drop-outs or dismissals.

TABLE 3: IRS TOPICS COVERED DURING TRAINING

Type of Training	Key Topics Covered
Training of trainers (ToT) for IRS district coordinators, site supervisors, and team leaders	Practical sessions on spraying techniques, training and facilitation skills, adult learning techniques, supervision of spray operations, advocacy and community mobilization, malaria epidemiology and vector biology and control, IRS planning, logistics, and implementation, storage and safe insecticide handling and environmental safety, safety of residents and environment, workers' safety during and after spraying, solid and effluent waste disposal, IEC and social mobilization: strategy/messages, compression pump components, use, and repair, IRS application techniques, data collection and management, supervision of spray operations, gender and equity in IRS, and developing an IRS community mobilization plan
SOPs	Basic malaria information on transmission and prevention, safe handling of insecticides and environmental safety issues in IRS, spray pump parts, operation, maintenance, transport, and storage, community mobilization: strategy and messages, spraying techniques: practical sessions, data collection and management, supervision of spray operations, IRS key messages: before, during, and after IRS, and gender and equity in IRS
Mobilizers	Introduction to malaria and role of IEC in IRS, IRS key messages: before, during, and after, myths and misconceptions about IRS, roles and responsibilities, IEC/mobilization and data collection plan, and gender and equity in IRS
Storekeepers	Store management and inventory tracking, IRS planning and procurement, Logistics needs assessment and resource estimation, environmental safety and security, cleanliness and washing, use of first aid kits, collecting and segregating IRS wastes; spray pump parts, operation, maintenance, transport, and storage; transport, receipt, and distribution of IRS commodities; temperature reading using min-max thermometers, and gender and equity in IRS
Pump maintenance technicians	Spray pump parts and function, handling and operation of the spray pump, cleaning and storage, servicing, repair, and maintenance, nozzle and control flow valve (CFV) calibration and maintenance, disassembling and assembling the spray pump, and gender and equity in IRS
Washers	Washing techniques and use of PPE, environmental compliance/effluent disposal, and gender and equity in IRS
Security guards	Security of IRS materials kept in and out of stores, and personal supervision during opening and closing of stores
Drivers	Transport planning and filling daily log sheets, use of PPE, handling an accident/emergency, spill management and reporting, vehicle decontamination guidelines, and gender and equity in IRS
Data entry clerks and Monitoring and Evaluation (M&E) assistants	M&E for IRS: Introduction to VectorLink database, IRS data collection and management, integrity and security, data reporting and reporting tools, pre/post-spraying inspections, performance monitoring, quality control and assurance, IRS data entry and practice, and gender and equity in IRS
Health workers/clinicians	Insecticide handling and insecticide safety, insecticides used for IRS and potential risks to SOPs, households, and environment, SOP safety, household safety, and environmental safety, management of emergencies and insecticide poisoning, and gender and equity in IRS.

TABLE 4: IRS TRAINING AND PARTICIPANTS, MAINLAND AND ZANZIBAR

Cadres of People Trained	Training on IRS Delivery				Other IRS Trainings																Gender Awareness		Total
	ToT		Spray Operations		Insecticide Poisoning Management		Mobilization		Store Management		Pump Maintenance		Washing		Security		Driving		M&E				
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	
National and sub-national representatives	10	29																			10	29	39
TPRI	0	2																			0	2	2
Abt permanent staff																					11	23	34
DMFP and DITT	7	21																			7	21	28
Supervisors	19	50																			19	50	69
Team leaders	168	220																			168	220	388
SOPs*			949	1,493																	949	1,493	2,442
Clinicians					20	36															20	36	56
Mobilizers							23	46													23	46	69
Storekeepers*									37	66											37	66	103
Pump technicians											0	67									0	67	67
Washers													79	14							79	14	93
Security guards															6	183					6	183	189
Drivers																	0	217			0	217	217
M&E assistants																			2	9	2	9	11
Data entry clerks*																			40	36	40	36	76
TOTAL M/F	204	322	949	1,493	20	36	23	46	37	66	0	67	79	14	6	183	0	217	42	45	1,371	2,512	3,883
TOTAL/ training	526		2,442		56		69		103		67		93		189		217		87		3,883		

*Include reserve participants

2.11 IRS HUMAN RESOURCES

Overall, the project hired 3,510 seasonal staff to implement the 2019 IRS campaign. Table 5 shows details of seasonal staff hired for each cadre of the 2018/2019 campaign, disaggregated by sex. The proportion of women hired for each cadre is indicated in the last column. Women hired to work at supervisory levels such as site supervisors, team leaders, and M&E assistants accounted for 36.7 percent (194 / 528) of all staff hired into supervisory positions, compared with 31.7 percent in 2018.

TABLE 5: SEASONAL STAFF HIRED

Cadre	Female	Male	Total	% of Female Hired
National and sub-national representatives	7	20	27	25.9%
DMFP	3	4	7	42.9%
DITTs (i.e. DMO, DIECO, and DHO)	5	15	20	25.0%
External supervisor	2	4	6	33.3%
Supervisors	18	51	69	26.1%
Team leaders	157	231	388	40.5%
SOPs	896	1,427	2,323	38.6%
Mobilizers	23	46	69	33.3%
Storekeepers	32	62	94	34.0%
Pump maintenance technicians	-	67	67	0.0%
Washers	79	14	93	84.9%
Water fetcher	8	72	80	10.0%
Security guards	7	182	189	3.7%
M&E assistants	2	9	11	18.2%
Data entry clerks	35	32	67	52.2%
Total	1,274	2,236	3,510	36.3%

3. IMPLEMENTATION OF IRS ACTIVITIES

The PMI VectorLink Tanzania project implemented IRS spray campaigns for 47 operational days in two phases between October 2018 and March 2019, covering seven districts in mainland Tanzania and 10 districts in Zanzibar. Phase 1 lasted 27 operational days, October 23 through November 24, 2018, in the mainland: three districts of Kagera Region (Bukoba Rural, Missenyi, and Ngara), two districts of Geita Region (Chato and Nyang`hwale), one district of Mwanza Region (Buchosa), and one district of Kigoma Region (Kakonko). Phase 2 lasted 20 operational days, February 23 through March 17, 2019, in 10 districts in Zanzibar: the districts were on Unguja and Pemba, as well as two small islands off of Pemba.

3.1 IRS APPROACH

PMI VectorLink Tanzania used three IRS approaches – district-based IRS, community-based IRS, and quasi-community-based IRS – in an attempt to use the least expensive, yet effective approach for each area. District-based IRS was used where the terrain was mountainous and IRS was being done for the first time. Community-based IRS was used in flat terrain and where communities were familiar with the IRS approach. The quasi-community-based approach was used to prepare a site before graduating it to the community-based approach. For all approaches, spraying started from the distant communities and ended with communities around the operations sites. To ensure good spray quality, the project continued to use CFVs with the Hudson sprayers and the Goizper pumps.

3.2 DISTRICT-BASED IRS

District-based IRS is a centralized approach in which the operations and spray teams meet at a central operations site and go out to the communities as a group to spray (Figure 5). This model requires the spray teams to prepare for the day and depart from the operations site very early in the morning to reach the targeted communities before the residents engage in other activities. Vehicles transport the spray teams throughout the campaign. The project used the district-based approach in all sites in Ngara and Kakonko districts due to the hilly terrain, and 10 sites in Unguja and three in Pemba, because the targeted shehias are widely scattered.

FIGURE 5: MORNING MOBILIZATION, DISTRICT-BASED IRS IN KIGOMA



3.3 COMMUNITY-BASED IRS

As its name implies, community-based IRS decentralizes operations down to the community level. This entails increasing the number of operations sites in a district, which shortens the distances between the sites and the target communities, enabling SOPs to either walk or bicycle to the communities. The model also is intended to stimulate community participation, as SOPs usually come from the target communities, villages, or hamlets. By obviating the need for hiring vehicles, the design reduces the cost of transporting spray teams. In 2019, the project implemented community-based IRS in Chato district and in two shehias, Fundo and Makoongwe, on Pemba. The rationale for choosing community-based IRS on the small islands was mainly based on staff safety and environmental concerns; it would have been risky to transport SOPs and their insecticides – over water, by ferry – to and from the spray site each day.

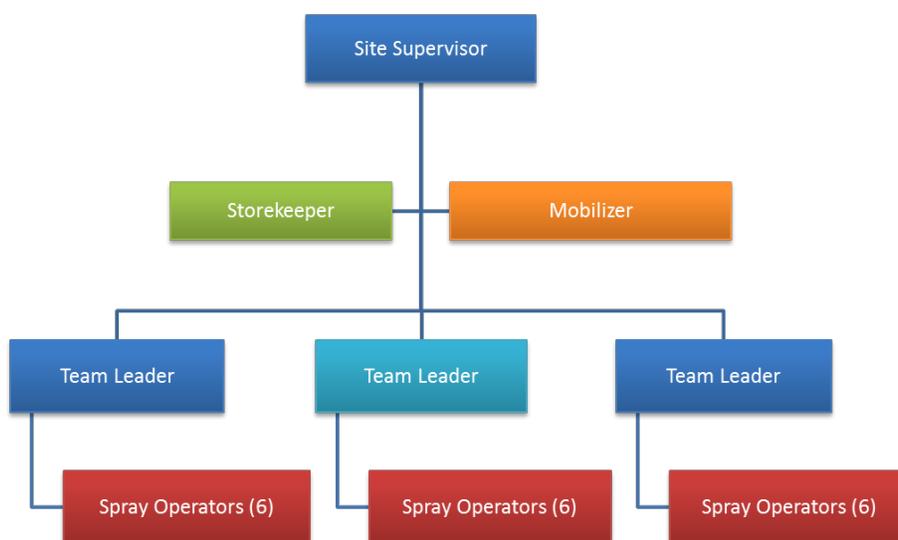
3.4 QUASI- COMMUNITY-BASED IRS

Quasi-community-based IRS blends the district-based approach of using rented vehicles and the community-based approach of relying on bicycle transportation. In 2019 in mainland Tanzania, the project used vehicles for the first 19 of the 27 operational days and then bicycles for eight days. This reduced the cost of vehicle rental as compared to the district-based approach, and necessitated fewer operations sites compared to the community-based approach. Spray teams could continue their work with bicycles because they were not travelling farther than a radius of 10 km per day. The project used the quasi-community-based IRS model in Bukoba Rural and Missenyi districts in Kagera Region, Buchosa in Mwanza Region, and Nyang’hwale in Geita Region.

3.5 COMPOSITION AND MANAGEMENT OF SPRAY TEAMS

In every operations site, the IRS staff comprised the following cadres: one supervisor who managed the spray teams in the field, a storekeeper, a site mobilizer, a pump technician, two site guards, a cleaner/washer, a water fetcher, and a team leader and team of SOPs. The teams had an average of six SOPs, and each site supervisor supervised an average of 35 SOPs. The SOPs reported directly to their team leader, who in turn reported to the site supervisor (Figure 6).

FIGURE 6: SPRAY SITE ORGANIZATION CHART



Note: Numerical values represent # people in IRS cadres.

3.6 PAYMENT OF SEASONAL STAFF

PMI VectorLink Tanzania continued its 2018 practice of using M-Pesa, a mobile money transfer service offered by Vodacom mobile network, to pay all seasonal staff (SOPs, team leaders, supervisors, washers, water fetchers, storekeepers, security guards, mobilizers, DECAs, and M&E assistants) on the mainland during IRS training and field operations. The project made bulk transfers of funds to each seasonal staff person's cell phone number after each training session and twice during the 27-day or 20-day spray campaign.

M-Pesa payments have several advantages over cash payments:

- **Time saving:** Seasonal workers did not have to travel to collect their wages, which the project sent directly to their phones. Seasonal workers could receive pay even while at work.
- **Cost saving:** Mobile money reduces the cost of transporting large amounts of cash to operations sites. It also obviates the need to pay security services/ police to escort the Finance team when they transported cash.
- **Female empowerment:** Women who participated in the IRS campaign had full control over their wages since they received money directly on their phones.

As a new initiative, the project sent Finance and Administration staff from the Mwanza office to assist the PMI VectorLink office coordinator in Zanzibar in confirming signed contracts, compiling the payment lists, cross-checking sign-in sheets, and verifying phone numbers before payment. The project was able to coordinate with Vodacom to register all seasonal workers, even those who had non-Voda numbers. The office coordinators were responsible for distributing and collecting signed contracts from the seasonal staff. The coordinators also collected all daily attendance registers for seasonal staff before preparing payrolls.

Though Vodacom is not a popular network in Zanzibar, in 2019 PMI VectorLink Tanzania managed to pay all seasonal staff in Zanzibar via M-Pesa and not, as it did in pre-2018 campaigns, via different mobile networks (mainly Zantel). The project team communicated with Vodacom and ZAMEP to ensure that all seasonal staff were registered with Vodacom during trainings, with Vodacom representatives present to facilitate registrations during all trainings, and that neither the project nor the seasonal workers incurred a registration fee. In addition, this year ZAMEP supported payments to seasonal staff: through the Global Fund, ZAMEP paid 116 SOPs who worked at three campaign sites (Mombasa A, Mombasa B, and Shakani) in Unguja, Zanzibar.

3.7 MHEALTH

PMI VectorLink Tanzania continued the partnership with Dimagi LLC to use the CommCare mobile health (mHealth) system for the 2019 IRS campaign. CommCare is an open-source platform that comprises the mobile and headquarters components for data collection, management, and repository during the IRS campaign. Using the CommCare system, PMI VectorLink Tanzania staff and district supervisors were able to conduct standard supportive supervision, access daily spray data quickly, conduct data verification at the household level, and remind temporary staff about regulations and operational procedures through daily job aid messages. The system enabled near real-time sharing of data and facilitated results-based decision-making. The team monitored site-level spray progress through Telerivet, a bulk message platform that sends out job aids and receives Performance Monitoring Tracking (PMT) reports in SMS format.

The mHealth reporting tools for data collection and verification, which the project used throughout the campaign, included:

3.8 SUPERVISORY APPLICATION

The supervisory application suite was for use by site supervisors, district coordinators, external supervisors, and VectorLink staff to support IRS supervisory activities. The application was accessible through the CommCare mobile phone app for all non-project supervisory staff and through ODK Collect for all PMI

VectorLink supervisors; the users received training on it during the ToT training. The application suite contained multiple forms covering key supervisory functions, including morning mobilization and transportation, storekeeper performance, household preparation, SOP performance, and end-of-day clean-up. Users completed forms during their routine supervision activities and submitted data to the CommCare and ODK Collect systems. Based on the information reported each day, CommCare and ODK Collect used daily email alerts to report any red flags project supervision teams observed during IRS operations. Examples of red flags were pump leakages, refusals by communities, and the need for additional items at sites such as gloves and first aid kit items.

3.9 DATA COLLECTION VERIFICATION

The M&E assistants used the data collection verification (DCV) mobile tool to collect household-level information on the spraying status of randomly sampled households. The M&E assistants verified the collected information by comparing ward and shehia-level spray coverage results to the VectorLink Collect database coverage for the same location. The margin of error during comparison was ± 5 percent, i.e., any difference above 5 percent, given sufficient sample size, means there could be critical data discrepancies. From 7,148 sampled structures in 113 wards and 66 shehias visited in 2019, DCV produced a 93.5 percent coverage rate while the PMI VectorLink spray database reported 95.4 percent coverage with 595,923 structures sprayed out of 624,348 structures found in total. The validity of the data collected will be further verified during the PSDQA. Data collection for the PSDQA took place February 4-8 on the mainland and April 13-17 in Zanzibar.

3.10 PERFORMANCE MONITORING TRACKER

During training, storekeepers learned to manage the PMT sheet at their respective sites. Users received instruction on how to maintain a constant flow of up-to-date operational data on the PMT sheet, which served as the basis for the PMT SMS system. At the end of each spray day, storekeepers sent aggregate data from the day's operations via SMS to the Telerivet system, which populated daily emails on PMT reporting spray progress and coverage figures from the site to the national level. The PMI VectorLink Tanzania team used the report to monitor sites with low spray coverage, fluctuating progress, and increased insecticide consumption. These daily data provided a timely snapshot of key operational indicators such as communities' IRS response rates and challenges in progress due to unforeseen weather changes. The data also helped in the estimation of sites' insecticide stocks throughout the campaign. Overall, site storekeepers sent 2,929 SMS messages to the Telerivet system during the 2019 spray campaign.

3.11 SMS JOB AID MESSAGES

During the spray campaign, PMI VectorLink Tanzania sent workers in the field SMS reminders about pertinent topics such as freedom from harassment at work, SOPs' daily structure targets, the importance of donning PPE, and avoiding eating while on duty. The project also sent emergency messages to cadres, such as pump technicians, either to communicate programmatic changes or to reinforce adherence to IRS operating procedures, such as marking of structures, dissemination and use of IRS cards and stickers in the field, and SOPs' need to depressurize their tanks when moving between structures and while in the vehicles.

During the 2018/2019 spray campaign, 157,953 job aid messages went out to DMFPs, supervisors, team leaders, SOPs, storekeepers, and mobilizers.

3.12 JOB AID BOOKLETS

PMI VectorLink Tanzania distributed pocket-sized booklets with key messages about the most important aspects of their job to four categories of field staff: site supervisors, team leaders, SOPs, and storekeepers. The project customized the booklets for each staff cadre, who used the booklets during the IRS campaign as pocket reference guides. All booklets were in Tanzanian Swahili.

4. ENTOMOLOGY

The entomological monitoring work is being implemented by the bilateral project, Okoa Maisha Dhibiti Malaria (OMDM), which translates as “Save lives control malaria”, to assess the quality and residual efficacy of IRS as well as other dynamics of local mosquito populations.

For details on OMDM’s results, please refer to their project reports.⁶

⁶ Source: USAID Umuhimu wa Takwimu za Malaria (UTM), IRS Quality Assessment Report Year 1, December 7, 2018.

5. MONITORING AND EVALUATION

The M&E processes for the 2018/2019 IRS campaign closely followed the 2018/2019 PMI VectorLink Tanzania Work Plan and Performance Monitoring Plan.

5.1 KEY OBJECTIVES

The key objectives of VectorLink Tanzania M&E activities are to:

- Emphasize timeliness of the data collection and accuracy of the data entry process through comprehensive training and supervision at all levels.
- Streamline and standardize data flow to minimize errors and facilitate timely reporting.
- Ensure IRS data security and storage for future reference through establishment and enforcement of proper protocols.
- Provide timely data on IRS implementation to facilitate management decisions.
- Verify the project's achievement against objectives in the 2018/2019 Work Plan.

5.2 APPROACH AND OBJECTIVES

PMI VectorLink Tanzania implemented M&E using standard VectorLink procedures and best practices and incorporated lessons learned from the 2016/2017 and 2017/2018 spray campaigns implemented by the PMI AIRS project. PMI VectorLink Tanzania was the third country project to pilot the new VectorLink Collect system in support of the IRS campaign. During the 2018/2019 campaign, the PMI VectorLink Tanzania M&E system provided accurate and timely data through paper-based data capture and the centralized VectorLink Collect database for entry and reporting. VectorLink Tanzania observed a high level of data quality throughout the campaign by ensuring that teams focused on achieving the M&E objectives as indicated above. Relevant Government of Tanzania staff had accounts to view data on VectorLink Collect for the duration of the campaign. Skills-building workshops for ZAMEP and NMCP staff will take place in May and June, 2019.

5.3 REPORTING INDICATORS

PMI VectorLink Tanzania's M&E Plan (Annex H) helped ensure proper data collection and reporting of all approved core and other (internal project) indicators. The project used data collected for the indicator targets to assess its progress during the campaign, and at the end of the operations for analysis and projections for the next implementation year.

5.4 M&E DATA COLLECTION AND VERIFICATION TOOLS

During the 2019 spray campaign, PMI VectorLink Tanzania used the quality assurance methods and tools outlined in the 2019 Work Plan to ensure high-quality IRS project implementation (Table 6). The standardized forms enabled it to collect and verify data to capture all core PMI indicators.

The PMI VectorLink Tanzania M&E team adhered to M&E protocols and introduced modifications in the data collection tools such as the IRS cards, Daily Spray Operator forms, and Daily Team Leader Summary forms for M&E assistants, supervisors, and team leaders. The changes resulted from 2018 feedback and reviews from project peers, the home office M&E specialist, and Abt's Data Science, Surveys and Enabling Technology (DSET) team. These improvements ensured the collection, management, and reporting of high-

quality data. The VectorLink Collect database helped the M&E and operations teams produce timely reports for quick feedback, follow up on spray quality, reconcile data collection errors, and prevent additional errors in data collection and entry through programmed quality checks.

The flow of data for the 2019 PMI VectorLink Tanzania IRS campaign was as follows: SOPs collected spray data at each structure, which team leaders and supervisors verified. Supervisors and supervision vehicles (for distant sites) transported the forms to the data entry centers. DECAs performed a final verification of spray form data and arithmetic checks before entering the data into the VectorLink Collect database. At the end of each day, the M&E assistants reviewed the data entered for anomalies and addressed issues with data center staff. For quality control purposes and timely generation of weekly client spray progress reports, the standard was to enter all data within 48 hours of spraying. DECAs filed and archived daily SOP forms at each of the data centers. Meeting the 48-hour data entry turnaround posed a challenge for some remote sites because of the time it took to transport the forms to the data center; in some widespread districts, it was not possible for supervision vehicles to collect forms from all operations sites on the same spray day.

TABLE 6: TANZANIA IRS 2018/2019 DATA COLLECTION TOOLS

Data Collection Tool	Used by Whom and When
Training participants registration form	Used by a lead trainer at training workshop to capture category and number of people trained, disaggregated by sex.
IRS card	Used by SOPs to record spray data. Data captured by the IRS cards included: name of head of household, data on mobilization, name of mobilizer, data of visited structure spray dates, and signature of SOP.
Daily SOP form	Used by SOPs during spray operations to capture structures found, structures sprayed and not sprayed, population protected and not protected, and rooms found and sprayed. Further information was also collected on the gender of the household representative that was interviewed during the SOP's visit and insecticide-treated nets information.
Daily Team Leader Summary form	Used by team leaders at the end of the spray day to compile all data from their respective SOPs. Like the Daily SOP form, this form captured structures found, structures sprayed and not sprayed, population protected and not protected, rooms found and sprayed in aggregate based on spray team performance and data quality checks. Three Error Eliminator checklist questions were added to the form, to reduce the number of forms (merging Daily Team Leader Summary and Error Eliminator forms) and increase team leader data verification efficiency.
Daily Site Mobilizer form	Site mobilizers completed this form during sensitization activities with village and hamlet leaders to capture hamlet-level household population information. Data obtained were used at the site level to guide spray operations and to serve as the reference for targeted mop-up activities.

5.5 DATABASE PREPARATION

For the 2019 IRS campaign, the project used the VectorLink Collect database. Spray data were entered directly into the customized, fully functioning offline desktop event capture application, an application that connects to the VectorLink Collect server, which is the primary, centralized database for storing all the spray data from the Daily SOP forms from the PMI VectorLink project.

After reviewing the VectorLink 2019 SOP form and making key improvements, the team examined the 2019 VectorLink Collect database developed by BAO Systems to identify possible modifications/additions to ensure that it was configured correctly to the PMI VectorLink Tanzania data collection form. After identifying these needs, the team worked closely with the home office M&E specialist, DSET team, and BAO Systems to update and incorporate the additions into the database. Modifications included translating some of

the database screens/forms from English to Swahili, including all SOP codes and their respective operations sites and districts, and the complete organization unit hierarchy for the targeted spray areas. The database went through multiple rounds of review and testing, where the PMI VectorLink Tanzania M&E and home office teams provided recommendations to ensure high-quality IRS data.

The M&E team ensured IRS data security and storage through:

- Establishment and enforcement of proper protocols
- Streamlined and standardized data information flow to minimize errors and facilitate timely reporting
- Emphasis on the accuracy of both the data collection/verification and the data entry process through comprehensive training and supervision at all levels
- Facilitating recruitment and training of DECAs and M&E assistants on the database, data entry, and data management

Spray coverage was calculated as the proportion (percentage) of eligible structures sprayed out of the total number of eligible structures that SOPs found in the field. Spray progress was the proportion (percentage) of the number of sprayed structures out of the total number of targeted structures. Targeted structures for 2019 spray campaign were determined based on district household records and 2012 census data from the National Bureau of Statistics.

5.6 DATA QUALITY ASSURANCE AND CONTROL

To ensure data integrity, PMI VectorLink Tanzania used the aforementioned standardized quality assurance and control tools. Two data quality assurance tools, the EE and DCV, helped improve the quality of data collection and facilitated data entry during the 2019 spray campaign. These tools helped assess the accuracy and completeness of SOP forms and verify household data. Annex I shows more M&E methods on quality assurance methods and tools.

The DCV form responses were also used to monitor spray coverage during the live campaign, and identify issues in the campaign as detailed in Table 7.

TABLE 7: USE OF DCV FORM: COMMON ISSUES FOUND AND CORRECTIVE ACTIONS TAKEN

Error/Issue Observed	Corrective Action Taken
<i>Understatement of a total number of eligible structures found by SOPs.</i> In households where structures were locked, some SOPs failed to record these on the SOP form as part of the total number of eligible structures found.	The M&E and operations teams corrected this error to SOPs, team leaders, and field supervisors. The team emphasized that all eligible structures were part of the count, whether locked or open. Spray teams were to probe further concerning the eligibility of structures, especially when the structure was locked. This issue was spotted early on, so the team avoided larger data collection issues throughout the campaign.
<i>Unsprayed eligible structures.</i> In some households with multiple structures, residents insisted that SOPs spray only one structure. The reasons the residents gave were that the other structures were used to store food items/ maize from abundant harvests or, when it was rainy, to store household items removed from the sprayed structure/s.	The M&E team asked SOPs, team leaders, and field supervisors to note this error and to be sure to count both eligible and sprayed structures, especially in large households with multiple courtyards. In the future, SOP training will include practical exercises to deal with such situations. The M&E team emphasized that food items /maize must be removed to wherever possible and the structure sprayed. In the case of rain, spray teams were advised to revisit the household and spray the remaining structure/s at a later date.

During the 2019 campaign, a Daily Site Mobilizer form was introduced where site mobilizers visited hamlets and shehias ahead of their spray schedule to collect information on the possible number of households in the area. The information was communicated to the site supervisors and calculated against the ward-level structure-to-household ratio to estimate the number of structures. This information was displayed on site calendars; it guided the team in determining the number of SOPs to assigned to the locations, and was used later to determine the number of structures that were not reached or not sprayed in the area.

5.7 M&E DATA ENTRY, TRACKING, STORAGE, AND SECURITY

PMI VectorLink Tanzania employed 67 DECs (53 on the mainland and 14 in Zanzibar) to enter all spray data generated from all districts. Project laptops were used for spray data entry. The 2019 VectorLink Collect desktop client was installed on DECs' and M&E assistants' laptops and connected to the internet for easy synchronization of data to the online VectorLink Collect production server. The project used double data entry, in which data were entered first by totals (i.e., data entry by the total lines of each form) for quick reporting and feedback, then by details (i.e., data entry by detailed data for each structure) for more accurate data entry and verification.

5.8 DATA STORAGE

Box files were used to store paper-based forms, i.e., Daily SOP forms and Team Leader Daily Summary forms. Team leaders had their box files with their name tags, while M&E assistants had one box file in which to file EE forms. At the end of each day, all data from the VectorLink Collect desktop client were synchronized to the server.

All physical data forms at the end of the project will be archived in special storage cabinets ready to be transported to the head office for permanent storage per Abt Associates policies.

5.9 DATA CLEANING

DECs at the district data centers cleaned the spray data, which involved the following:

- Ensured correct entry of data forms by double entry method (entering first by totals and then by details)
- Checked whether any orphan records, data with missing geographical locations and sprayers, existed in the database and made appropriate corrections
- Checked and removed duplicate records
- Identified and entered missing records

The DECs used the IRS Duplicate Finder tool to check for duplicate IRS card numbers and duplicate entry. The data center teams ran the spray variance report to check for variance that existed between the Total entry and Details entry during data cleaning. Finally, the data centers used the Event count indicators, extracted from VectorLinkCollect, to identify any missing entries. Data were cleaned daily throughout the spray campaign, with final data cleaning completed within five days of the end of the campaign.

5.10 POPULATION AND STRUCTURES FOUND RESULTS

During the 2019 IRS campaign, SOPs sprayed 595,923 structures out of the 624,348 eligible structures found, resulting in 95.4 percent spray coverage and 98.5 percent spray progress (Table 8).

TABLE 8: SUMMARY OF RESULTS FOR TANZANIA 2018/2019 IRS CAMPAIGN

Zone/District	Targeted Structures	Total Structures Found	Total Structures Sprayed	Spray Coverage (%)	Spray Progress (%)
Bukoba Rural	75,991	76,109	73,510	96.6%	96.7%
Missenyi	62,164	61,661	59,206	96.0%	95.2%
Ngara	86,164	85,075	81,276	95.5%	94.3%
Chato	119,726	128,137	123,640	96.5%	103.3%
Nyang'hwale	57,327	62,716	58,926	94.0%	102.8%
Buchosa	67,438	74,371	69,540	93.5%	103.1%
Kakonko	47,586	37,153	35,486	95.5%	74.6%*
Mainland Total	516,396	525,222	501,584	95.5%	97.1%
Pemba	16,965	19,327	18,504	95.7%	109.1%
Unguja	71,390	79,799	75,835	95.0%	106.2%
Zanzibar Total	88,355	99,126	94,339	95.2%	106.8%
Total	604,751	624,348	595,923	95.4%	98.5%

* The number of structures targeted pre spray in Kakonko District turned out to be greater than the actual number of structures sprayed, driven by use of out-of-date census data and application of an incorrect household:structure ratio.

5.11 POPULATION PROTECTED RESULTS

During the 2018/2019 campaign, 2,404,010 (95.7 percent) of 2,513,160 people reached were protected by IRS. The number of people protected includes 78,203 pregnant women and 436,700 children under five. Table 9 provides a detailed summary of the total population in each district, proportion protected, and total population protected, segregated into pregnant women and children under five protected.

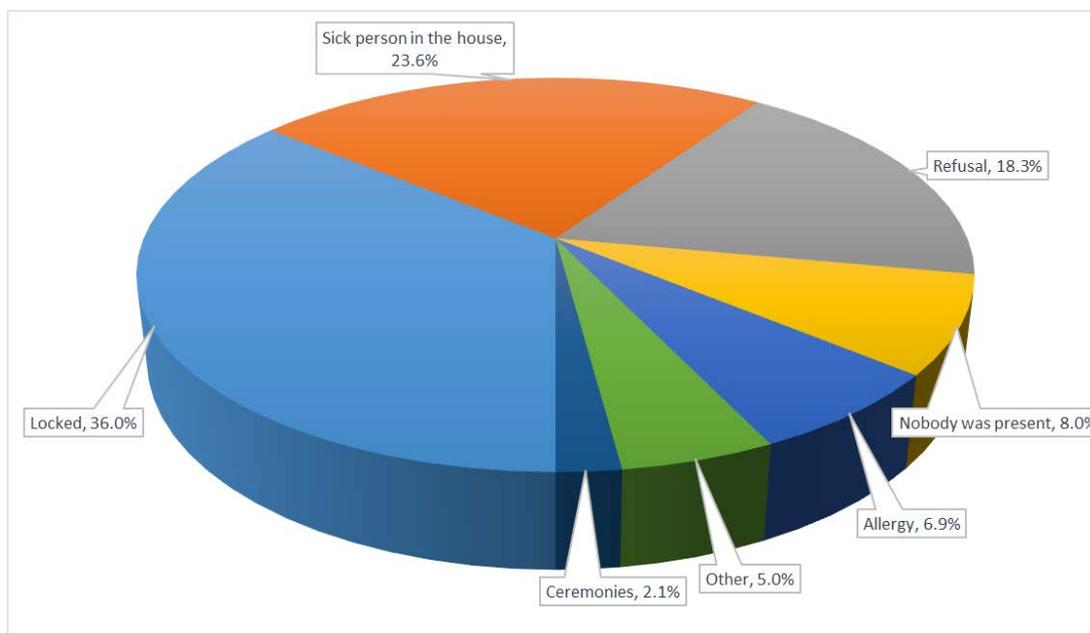
TABLE 9: PEOPLE PROTECTED DURING 2018/2019 IRS CAMPAIGN

Zone/District	Total Population	# of People Protected	% of Pop. Protected	Pregnant Women Protected	Children Under Five Protected
Bukoba Rural	317,876	307,757	96.8	7,355	42,745
Missenyi	246,960	237,152	96.0	6,813	35,257
Ngara	352,693	338,696	96.0	9,005	60,729
Chato	466,378	449,805	96.4	19,024	94,284
Nyang'hwale	222,158	209,585	94.3	11,581	46,427
Buchosa	251,060	233,593	93.0	8,498	47,427
Kakonko	156,237	150,179	96.1	3,035	27,114
Mainland Total	2,013,362	1,926,767	95.7	65,311	353,983
Pemba	104,556	100,637	96.3%	2,744	19,758
Unguja	395,242	376,606	95.3%	10,148	62,959
Zanzibar Total	499,798	477,243	95.5%	12,892	82,717
Grand Total	2,513,160	2,404,010	95.7%	78,203	436,700

5.12 STRUCTURES AND ROOMS NOT SPRAYED RESULTS

In the 2019 PMI VectorLink Tanzania spray campaign, 28,425 structures (4.6 percent) were not sprayed. The reasons for this were: locked structures (36 percent), sick person in the structure (23.6 percent), refusals (18.3 percent), no adult was around (8 percent), allergy (6.9 percent), “other reason” (5 percent), and ceremonies/funerals (2.1 percent). The pie chart in Figure 7 illustrates this breakdown. Overall, 362,747 (18.3 percent) of 1,980,471 rooms found were not sprayed because they were locked, the homeowner refused or the room was used as food storage space for cereals, coconuts, and/or seaweed.

FIGURE 7: STRUCTURES NOT SPRAYED DURING 2018/2019 IRS CAMPAIGN



5.13 USE OF INSECTICIDE RESULTS

SOPs used 155,791 sachets of SumiShield 50WG and 27,200 bottles of Actellic 300CS to spray 595,923 structures during the 2019 spray campaign. On average, one sachet sprayed 3.5 structures and one bottle sprayed 3.2 structures. SOPs used an average of 3.1 bottles and sachets per day, and each SOP sprayed an average of 10 structures per day. Table 10 shows details of insecticide consumption by district.

TABLE 10: INSECTICIDE USE DURING 2018/2019 IRS CAMPAIGN

District	Total Structures Sprayed	Total Bottles/Sachets Used	Average Number of Structures Sprayed per Bottle/Sachet	Average Number of Bottles/Sachets per SOP per Day	Number of Structures Sprayed per Day per SOP
Bukoba Rural	73,510	21,872	3.4	3.0	10.1
Missenyi	59,206	17,277	3.4	2.8	9.7
Ngara	81,276	25,454	3.2	3.0	9.7
Chato	123,640	39,636	3.1	3.3	10.4
Nyang'hwale	58,926	19,415	3.0	3.5	10.5
Buchosa	69,540	21,069	3.3	3.2	10.6
Kakonko	35,486	11,068	3.2	2.2	7.0*
Mainland Total	501,584	155,791	3.2	3.1	9.9
Pemba	18,504	5,103	3.6	3.0	10.9
Unguja	75,835	22,097	3.4	3.1	10.6
Zanzibar Total	94,339	27,200	3.5	3.1	10.6
Total	595,923	182,991	3.3	3.1	10.0

* The number of structures earmarked for spray in Kakonko District were sparsely located, leading SOPs to travel long distances and spray fewer structures per day.

At the end of the spray campaign, 6,564 sachets of SumiShield 50WG and 5,310 bottles of Actellic 300CS remained unused and are safely stored in warehouses on the mainland and in Unguja for use in future operations.

6. ENVIRONMENTAL COMPLIANCE

The goals of the environmental compliance activities were to ensure the safety of field staff and community members, to avoid contaminating the environment, and to ensure compliance with U.S. Agency for International Development (USAID) and national requirements in importation, storage, and use of insecticides.

Before the start of the spray campaign, the PMI VectorLink Tanzania project pursued a number of legal clearances with USAID and the government of Tanzania such as an approved letter report, Environmental and Social Impact Assessment (ESIA) for the new district to implement IRS (Kakonko), and variation certificates for the six districts that previously were issued ESIA that did not cover the use of SumiShield 50WG. Provisional approval was granted to proceed with IRS while the government was processing ESIA and variation certificates and insecticide import permits. The variation certificates were issued while the campaign was under the cover of provisional approval; the ESIA for Kakonko awaits field review by NEMC and the experts meeting to approve our application. Project staff follow-up regularly in hope of obtaining approval before the end of July 2019.

Annex D contains the 2019 Environmental Mitigation and Monitoring Report.

6.1 PRE-, MID-, AND POST-SEASON ASSESSMENTS

6.1.1 PRE-IRS ASSESSMENT

A PMI VectorLink Tanzania team comprising the environmental compliance officer (ECO), operations manager, and the five IRS regional coordinators conducted pre-IRS environmental compliance assessments for 93 operations sites, 78 in mainland Tanzania and 15 in Zanzibar. The assessments took place between August and November 2018. They focused on the status of IRS operations sites and identified refurbishments needed for storage facilities, effluent management systems, and fences to prohibit access by non-IRS staff and animals. For proposed new sites, the assessment had to establish ideal locations based on Best Management Practices Manual guidelines and other local requirements. The team used pre-designed mHealth-based electronic data forms on smartphones, which enabled scoring of specified conditions for every site. The assessing officer directly submitted the scored information to a central database on an automated server at Abt's Rockville office. The server analyzed the submitted data and graded the sites as qualifying or non-qualifying for hosting IRS operations. Figure 8 shows a permanent standard site. The server also provided a list of gaps to be addressed at every site. An email from the server automatically disseminated the information to various Abt staff, including the chief of party, operations manager, and ECO, who sorted out budgetary and logistic requirements for the refurbishment of sites in collaboration with the procurement team.

To comply with the importation requirement, project personnel delivered to the TPRI in Arusha a sample of six sachets of SumiShield 50WG for the quality assay. The TPRI found the submitted samples to be of the required quality, with active ingredient at the level of (50.1–50.5 percent). This compares well with the WHO/United Nations Food and Agriculture Organization specification, which ranges from 47.5 percent to 52.5 percent. A copy of the certificate of analysis appears in Annex F.

FIGURE 8: STANDARD IRS SITE WITH A WASHING SLAB, SOAK PIT, WATER RESERVOIR, AND BATHING FACILITIES AT MBUZINI B IRS SITE IN UNGUJA, ZANZIBAR



6.1.2 MID-IRS ASSESSMENT

A wide range of supervisory teams from PMI VectorLink and other stakeholders such as NEMC, the NMCP, ZEMA, and ZAMEP, and regional and district authorities conducted a mid-IRS assessment. The exercise involved inspection in assessing the level of environmental compliance through supportive supervision. Where they noted gaps, the PMI VectorLink Tanzania team instituted immediate corrective measures. These included instructions to supervisees, and replacement or repair of missing or damaged tools.

FIGURE 9: SOPs PERFORMING MORNING MOBILIZATION WHILE IN FULL PPE



6.1.3 POST-IRS ASSESSMENT

The PMI VectorLink Tanzania ECO, assisted by the operations manager and regional coordinators, conducted post-IRS assessments after closure and demobilization of IRS supplies back to regional or central warehouses. Using pre-designed electronic data forms, the assessment scored various aspects to evaluate the status of the site after closure and to ensure that the environment was safe for residents and all other macro and microorganisms. The project uploaded the data to the central server in the United States. An automated response indicated whether the site was safe or had issues to address.

PMI VectorLink Tanzania used iron plates secured with padlocks to cover permanent soak pits that had received effluent from the washing bays. The aim is to prohibit access by humans and other animals to the contaminated surface. Also, it will prevent the growth of plants and collection of debris that eventually clogs the system. The temporary soak pits, whose walls were protected with plastic sheeting, were closed by folding the plastic on top of the coarse aggregate and covering this with a layer of soil.

TABLE II: IRS SITES THAT WERE REFURBISHED BEFORE 2018/2019 IRS CAMPAIGN

Location	Permanent Sites	Temporary Sites	Site Refurbished or Set Up (soak pit, storeroom, fence, etc.)
Mainland Tanzania	47	31	<ul style="list-style-type: none">• 31 temporary IRS sites refurbished• 47 permanent IRS sites refurbished
Zanzibar	15	0	<ul style="list-style-type: none">• 5 permanent IRS sites established• 10 permanent IRS sites refurbished

6.2 WASTE MANAGEMENT

PMI VectorLink Tanzania used different approaches for waste management: effluent detoxification, incineration, recycling, re-use, and disposal at the municipal landfill. Several factors guided the choice of approach: the type of the waste (effluent or solid), level of contamination with insecticide, available technology for recycling, and laws and regulations of the U.S. and Tanzanian governments.

For detoxification of effluent from washing pumps and SOPs' PPE, the project built and installed soak pits with multiple layers of gravel, stones, and wood, charcoal, and sawdust or rice hulls. These layers provide numerous functions that collectively ensure filtration, reduction of flow speed, dispersion, adsorption, and absorption as the effluent seeps through the soak pit layers. This technique complies with PMI Best Management Practice Manual standards, which the WHO, USAID, and the Government of Tanzania accept.

For paper wastes, PMI VectorLink Tanzania secured vendors that collected waste paper (cardboard used as packaging material and guide handbooks) from our warehouse and eventually delivered them to paper mills, where they are recycled.

PMI VectorLink Tanzania incinerates lightly contaminated solid wastes that can neither be recycled nor given away. Incineration is done at Nyanguge in Mwanza Region and at Kivunge Hospital in Zanzibar, which have incinerators that can heat to greater than 1,000°C. Wastes incinerated included sachets used as primary packaging containers for clothianidin (SumiShield 50WG), contaminated masks, sand used during spill management, and other secondary packaging materials not suitable for recycling and which do not produce dioxins on burning.

Other non-contaminated and damaged solid wastes not suitable for incineration were given away, when possible, or as a last resort, sent to municipal landfills. Items in this category include boots, coveralls, helmets, and haversacks. Teams cleaned and gave away items with minor damage to selected groups in need of such items, such as prisons and schools.

For mainland Tanzania, metallic solid wastes were turned over to licensed and NEMC-certified vendors Ibrahim S. Omari and Ally Mussa Tarimo, Plastic waste was turned over to Victoria Molders. Electronic

waste like calculators were given to Kenwood Enterprises Tanzania Limited, a company registered in the country to handle this waste. The Zanzibar Environmental Management Authority (ZEMA)-certified recycling company, Ally Othman Shredding Center, will recycle the bottles. In Zanzibar, vendors with permits to handle various other wastes are being identified. Information on solid waste quantification and management is in Annex G.

6.3 WORKER AND RESIDENT SAFETY

PMI VectorLink Tanzania put in place measures to ensure workers' and residents' safety during the 2019 IRS campaign, in keeping with the project's global best practices.

The first measure was informing the public of precautions to take during IRS operations. Through IEC/BCC, which hamlet leaders implemented under the guidance of WEOs, the project informed the communities of their responsibilities for household preparation, what to do in case of insecticide contamination during spraying, and post-spray safety.

In addition, PMI VectorLink Tanzania trained health workers, site supervisors, storekeepers, team leaders, SOPs, washers, and drivers on first aid in case of insecticide poisoning. The project also trained six clinicians in each of the seven IRS districts of mainland Tanzania. In Zanzibar the project trained six clinicians from Unguja and six from Pemba. The project selected the designated health facilities in consultation with each district's DMO; the preference was for health facilities close to the spray areas for ease of access. In Zanzibar, it supplied to the selected health facilities ampoules of atropine, an antidote for organophosphate. Abt Associates funded the atropine procurement outside of the project.

The project followed the guidelines for PPE use by all field staff, providing all drivers who transported spray teams and insecticides with coveralls and gumboots. It trained them on the use of PPE, the management of spills, and the importance of safe driving practices, such as strict compliance with speed limits. Site guards received training on the use of fire extinguishers and management of accidental insecticide spillage.

All sites and vehicles for SOPs and insecticide transport had first aid boxes, material-safety data sheets, spill kits, emergency procedures, spill clean-up procedures, and telephone contacts for the fire brigade, police, and ECO in case of emergencies.

Also, PMI VectorLink Tanzania ensured that site supervisors and mobilizers, who were authorized to use motorbikes during the campaign, endorsed and adhered to the motorcycle policy, which regulates driving speed and ensures compliance with road safety protocols. Strict adherence to the safety precautions during the 2019 IRS campaign contributed to a safe campaign, with only one minor vehicular accident.

Annex E contains a summary of incident reports.

7. INFORMATION, EDUCATION, AND COMMUNICATION

The primary objective of the PMI VectorLink Tanzania's IRS communication activities was to ensure a successful spray campaign by motivating near-universal coverage, timely preparation of premises, and adherence to safety precautions. IEC/BCC is a vital component of IRS to ensure safe, high-quality, and effective campaigns with the high coverage and long-lasting impact of spraying.

In 2018/2019, PMI VectorLink Tanzania and DHOs in both mainland Tanzania and Zanzibar implemented IEC/SBCC activities for IRS, in particular, mass media messaging and community-level outreach activities. Prior to spraying, the project conducted advocacy and sensitization meetings at regional, district, and ward levels on the mainland and at the regional level in Zanzibar. These meetings were aimed to win the political will and support for IRS from authorities at all levels, and from communities.

IEC/SBCC approaches also involved the use of site mobilizers to coordinate hamlet leaders on the mainland and shehas in Zanzibar as they mobilized their communities before and during the spray campaign. This was supplemented by mass communication through local radio stations across IRS districts as well as by the distribution of printed IEC materials.

Specifically, 2018/2019 IEC/BCC focused on:

- Notifying communities on the forthcoming IRS campaign and the exact dates when their village or hamlet is expected to be sprayed
- Emphasizing household roles and responsibilities including properly preparing their structures before spray teams arrived, being available during spraying to open the structures and do any needed final preparation, and providing a bucket of water for mixing the insecticides
- Informing stakeholders and beneficiaries about safety issues related to the environmental and health effects of using insecticides
- Addressing community beliefs, misconceptions, and frequently asked questions about IRS and malaria
- Stressing gender equality in all IRS activities by emphasizing the need for more female participation and using IEC materials that depict women in various IRS roles
- Identifying synergies with the USAID Tulongwe Afya Project and sharing VectorLink Tanzania's IEC/BCC materials.

7.1 ADVOCACY MEETINGS

PMI VectorLink Tanzania conducted advocacy and sensitization meetings at regional, district, and ward level. The meetings were to communicate IRS messages at the district level on the mainland and thus lay the groundwork for project implementation. The project assigned WEOs and village executive officers to communicate the IRS message to hamlet and village chairs so they would disseminate the information to the communities under their leadership. In Zanzibar, regional advocacy meetings involved national, regional, and district leaders. Hamlet leaders and shehia mobilizers then took on the task of sensitizing and mobilizing their communities for the spray campaign.

7.2 COMMUNITY SENSITIZATION

PMI VectorLink Tanzania conducted community meetings with local leaders, including WEOs, village executive officers and chairpersons, council and community health agents, and hamlet leaders, as well as district, regional, and national leaders. Table 12 shows the number of community meetings conducted in 2018/2019 and the number of participants from each district.

TABLE 12: REGIONAL AND DISTRICT ADVOCACY MEETING PARTICIPANTS, 2018/2019 IRS CAMPAIGN

District	Regional Advocacy	District Advocacy	Ward Advocacy
Bukoba Rural	26	39	-
Missenyi		39	-
Ngara		42	-
Buchosa	18	35	-
Nyang'hwale	18	35	-
Chato		41	-
Kakonko	14	30	490*
Mainland Total	76	261	490
Pemba	59	-	-
Unguja	80	-	-
Zanzibar	139	-	0
Total	215	261	490

*The 2019 IRS campaign was the first IRS activity to be implemented in Kakonko district, Kigoma.

7.3 IEC/BCC MATERIALS AND INFORMATION

PMI VectorLink Tanzania engaged the local radio stations in Kagera, Kigoma, Mwanza, Geita, and Zanzibar to air 192 radio spots and 144 announcements in Swahili (Table 13). The spots aired at times that maximized the duration and coverage pre-, mid-, and post-spray. Mainland residents heard four radio spots – “Tunahama Tena,” (We are Moving Again) “Jingle,” “Dawa ya Ukoko,” (Residual Insecticides) and “Bao.”⁷ On Zanzibar, the BCC unit prepared “Upigaji Dawa Majumbani” (Indoor Residual Spraying).

The local radio stations used and districts covered were as follows:

- Radio Kwizera: Buchosa, Kakonko, Missenyi, Ngara, Chato, and Nyang'hwale
- Radio Kasibante FM: Bukoba Rural
- Shirika la Utangazaji Zanzibar (ZBC): Unguja and Pemba
- Radio Jamii Micheweni: Pemba
- Radio Jamii Mkoani: Pemba

⁷ “Bao” is an African game which resembles chess, mostly played by elders in the community. During bao games, elders often deliberate and decide on important matters concerning their communities.

In addition, PMI VectorLink Tanzania distributed 6,937 fact sheets and 1,956 question and answer (Q&A) sheets and put up 3,112 posters in the targeted mainland districts. In Unguja and Pemba, shehia leaders distributed 1,189 IEC materials comprising fact sheets, posters, and Q&A sheets. The materials had been prepared by the PMI AIRS project in collaboration with Johns Hopkins University Center for Communications Programs.

TABLE 13: VECTORLINK TANZANIA MESSAGE DISSEMINATION CHANNELS IN EACH OPERATIONS DISTRICT

Zone/Region	Location	Radio Spots	Fact Sheets	Q & A Sheets	IRS Posters
Kagera	Bukoba	48	920	259	413
	Missenyi	48	752	212	338
	Ngara		1,043	294	468
Geita	Chato		1,449	409	650
	Nyang'hwale		694	196	311
Kigoma	Kakonko		576	162	258
Mwanza	Buchosa		816	230	366
Mainland Total		96	6,250	1,762	2,804
Zanzibar	Pemba	48	132	37	59
	Unguja	48	555	157	249
Zanzibar Total		96	687	194	308
Grand Total		192	6,937	1,956	3,112

7.4 WORLD MALARIA DAY

To commemorate the 2019 World Malaria Day on April 25, 2019, PMI VectorLink Tanzania worked closely with the NMCP, ZAMEP, and IRS regional authorities to showcase IRS activities and the project's role in malaria control. It participated in the nationwide World Malaria Day commemoration in Lindi, in southern Tanzania, through a booth that explained IRS concepts and displayed IRS paraphernalia like spray pumps and PPE.

8. GENDER MAINSTREAMING

The USAID policy of gender equality and female empowerment (GEFE) aims to improve lives of citizens around the world by advancing equality between men and women and empowering women and girls to participate fully and benefit from their society's development. PMI VectorLink Tanzania recognizes GEFE as a development goal in its own right, as well as approaches to accelerate progress toward vector control. PMI VectorLink Tanzania attained a 36.3 percent of women's participation during the 2019 spray campaign. During recruitment of field staff, priority was given to women applicants if a female candidate had equal merit to a male candidate.

All operations sites were refurbished so that they could accommodate males and females, ensuring clean, safe toilets as well as showers and changing rooms that provided privacy.

PMI VectorLink Tanzania also worked with the NMCP and ZAMEP to develop IEC materials with photographs depicting women spraying. This was to motivate more women to join the IRS program. Anecdotal data suggest that these inclusive images were important to female SOPs in their decision to apply for positions on the campaign. Therefore, PMI VectorLink Tanzania will continue to use the photos in the future to recruit more women.

Several PMI VectorLink countries have found that distribution of sanitary pads to female workers encourages attendance. PMI VectorLink Tanzania distributed sanitary pads to female SOPs in all targeted districts in the 2019 spray season. Undocumented reports from seasonal workers suggest that the women appreciated these supplies, which allowed more women to consistently come to work. In addition to providing the pads, the project ensured that used pads were discreetly and hygienically disposed of. During the spray campaign, all IRS sites displayed Swahili sexual harassment posters, which reinforced a workplace culture free of harassment.

This year, VectorLink piloted adapted PPE for women in Pemba, in response to concerns that standard PPE

does not align with local norms for women's dress. The project had local tailors sew skirts and each woman was allocated two, as with coveralls, to allow for washing. Some women appreciated the skirts and said that it was not difficult to complete their work while wearing them (Figure 10). Others, particularly smaller women, found the wrap design bulky and reported that they had to roll the waistband to achieve appropriate length. Some women said they would prefer a long tunic and loose pants to the skirts. None said that the extra layer made them too hot. All men, including site supervisors, national supervisors, and zonal coordinators, thought that the skirts were an excellent idea and recommended expanding their use to Unguja next year. The team is collecting additional feedback from seasonal workers through a brief questionnaire, the results of which will be shared separately.

During the campaign, one seasonal worker in Zanzibar was found to be pregnant. She was assigned to work at the data center to arrange files in compliance with VectorLink's pregnancy policy of not allowing pregnant women to work with insecticides.

FIGURE 10: FEMALE SOP IN PPE WRAP-SKIRT REPRESSURIZES A PUMP DURING SPRAY



8.1 TRAINING

VectorLink Tanzania ensured that all permanent and temporary staff had training on gender awareness and inclusion before starting the spray campaign. The project incorporated gender awareness and integration into all IRS pre-spray training programs, which focused on PMI anti-sexual harassment guidelines. Project staff facilitated gender awareness for team leaders, site supervisors, storekeepers, SOPs, and all other temporary staff, including government personnel who were to work on the project during the spray campaign. Training was in Swahili so that all participants could understand it. Gender training established communication channels and hotlines to report any sexual harassment and gender-based violence among temporary staff.

8.2 FREEDOM FROM HARASSMENT POSTERS

To ensure a gender-equitable working environment, the project translated the anti-sexual harassment guidelines into Swahili and printed them on large Plexiglas posters that were conspicuously displayed at all operations sites and all Abt offices. This made all staff aware of the standards of the project and therefore served as a deterrent, thus making the work site safe and free from harassment.

9. CAPACITY BUILDING

9.1 CAPACITY BUILDING DURING IRS TRAINING AND OPERATION

The PMI VectorLink project builds on the AIRS project's efforts to develop the capacity of local staff and government counterparts. In 2019, PMI VectorLink built the capacity of government stakeholders through their participation in the ToT and technical training to ensure high-quality IRS spray, mobile-based supportive supervision of a spray campaign, logistic assessment, procurement, and safe and correct insecticide applications.

Involvement of ZAMEP staff and district representatives in the procurement of local materials ensured transparency and awareness of the procurement process. In addition, two ZAMEP representatives participated as observers in the mainland spray campaign, to experience how an intensive IRS operation is managed.

10. POST-SEASON ACTIVITIES

10.1 POST-SPRAY EVALUATION

Post-spray review meetings were held on March 18–31, 2019, for mainland Tanzania and Zanzibar. For Zanzibar, the project invited ZAMEP, ZEMA, DMOs, and national supervisors to the meeting. The meeting reviewed results for 2019 IRS campaigns, lessons learned, and future improvement. The post-spray review meetings were attended by the following:

- National level: Representatives from the NMCP and NEMC in mainland Tanzania and ZEMA and ZAMEP in Zanzibar
- Regional level: regional medical officers and regional malaria focal person
- District level: DMOs and DMFPs
- PMI VectorLink senior staff

10.2 INVENTORY ASSESSMENT

All warehouses conducted a post-spray inventory assessment of materials, insecticides, and empty insecticides sachets. The inventory-audited report provides an update on the materials and insecticides the project had before the campaign, quantities procured, items used during the campaign, and items that remained after the campaign for future use. The report also indicates quantities of new, used, damaged (requiring service and repair), and disposable items. Annex C shows the result of the post-IRS inventory report.

10.3 DEMOBILIZATION

Immediately after the IRS operation, the project team decontaminated all IRS materials and left them to dry at the IRS sites. The teams then demobilized materials from IRS sites to warehouses in Bukoba, Geita, and Mwanza in mainland Tanzania and Unguja and Pemba in Zanzibar for storage until the next IRS campaign. The project's ECO led the post-spray IRS inspections and IRS site closures with the support of the regional coordinators. These inspections aim to ensure collection and safe disposal of wastes, leaving the sites in an environmentally compliant condition. After confirming that the sites were in a safe and well-maintained state, the ECO formally handed back the sites to the local authorities for safe custody until the next IRS operation. This was done with the understanding that a PSDQA would still be done.

11. CHALLENGES, LESSONS LEARNED, AND RECOMMENDATIONS

11.1 CHALLENGES AND LESSONS LEARNED

The main challenges experienced and lessons learned during the 2018/2019 IRS campaign include the following:

11.2 CHALLENGES

- A delay in the Ministry's approval of the Environmental Compliance Certificate forced a slight (one-day) delay in starting the IRS campaign on the mainland
- Heavy rain during the spraying season on the mainland also made the SOPs meeting their daily targets a challenge. The teams struggled to catch up on sunny days.
- The spray campaign in Zanzibar took place later this year than in previous years, in an effort to ensure that residual efficacy lasted through the peak transmission period. However, the later start meant that the campaign was conducted during a very hot period, just before the rainy season.
- There were pockets of refusals and resistance to IRS.
- There were structures eligible for spraying, but they had no occupants to prepare and open them for spraying, because a majority of them are owned by family members residing in urban areas.
- Most of the houses were not well prepared for the arrival of SOPs, which delayed the SOPs because they had to help prepare the house. They found things like seaweed and coconuts in the rooms that were meant to be sprayed; in some cases, the main bedrooms were locked from spray because they had too many things to move outside before spray.
- Some IRS cards within the same district were printed with the same IRS number, leading to duplicates in the database.
- Issues with syncing data from the desktop application to the VectorLink Collect server temporarily delayed spray data availability.
- Some washers were overburdened with work due to the large size of the sites, which meant more field staff and more clothes to wash.
- Not all cadres of staff received pocket guides, as these only exist for a few job categories on PMI VectorLink.
- Many refusals were due to the popular myths that IRS attracts bed bugs and causes impotence.

11.3 LESSONS LEARNED

- Strict training and supervision on safety issues led to essentially zero vehicle accidents during the 2019 campaign. There was only one minor motorcycle accident, on Zanzibar.
- Intensive and strict supportive supervision of site, district, regional, national, Abt staff, and external supervisors contributed greatly to decreased cases of insecticides loss.

- Assignment of tasks to field supervisors created a sense of both ownership and accountability during the campaign. Two DITT members and two ZAMEP supervisors in each location were assigned to do DCV while the remaining supervisors did regular supervisory checks, making it easy to spot red flags and take quick corrective measures during the campaign.
- Giving M&E assistants an additional (third) field day to conduct DCV alongside project M&E staff and the two DITT members allowed more structures to be verified and provided a nearly matching spray coverage between SOPs data, DCV findings, and PSDQA results.
- Use of carefully selected, experienced external supervisors strengthened supportive supervision and on-the-job mentoring of spray teams.
- The household-to-structure ratio appeared to be low in Kakonko District, hence fewer structures were sprayed during the campaign. This was the first time that IRS had been conducted in this district and the estimated number of structures was too high.
- The newly introduced Daily Site Mobilizer form helped the mobilizers know the estimated structures earmarked for spray, and they worked with site supervisors and hamlet leaders in identifying unsprayed structures for mop-up.
- Quantification of insecticides was enough that there was no need to ration insecticide. This is because insecticide estimations were based on projected census data, which gave a more realistic picture than did using the number of structures found in the previous year (2017/2018).
- There was an increase in the number of IRS cards and stickers issued daily to SOPs from 12 each to 15, which ensured all visited structures were accounted for.
- ToT and SOP training, and supportive supervision emphasized the need to record all eligible structures found.
- Introducing Voda M-Pesa and facilitating field staff's access to registered Vodacom simcards made the payment of all IRS seasonal staff easier and faster than expected.
- Building sister washing slabs shortened formerly long queues for SOP and expedited end-of-day clean-up.
- Sprayers' coveralls do not allow free air circulation and make the wearer uncomfortably hot.
- Adoption of a skirt for female sprayers in Pemba was well received. The team may modify the design of the skirt slightly in future years in response to feedback from the pilot.
- A daily nutritious, hot breakfast served to SOPs supported their work during long days in the field, and water breaks during the day allowed them to avoid dehydration.
- Introduction of solar emergency lights for site stores made storekeepers work in a conducive environment where they could access store materials and documents early in the morning when the teams were preparing for work.
- Newly-available dashboards proved to be useful. The supervision team relied on them to identify key areas for additional support during the campaign.

11.4 RECOMMENDATIONS

- IRS should be done before the rainy season. This calls for an early decision on areas targeted for spraying, to give the implementation team enough time to prepare for the spray campaign.
- Strict training and supervision on safe vehicle usage should be continued.
- Strict supportive supervision of SOPs to ensure good quality of spray should be continued.

- Village chairs in spray districts should be engaged as part of the local authority close to the communities along with hamlet leaders, village executive officers, and WEOs.
- Sharing information and community education on IRS should be done repeatedly in religious congregations and schools during the campaign to give community members correct information on IRS.
- Printing of numbers on IRS cards should be carefully monitored to reduce the problem of repeated numbers and duplicates in the database.
- The number of site washers should reflect the number of wash slabs per site.
- The project should consider replacing SOP coveralls with two-piece PPE, which are cooler.
- Frequent learning sessions for supervisors, engagement during data analysis, and feedback meetings could create more data ownership, improve interpretation skills, and build the capacity of government stakeholders.

ANNEX A: LOCAL PROCUREMENT

Description	Unit of Measurement	Quantity
Assorted Materials		(per item unless noted)
Araldite glue for Hudson pump repairs	Pc	199
Bar soap	Bar	3912
Aprons (for washers)	Pc	33
Coverall	Pc	327
Gumboot	Pair	969
Helment	Pc	319
Basin 80 L	Pc	219
Batteries for watchmen and team leaders	Pc	19617
Calculators	Pc	523
Barrel for liquid waste	Pc	17
Slashes	Pc	4
Chalk (pct. of 100)	Packet	1394
Rakes	Pc	4
First aid kits (site and SO vehicle)	Set	290
Haversacks	Pc	1,518
Handkerchiefs (for sieving water)	Pc	3489
Jug - 2lt	Pc	115
Calibrated jug	Pc	2
Liquid washing soap (5 L)	5L Bottle	581
Lubricant oil (1L bottles)	Bottle	217
Padlocks	Pc	114
Plastic cup (0.5L)	Pc	523
Plastic bag for parking material	Kg	500
Yellow hazard bags	Pc	104
Colour coded vest - Yellow	Pc	95
Colour coded vest - Orange	Pc	18
Dust bin	Pc	102
Mopper bucket (cleansing set)	Pc	45
Pregnancy tests for female spray personnel	Pc	1,164
Female skirt for Pemba	Pc	106
Emergency Solar light	Pc	87
Plastic bucket 20L	Pc	91
Plastic bucket 10L with side marking lines painted in RED	Pc	51
Plastic bucket for vehicles (10 lts)	Pc	4
Sanitary napkins for female spray personnel	Pc	1396
Sisal rope - cylinder roll, 80m length, 2mm diameter	Roll	199
Socks	Pair	3297

Description	Unit of Measurement	Quantity
Stationary - box files for Data Management Unit	Pc	397
Stationary - Attendance Register	Pc	213
Stationary - box files for sites	Pc	174
Stationary - clear bag files	Pc	2559
Stationary- notebook	Pc	4545
Stationary - store ledger book	Pc	204
Stationary – marker pens	Pc	3474
Stationary – masking tape	Pc	261
Stationary - pens	Pc	4699
Stationary – stapler machine	Box	21
Stationary – stapler pins	Pc	123
Tool kits big	Pc	54
Toilet paper	Pc	3060
Tooth brush (for cleaning nozzles)	Pc	873
Towel (small towel,100% cotton	Pc	3270
Torch	Pc	2801
Water Tank (1000L)	Pc	45
Stationery – Puncher Machine	Pc	12
Stationery – Visitors Book	Pc	111
Thermometers	Pc	24
Nose masks (N 95)	Pc	26,994
Printed materials		
<i>M&E forms</i>		
IRS cards	Pc	652917
Spray operator forms	Pc	83429
Team leader forms	Pc	14937
PMT forms	Pc	279
EE form for supervisor	Pc	180
PMT forms	Pc	310
<i>IEC materials</i>		
IEC materials - Q&A brochures	Pc	1,762
IEC materials - fact sheets	Pc	6,249
IEC materials - posters	Pc	2,804
<i>Store stationary</i>		
Bin cards	Pc	8700
Household stickers	Pc	709912
Daily distribution form	Pc	2835
Goods received notebooks	Pc	2550
Goods issued note books	Pc	154
Daily insecticide tracking sheets	Pc	2735
Daily monitoring form for insecticide consumption	Pc	2735
Temperature log sheet	Pc	261
<i>Finance Forms</i>		
Training attendance sheet	Book	120

Description	Unit of Measurement	Quantity
Daily IRS attendance sheet	Book	120
IRS vehicle logbook	Book	180
Medical attendance card	Pc	900
Temporary worker contracts	Book	104
IRS transportation		
IRS supervision vehicles	Vehicle	18
Vehicles for distribution of IRS materials	Vehicle	47
Vehicles for transporting of spray operators	Vehicle	153

ANNEX B: INTERNATIONAL PROCUREMENT

Description	Unit of Measurement	Quantity
Nose masks (N95)	Pc	83,040
Short gloves	Pc	3,024
Long gloves	Pc	10
Face shields	Pc	1,000
Goizper team leader kit	Pc	369
Goizper tool to tighten chamber	Pc	80
SumiShield 50WG	Sachets	161,374

ANNEX C: STOCK UPDATE

Item Name	Unit	Stock from 2018	Procured 2019	Total before IRS	Issued during IRS	TOTAL After IRS
PPE:						
Total coverall	Pc	8308	327	8635	7865	8169
Nose masks (N95)	Pc	960	110034	11994	79902	32902
Neck protection	Pc	7325	0	7325	5974	7285
Total gumboot	Pair	2555	969	3524	3522	3030
Gloves new	Pair	0	3024	3024	1779	1227
Gloves used	Pair	2809	0	2809	2809	4065
Long gloves for washers	Pair	194	10	204	186	164
Helmet, complete (with harnesses and chin strap)	Set	4810	319	5129	3880	4111
Helmet harness	Pc	4491	0	4491	3611	4633
Face shield new from U.S. 2017 and 2018	Pc	7944	1000	8944	4993	6423
Shield brackets new from the U.S.	Pc	1092	0	1092	596	868
Shield adaptor	Pc	17298	0	17298	4392	16003
Other equipment for operation:						
Handkerchief	Pc	0	3489	3489	2851	638
Socks	Pc	0	3297	3297	2835	462
Small towels	Pc	0	3270	3270	2845	425
Haversack with USAID logo	Pc	3482	1518	5000	4235	4292
Plastic cup (0.5 L)	Pc	2442	523	2965	2841	2423
Tool kits	kit	35	54	89	89	86

Item Name	Unit	Stock from 2018	Procured 2019	Total before IRS	Issued during IRS	TOTAL After IRS
Basin 80 Lts	Pc	1180	219	1399	1344	1248
Barrel for liquid waste	Pc	170	17	187	175	185
Hoe	Pc	118	0	118	88	108
Slashes	Pc	125	4	129	93	126
Rakes	Pc	116	4	120	93	119
Plastic buckets 20 Lts	Pc	1975	91	2066	1488	1889
Plastic buckets 10 Lts	Pc	113	51	164	132	152
Jag for bucket and basin	Pc	3071	115	3186	2257	3048
Thermometer	Pc	153	24	177	177	129
Moper bucket, moper (cleansing set)	Set	681	45	726	249	685
Squeezer	Pc	494	0	494	234	488
Soft broom	Pc	246	0	246	234	227
Hard broom	Pc	338	0	338	234	321
Dustbins	Pc	0	102	102	95	99
Calibrated jug 2Lts	Pc	150	2	152	152	129
"Tooth brush" for nozzle cleaning	Pc	37	873	873	637	236
Colour coded vest yellow	Pc	657	95	752	742	596
Color-coded vest orange	Pc	286	18	304	185	203
Washing brush	Pc	178	30	208	186	198
Plastic apron	Pc	189	33	222	170	139
Consumables:						
Battery per watchmen (Size MU-1)	Pc	0	19617	19617	15847	3770
Liquid washing soap	P/5L	0	581	581	259	322
Bar soap	Bar	0	3912	3912	2857	1055
Powder soap	15Kg	0	2205	2205	1980	15
Toilet paper	Pc	0	3060	3060	2773	287

Item Name	Unit	Stock from 2018	Procured 2019	Total before IRS	Issued during IRS	TOTAL After IRS
Lubricant oil	Litre	0	217	217	168	49
Pregnancy test	Strip	0	1164	1164	1164	0
Spray Equipment:						
Total Hudson pump	Pc	3183	0	3183	982	1722
Goizper pumps	Pc	1465	0	1465	1333	1463
Pump hunger	Pc	176	0	176	95	176
Pallets	Pc	620	56	676	460	676
Hudson pump spare parts						
Hudson spare kits	kit	46	0	46	46	39
Hose connector 115-950	Pc	35	0	35	35	0
8L extension tube assembly only 141-967	Pc	33	0	33	0	33
Hosepipe/hose only 115-902 (Hose 5' Long)	Pc	834	0	834	834	34
Plunger tube and handle only 147-501	Pc	23	0	23	0	23
Shutoff valve body cap 115-733	Pc	0	0	0	0	0
Teflon bearing for valve pin 110-234	Pc	0	0	0	0	0
Strainer assembly complete 146-617	Pc	0	0	0	0	0
O ring gasket for male strainer fitting 805-310	Pc	2865	0	2865	0	2865
Strainer housing assembly 146-627	Pc	171	0	171	50	121
Nozzle body 114-791	Pc	255	0	255	17	238
Shutoff cock 806-428	Pc	103	0	103	60	80
Supply tube 129-074 - 3-gallon tank	Pc	46	0	46	26	20
Supply tube 129-074 - 4-gallon tank	Pc	5	0	5	5	0
CFV (Green) 98668	Pc	92	0	92	50	83
CFV (Blue) 98667	Pc	82	0	82	0	82
CFV (Red) 98666	Pc	1636	0	1636	637	1536
CFV (Yellow) 98665	Pc	50	0	50	0	99

Item Name	Unit	Stock from 2018	Procured 2019	Total before IRS	Issued during IRS	TOTAL After IRS
Male fitting for strainer housing 114-905	Pc	107	0	107	17	90
Nut wing 115-970	Pc	182	0	182	50	132
No. 8002E hardened stainless steel nozzle tip (TIP T-JET) 805-855	Pc	1227	0	1227	344	883
Nozzle body cap (nozzle nut) 115-680	Pc	1150	0	1150	161	989
Hose adaptor assembly (stop cock) 148-704	Pc	0	0	0	0	0
Hose adaptor 115-960	Pc	0	0	0	0	0
Supply tube adapter with wing fitting 115-968	Pc	7	0	7	0	7
Pump cylinder assembly, complete (brass cylinder assembly XP) 147-202	Pc	0	0	0	0	0
Shutoff assembly complete thrust less (thrust less subassembly) 149-706	Pc	0	0	0	0	0
Shoulder strap "2" wide 152-829	Pc	131	0	131	1	130
Hose with thrust less, shutoff and strainer assembly (hose assembly) 146-689	Pc	93	0	93	12	81
100-Lb pressure gauge 803-311	Pc	256	0	256	29	227
Filter assembly for pressure gauge 146-605	Pc	151	0	151	15	136
Plunger assembly, complete for 3/4 gallon unit (147-538) 147-541	Pc	0	0	0	0	0
Cup replacement kit 148-833	Pc	212	0	212	120	92
Shutoff valve body 113-377	Pc	0	0	0	0	0
Cover assembly complete 140-205	Pc	0	0	0	0	0
Plug for gauge adaptor fitting (Plug) 114-152	Pc	481	0	481	207	274
Cotter Pin, 3/32 x 7/8 - 801-419	Pc	2411	0	2411	596	1815
1/8 x1/2 cotter pin 801-423	Pc	283	0	283	225	58
Polyethylene nozzle gasket 123-950	Pc	4440	0	4440	554	3886
Extension tube and nozzle assembly 141-966	Pc	0	0	0	0	0
Nozzle assembly complete 141-989	Pc	0	0	0	0	0
Supply tube only for 4-gallon tank 129-075	Pc	36	0	36	10	26

Item Name	Unit	Stock from 2018	Procured 2019	Total before IRS	Issued during IRS	TOTAL After IRS
Strainer (Filter) 152-356 (152 -135)	Pc	676	0	676	12	664
Bumper pad 151-028	Pc	680	0	680	0	680
Cup retainer 153-816	Pc	301	0	301	22	279
Washer 123-908	Pc	978	0	978	77	851
Cup leather only 154-007	Pc	668	0	668	267	401
Hose clamp 803 623	Pc	759	0	759	127	632
Valve pin assembly 143-000	Pc	1090	0	1090	102	988
Cover chain 116-426	Pc	382	0	382	20	362
Valve body cap, with O ring gaskets 149-702	Pc	149	0	149	20	129
Housing for pump cylinder 110-790	Pc	219	0	219	9	210
Shutoff valve pin 115-716	Pc	185	0	185	14	171
Shutoff valve pin washer 123 -911	Pc	0	0	0	0	0
Pump cylinder check valve assembly 140-054	Pc	571	0	571	64	507
Bumper spring 150-409	Pc	117	0	117	0	117
Shutoff valve pin spring 150-400	Pc	1198	0	1198	0	1198
Spring for pump cylinder check valve 150-604	Pc	379	0	379	0	379
Valve pin spring 150-605	Pc	4481	0	4481	0	4481
Pump cap assembly, brass 149-102	Pc	144	0	144	33	111
Valve body cap O ring 805-309	Pc	0	0	0	0	0
O ring gasket for extension tube (805 -337)	Pc	580	0	580	200	380
Plunger adaptor 153-812	Pc	914	0	914	58	856
O ring gasket for hose connector 805-307	Pc	740	0	740	126	614
O ring for supply tube 805-312	Pc	1017	0	1017	20	997
Shutoff valve pin packing 151-016	Pc	290	0	290	0	20
Teflon valve pin sparer 118-243	Pc	0	0	0	0	0
Valve body cap O ring for valve pin 805-335	Pc	3361	0	3361	364	2997

Item Name	Unit	Stock from 2018	Procured 2019	Total before IRS	Issued during IRS	TOTAL After IRS
Cover gasket 151-401	Pc	250	0	259	33	214
Plier spanner	Pc	140	0	140	63	77
Adjustable spanner	Pc	131	0	131	117	118
Screw driver	Pc	227	0	227	3	224
Pump cylinder gasket 151-030	Pc	4130	0	4130	205	3925
Shutoff operating lever 123-899	Pc	954	0	954	0	954
Instruction booklet - 871-596B	Pc	405	0	405	331	74
Instruction booklet - 871-598	Pc	0	0	0	0	0
Goizper pump spare parts						
Complete hose	Pc	47	0	47	0	47
Evo complete handle	Pc	21	0	21	20	5
Lance tube	Pc	43	0	43	0	43
Pressure regulator without	Pc	0	0	0	0	0
Tool to tighten chamber	Pc	0	80	80	32	86
Goizper team leader spare kits	kit	434	369	803	349	798
Goizper nozzle	Pc	0	0	0	0	0
Insecticide:						
Actellic 300CS	Bottles	21823	10603	32506	27196	5310
Actellic 300CS empty bottles	Bottles	0	0	0	0	27193 ⁸
SumiShield 50WG	sachets	0	161374	161374	154750	6564
SumiShield 50WG empty sachets	sachets	0	0	0	0	154744
Environmental compliance and mitigation devices:						
Plastic sheets	Pc	4029	444	4473	3623	4362
Empty sachet container	Pc	5387	0	5387	0	2691

⁸ Three bottles were issues to TPRI and the empty bottles were not returned to the project.

Item Name	Unit	Stock from 2018	Procured 2019	Total before IRS	Issued during IRS	TOTAL After IRS
Whistle for security	Pc	176	22	198	184	205
Emergency medication kit	Pc	340	327	667	347	490
Emergency solar light	Pc	0	87	87	78	67
Torch for security guards,Sop and team leaders	Pc	467	2801	2801	2892	2547
Fire extinguisher 5 Kg	Pc	22	0	22	0	17
Fire extinguisher 9 Kg	Pc	206	15	221	186	212
Red tin bucket 10 litres for sand	Pc	225	0	225	156	230
Shovel	Pc	128	02	130	93	130
Safety signs and labelling	Pc	272	9	281	186	230
Water pump	Pc	0	0	0	0	0
Yellow hazard bag	Pc	0	104	104	97	7
Barrel for solid waste 100 ltrs	Pc	185	19	204	186	158
Water tank 210Lt	Pc	32	0	32	12	27
Water tank 500Lt	Pc	6	0	6	1	4
Water tank 550Lt	Pc	3	0	3	3	1
Water tank 1000Lt	Pc	60	25	85	85	58
Water tank 2000Lt	Pc	10	0	10	8	10
Water tank 3000Lt	Pc	2	0	2	0	1
Generator	Pc	0	0	0	0	0
Door locks	Pc	326	159	485	395	248
File shelf	Pc	3	0	3	0	3
Heavy-duty shelf	Pc	61	0	61	0	61
Bags for packing of materials (sandarusi)	Pc	0	598	598	308	290
Sisal ropes	Pc	0	199	199	197	2
Weigh scale	Pc	0	0	0	0	0

Information system:

Item Name	Unit	Stock from 2018	Procured 2019	Total before IRS	Issued during IRS	TOTAL After IRS
Calculator	Pc	438	523	961	451	883
USAID stickers small and big sizes	Pc	193	0	193	173	20
IRS Stickers	Pc	0	709912	709912	709912	15600
IRS cards by SOPs	Pc	0	652917	652917	652917	26247
Chalks white/coloured	Pc	602	139380	139982	139982	54250
SOPs form	Pc	0	83429	83429	83429	10792
PMT forms by storekeepers	Pc	30	279	309	309	70
Team leaders eliminators forms	Pc	0	0	0	0	0
Team leaders forms (with EE forms at the back)	Pc	0	14937	14937	14937	1827
Supervisor Forms	Pc	0	0	0	0	0
Bin cards	Pc	174	8700	8874	8596	278
Store ledger book	Pc	45	204	249	249	73
Daily distribution form	Pc	0	2835	2835	2458	240
Goods received note (GRN) forms	Pc	0	2550	2550	1630	1027
Issue vouchers booklet	Pc	0	184	184	138	51
Daily insecticides tracking sheets	Pc	0	2735	2735	2735	392
Daily monitoring form for insecticides consumption	Pc	0	2735	2735	2735	540
Daily temperature Log sheet	Pc	0	261	261	261	40
Attendance register	Pc	33	213	246	246	110
Visitor's book	Pc	5	111	116	116	24
My clear bag	Pc	674	2559	3233	2992	2050
ID card holder	Pc	3288	0	3288	2980	3096
Box files for DMU and site stores	Pc	44	397	441	312	129
Flat file	Pc	0	174	174	174	0
Pens	Pc	0	4699	4699	3967	662
Punch machine	Pc	111	12	123	93	227

Item Name	Unit	Stock from 2018	Procured 2019	Total before IRS	Issued during IRS	TOTAL After IRS
Stapler machine	Pc	97	18	115	93	105
My pockets guides for storekeepers	Pc	0	88	88	78	80
My pockets guides for team leaders	Pc	428	0	428	314	399
My pockets guides for spray operators	Pc	0	2240	2240	1876	2136
Envelope A4	Pc	0	0	0	0	0
Participant attendance list	Pc	0	0	0	0	0
Rubber band	B10	0	85	85	85	0
Stappler pin size 24/6	P1000	87	117	204	108	67
Masking tapes	Pc	0	261	261	261	0
Paper clips	Box	0	0	0	0	0
Sexual harassment poster	Pc	0	98	98	93	95
Marker pen	Pc	0	3474	3474	3072	618
Notebooks	Pc	0	4545	4545	3173	1372
IEC:						
Leaflets	Pc	0	0	0	0	0
VectorLink posters	Pc	0	2804	2804	2479	325
Flip charts	Pc	0	54	54	54	0
Q&A brochure	Pc	0	1762	1762	1586	176
Atropine inj. sulphate	Pc	0	110	110	110	0
Aladite glue	Pc	0	199	199	199	48
Sanitary pads	Pc	0	1396	1396	1254	142
Food items:						
Biscuits	Bottles	0	0	0	0	0
Juices	Bottles	0	0	0	0	0

ANNEX D: ENVIRONMENTAL MITIGATION AND MONITORING REPORT

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
1. Occupational risks for workers involved in IRS campaigns			
1.1. Pre-contract inspection and certification of vehicles used for pesticide or spray team transport	<p>Each vehicle selected for IRS operations had to submit a certificate of inspection from the government vehicle inspector. After that, the ECO and other members of the technical team inspected the vehicles to ensure they met IRS standard requirements.</p> <p>A total of 217 vehicles were hired to support IRS operations in mainland Tanzania and Zanzibar.</p>	<p>The project did not contract vehicles that did not meet PMI and IRS requirements or local regulations on vehicle road worthiness, such as the driver having a valid driving license, road license, and insurance, or the vehicle having strong benches for SOPs to sit on. Old and expired fire extinguishers were replaced with new ones.</p> <p>When the vehicle broke down during the operation, the vendor replaced it with another vehicle.</p>	
1.2. Driver training	<p>A total of 217 drivers who would transport spray teams and insecticide were trained on safety issues, including observing speed limits and ensuring passengers use safety belts, on wearing proper PPE, and on managing insecticide spills. All vehicles were issued documents such as a spill management guide and first aid guide in case of insecticide intoxication.</p>	<p>No issue was reported.</p>	
1.3. Cell phone, PPE, and spill kits on board during pesticide transportation	<p>We ensured that cellphone, PPE, and spill kits were on board during insecticide transportation.</p>	<p>The very few cases of drivers not found in PPE were recorded as non-compliant and corrective measures immediately taken.</p>	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
1.4. Mandatory pregnancy testing for female candidates applying for jobs with potential pesticide contact (washers, SOPs, team leaders, storekeepers, pump technicians, and supervisors)	1,252 ⁹ IRS female workers were given a pregnancy test; all but one test was negative and so those women qualified for the work.	The one woman who was found to be pregnant was assigned to a different job that would not expose her to insecticides.	
Mandatory health fitness testing for all SOPs	All IRS workers who might be exposed to insecticide were tested for fitness. These included SOPs, washers, team leaders, storekeepers, and supervisors. 2,967 ¹⁰ personnel were tested and found to be physically fit for IRS work.	There were no issues.	
1.5. Procurement of, distribution to, and training on the use of PPE for all workers with potential pesticide contact	All workers who might be exposed to and thus contaminated with insecticide were trained and issued PPE for their protection.	There were no issues of concern.	
Training on mixing pesticides and proper use and maintenance of spray pumps	All SOPs were trained on mixing pesticides before spraying. Pump technicians were re-trained on pump maintenance and repair. On a daily basis during morning mobilization, the procedure for insecticide mixing was repeated by the supervisor to ensure all SOPs could do so correctly.	In the first few days of the campaign, there were reports of pump leakage, which were followed up and fixed.	Pump leakages were reported and fixed immediately.
Provision of adequate facilities and supplies for end-of-day clean-up	All items needed for the end-of-day clean-up (water, soap, wash basins, etc.) were adequately supplied.	No outstanding issue.	

⁹19 Supervisors, 168 Team Leaders, 949 SOPs, 37 Storekeepers, 0 Pump Technicians, 79 Washers.

¹⁰69 Supervisors, 388 Team Leaders, 2,323 SOPs, 93 Storekeepers, 1 Pemba Warehouse Storekeeper, and 93 Washers.

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
1.6. Enforcement of clean-up procedures	Team leaders did careful supervision of end-of- day clean-up	No outstanding issue	
2. Health and safety risks for residents of treated houses (e.g., risks from skin contact and/or ingestion of insecticides)			
2.1. Inform homeowners of their responsibilities and precautions to take during IEC campaigns	For the 2019 campaign, IEC/BCC was mainly conducted by hamlet leaders and shehia mobilizers, who were trained before their engagement. Mass media campaigns, mainly on the radio, were also used.	Though there was good information coverage, some homeowners refused IRS or did not adequately prepare their households for spray.	Government leaders were engaged to address refusals and IRS was subsequently implemented with safety precautions for residents.
2.2 Prohibit spraying of houses that are not properly prepared	Where SOPs encountered inadequately or unprepared structures they had to educate and support families in household preparation for spraying.	Improper preparation continues to be a challenge; it takes up field time of SOPs who end up helping to prepare houses, or forces fewer rooms to be sprayed.	Future campaigns should more quickly leverage government machinery, especially village leaders, to ensure all houses are well prepared before SOPs arrive.
2.3 Advise homeowners to not enter their houses for two hours after spraying	Homeowners were instructed to remain outside for two hours after spray, and not to paint the house.	No outstanding issue	In the future, homeowners will be told to ask the SOP what to do after spraying. Mobilizers and mass media will continue to emphasize the importance of remaining outside for two hours.
2.4 Instruct homeowners to wash itchy skin and go to a health clinic if symptoms persist	This was given as part of post-spray instructions.	No outstanding issue	
3.0 Environmental risks that might be caused by insecticides eaching the targeted surfaces			
3.1. Indoor spraying only	Spraying covered the recommended surfaces.	No outstanding issue	
3.2. Train on proper spray technique and use of CFV to ensure only the needed amount is applied to targeted wall	Spraying techniques were carefully adhered to.	No outstanding issue	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
3.4. Maintain pumps to prevent leakage	Pump leakages were flagged in the first week of the campaign; two SOPs were contaminated with insecticides	A leaking pump can contaminate the SOP and the environment and waste insecticide. The program trained a pump technician for every site who promptly repaired the reported leaking pumps.	The reported leaks were fixed. Also, the project has procured many new pumps, thus minimizing the number of old pumps that are likely to leak.
3.5 Choose sites for disposal of liquid wastes according to PMI best management practices	All soak pits were well located, fenced, and covered to ensure maximum safety.	No outstanding issue was observed.	All soak pits were fenced to ensure humans and animals had no access to them. During the campaign, the project employed site guards to keep unwanted people and animals away. Post-IRS, steel covers were installed on all soak pits that had received highly contaminated effluent from the washing slab to further prevent access by people and animals.
3.6. Construct soak pits with charcoal to absorb pesticide from rinse water	Project rehabilitated and reconstructed some soak pits according to PMI best management practices guidelines.	There were no outstanding issues of concern.	
3.7 Maintain soak pits as necessary during the campaign	There were cases where soak pits showed signs of overflowing.	Such events happened due to excessive rains that coincided with the spray season.	The reported cases were fixed by vendors assigned to repair the specific IRS sites. Also, the slabs were provided with plastic covers to divert rainwater from the soak pits.

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
3.8. Inspect and certify solid waste disposal sites before spray campaign	The program inherited two incineration units, that were qualified by the Supplemental Environmental Assessment for incineration of masks and other contaminated materials; however, one incinerator, in Zanzibar, is to be relocated in future due to the recent construction of hospital buildings nearby. For the 2019 campaign, the Ministry of Health has granted permission to cease construction during of the current stock of wastes. The Zanzibar Ministry of Health in collaboration with Abt and ZEMA are considering possible new locations. Plastic bottles that contained insecticides are being cleaned and will be shredded, then issued to an authorized company for recycling into products that have minimal human contact. Cardboard will be sent to a paper mill for recycling.	There were no outstanding issues of concern.	
3.9. Monitor waste storage and management during the campaign	Waste generated from the IRS campaign is kept under strict rules of storage, which include record keeping on bin cards and ledgers and using issue vouchers when transferring them from field stores to the main warehouse.	There were no outstanding issues of concern.	
3.10. Monitor post-campaign disposal procedures	IRS wastes to be disposed of in the municipal council landfills will be accompanied by a team including the Abt ECO, a representative from NEMC, and relevant city/town council authorities.	There were no outstanding issues of concern.	
4.0. Health and environmental impacts may result due to inadequate quality control of insecticides (i.e., procuring non-approved insecticides, improper storage, or poor inventory management).			
4.1 Ensure quality of insecticides	Before it could import insecticide, the project acquired the insecticide import permit from TPRI, the government agency mandated to control importation and use of insecticides. On arrival at the entry port, samples were collected and sent to the TPRI laboratory for quality control.	Bothe SumiShield 50WG and Actelic 300CS were found to be of the correct quality. (See Annex F.)	
4.2 Ensure good storage facilities	There are two types of storage facility: Main warehouses, in Mwanza, Geita, and Bukoba, are maintained year round. All were rented in an appropriate location and renovated in line with	Both main and seasonal storage facilities met PMI standards.	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
	<p>PMI best management practices: reinforced doors and windows, good light, good ventilation, and intact floor and roofs.</p> <p>Seasonal storage facilities were provided by beneficiary communities and were refurbished by the project.</p>		
4.3. Maintain records of all pesticide receipts, issuance, and return of empty sachets/bottles	All stores kept their control books up to date and tallied the stock.	There were no outstanding issues of concern.	
4.4. Reconcile the number of houses sprayed vs number of sachets/bottles used	On a daily basis, storekeepers used the performance tracking sheet to record spray information that helped to check if the sprayed houses tallied with the used insecticides.	There were no outstanding issues of concern.	
4.5 Do visual examination of houses sprayed to confirm pesticide application	Quality control wall bioassay tests were conducted by an independent qualified institution, the NIMR. The results showed adherence to PMI guidelines, and WHO standards were the cutoff points. All seven districts in mainland Tanzania and 10 in Zanzibar were tested. All tests scored 100% mortality after 24 hours for Actellic 300CS and 72 hours for SumiShield 50WG, indicating good spray quality.	No structures documented as sprayed were found not to have been sprayed.	Future campaigns will continue to train SOPs and team leaders to master good spray techniques in order to ensure high-quality spraying.
4.6. Perform physical inventory counts during the spray season	Coordinators, storekeepers, and supervisors in all districts checked inventory regularly during the campaign.	60 empty sachets were lost during demobilization.	

ANNEX E: SUMMARY OF INCIDENT REPORTS

No.	Type of Incident	Districts Where It Occured
2018/1	A heavy storm blew the roof off a warehouse where the project was storing materials. Some paper forms and PPE were wet but, after drying, were found to be usable.	Bukoba District, Mainland, Tanzania
2018/2	One box of SumiShield was reported missing at an operations site. The insecticide was later located at another project site.	Misenyi District, Mainland, Tanzania
2018/3	One team leader lost a sachet of insecticide.	Buchosa District, Mainland Tanzania
2018/4	The owner of the house broke a lance in an attempt to stop his house from being sprayed.	Buchosa District, Mainland Tanzania
2018/6	One SOP was involved in data falsification and improper disposal of insecticide. He was fired.	Buchosa District, Mainland Tanzania
2018/6	One SOP was involved in data falsification with dumping of insecticides on hidden ground.	Nyang'wale District, Mainland Tanzania
2018/8	One SOP fainted during morning mobilization.	Ngara District, Mainland Tanzania
2018/7	One SOP lost one sachet while conducting IRS in the field.	Ngara District, Mainland Tanzania
2019/1	The hired driver lost 60 empty sachets of SumiShield between the IRS site and the main warehouse.	Ngara District, Mainland Tanzania
2019/2	One SOP experienced a seizure while walking home from work. He later confirmed that he has epilepsy and was reassigned to another role.	West B District, Zanzibar
2019/3	Two SOPs experienced mildly impaired breathing and diagnosed with allergy to Actellic 300CS. They were reassigned to other roles on the project.	North A District, Zanzibar
2019/4	One SOP developed a severe headache and was disoriented. He was assigned to another role on the project.	North B District, Zanzibar
2019/5	One SOP was contaminated by insecticide (Actellic 300CS) due to pump leakage.	West B District, Zanzibar
2019/6	One SOP was contaminated by insecticide (Actellic 300CS) due to pump leakage.	West B District, Zanzibar
2019/7	One team leader was robbed of her mobile phone early in the morning while going to work.	Central District, Zanzibar
2019/8	SOP developed chickenpox during the IRS operation.	Wete District, Pemba
2019/9	One mobilizer was involved in a motorcycle accident with minor injuries.	Wete District, Pemba

ANNEX F: INSECTICIDE QUALITY ASSURANCE CERTIFICATE

Form Parts-5


THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF AGRICULTURE, FOOD SECURITY AND COOPERATIVES
Plant Protection Division Pesticides Registration and Control
P.O. Box 9071, Dar es Salaam - Tanzania

N^o 00001886

CERTIFICATE OF ANALYSIS
(Under Regulation 22)
(To be filled in Quadruplicate)

I hereby declare that I have made a proper analysis of the sample of **SUMISHIELD 50WG**
Batch No: 8733FO/8734FO/8736FO/8737FO/8738FO/8739FO, Sample Lab No: **2636-2641**, (6 Samples)

submitted to the Pesticides Registration and Control Analytical Laboratory by
SUMITOMO CHEMICAL, P.O. BOX 945, ARUSHA - TANZANIA

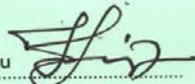
on (Date) **03** (Month) **10** Year **2018** the
result of the analysis being as follows:

Active Ingredient Content: **Chlothianidin 50.5%w/w (Average)**

Wettability: **Within two minutes**

The results met the required specifications.

Remarks **The FAO, Tolerance Limit of Active Ingredient: 47.5% - 52.5%w/v**

Name and Signature of Analysis in Charge: **Jumanne Rajabu** 

Designation: **Acting Analyst In-Charge**

Laboratory and Address: **TROPICAL PESTICIDES RESEARCH INSTITUTE, P.O. BOX 3024, ARUSHA**

Date: **21/02/2019**

Government Printer - Dsm



THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF AGRICULTURE, FOOD SECURITY AND COOPERATIVES

Plant Protection Division Pesticides Registration and Control
P.O. Box 9071, Dar es Salaam - Tanzania

Nº 00001891

CERTIFICATE OF ANALYSIS

(Under Regulation 22)
(To be filled in Quadruplicate)

I hereby declare that I have made a proper analysis of the sample of ...**ACTELIC 300 CS**.....
Batch No: **BSN8C1180**, Sample Lab No: **3827-3828**, (2 Samples)
submitted to the Pesticides Registration and Control Analytical Laboratory by
Abt Associates, P.O. BOX 1212, MWANZA - TANZANIA
on (Date)**07**..... (Month) **FEBRUARY**..... Year **2019**..... the
result of the analysis being as follows:

Active Ingredient Content: **Primiphos-methyl 29.8%w/v (Average)**.....

Remarks **The results met the required specifications.**.....

The FAO, Tolerance Limits of Primiphos methyl (30%) is 28.5-31.5%w/v

Name and Signature of Analysis in Charge: **Jumanne Rajabu**.....

Designation: **Acting Analyst In-Charge**.....

Laboratory and Address: **TROPICAL PESTICIDES RESEARCH INSTITUTE, P.O. BOX 3024, ARUSHA**.....

Date: **06/03/2019**.....

ANNEX G: PMI VECTORLINK – TANZANIA 2019 SOLID WASTE MANAGEMENT

Waste Type	Amount of Waste	Disposal Method	Disposal Site	Date of Disposal
Contaminated mask	63,696	Incineration	PMI/USAID owned incinerator at Nyanguge - Mwanza	4/13/2019
Empty sachets of Sumishield	149,886	Incineration	PMI/USAID owned incinerator at Nyanguge - Mwanza	4/13/2019
Gumboot	2232	Re-use	Butimba Prison	2/21/2019
Cardboard	9 tons	Recycle	Zaidi General Enterprise	1/30/2019
Gloves	2580	Shred and dispose	Mwanza city landfill	3/21/2019
Helmet	71	Re-use	Butimba Prison	2/21/2019
Helmet harness	451	Recycle	Victoria Molders	2/20/2019
Face shield	1093	Recycle	Mbope Co., Ltd.	2/20/2019
Shield adaptor	640	Recycle	Victoria Molders	2/20/2019
Plastic cup 0.5L	318	Recycle	Victoria Molders	2/20/2019
Plastic basin 60L	158	Recycle	Victoria Molders	2/20/2019
Plastic water basin 100L	1	Recycle	Victoria Molders	2/20/2019
Plastic basin 80L	153	Recycle	Victoria Molders	2/20/2019
Plastic buckets 20L	264	Recycle	Victoria Molders	2/20/2019
Plastic buckets 10L	19	Recycle	Victoria Molders	2/20/2019
Plastic jug 1.5L	122	Recycle	Victoria Molders	2/20/2019
Jugs 2.0L	52	Recycle	Victoria Molders	2/20/2019
Plastic mop bucket	18	Recycle	Victoria Molders	2/20/2019
Plastic water tank 210L	5	Recycle	Victoria Molders	2/20/2019
Plastic calibrated jug 2L	84	Recycle	Victoria Molders	2/20/2019
Water tank 500L	1	Recycle	Victoria Molders	2/20/2019
Water tank 550L	3	Recycle	Victoria Molders	2/20/2019
Water tank 1000L	5	Recycle	Victoria Molders	2/20/2019
Broken thermometers with mercury	45	Permanent encapsulation in a cement block	Mwanza city landfill	3/21/2019
Soft and hard broom	9	Dispose	Mwanza city landfill	3/21/2019
Toothbrush	429	Dispose	Mwanza city landfill	3/21/2019
Plastic apron	40	Wash, shred and dispose	Mwanza city landfill	3/21/2019

Waste Type	Amount of Waste	Disposal Method	Disposal Site	Date of Disposal
Coverall	302	Re-use	Butimba Prison	2/21/2019
Haversack	249	Shred and dispose	Mwanza city landfill	3/21/2019
Plastic strainer	144	Recycle	Victoria Molders	2/20/2019
Color coded vest	298	Shred and dispose	Mwanza city landfill	3/21/2019
Hudson pumps	2224	Recycle	Ibrahim Omary & Tarimo Gen. Supplies	3/8/2019
Hudson spare kits	150	Recycle	Ibrahim Omary & Tarimo Gen. Supplies	3/8/2019
Pump cylinder assembly, complete (Brass cylinder assembly xp) 147-202	61	Recycle	Ibrahim Omary & Tarimo Gen. Supplies	3/8/2019
Plastic sheets	25	Recycle	Victoria Molders	2/20/2019
Plastic empty sachet container	2357	Recycle	Victoria Polybags Company	2/20/2019
Torch for security	336	Recycle	Ibrahim Omary & Tarimo Gen. Supplies s	3/8/2019
Fire extinguisher	15	Recycle	Ibrahim Omary & Tarimo Gen. Supplies	3/8/2019
Door locks	78	Recycle	Ibrahim Omary & Tarimo Gen. Supplies	3/8/2019
Shoulder strap	176	Wash, shred and dispose	Mwanza city landfill	3/21/2019
My clear bag	1269	Wash, shred and dispose	Mwanza city landfill	3/21/2019
ID Card Holder	288	Shred and dispose	Mwanza city landfill	3/21/2019
Sexual harassment poster	121	Shred and dispose	Mwanza city landfill	3/21/2019
Expired liquid soap	9	Re-use	Butimba Prison	2/21/2019

ANNEX H: PMI VECTORLINK TANZANIA M&E PLAN

Last Updated: April 30, 2019

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
Objective 1: Implementation of Malaria Vector Control Interventions													
1.1	Successfully execute IRS and other malaria vector control programs												
1.1.1	Number and percentage of complete annual country work plans developed and submitted on-time	Project records Annually	Country	1 ; 100%	1 ; 100%								
1.1.2	Number of eligible structures targeted for spraying	Project records Annually	Country	587,751	624,348								
1.1.3	Number of eligible structures sprayed with IRS	Project records Annually	Country	499,588 ¹¹	595,923								
1.1.4	Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	Project records Annually	Country	85%	95.4%								
1.1.5	Number of people protected by IRS	Project records Annually	Country Sex Pregnant women Children <5	1,828,321 ¹²	2,404,010								
1.1.6	Number and percentage of vector control project country programs submitting an EOSR within 45 days after the end of spray (including completing MEP and EMMR)	Project Annually	Country	1; 100%	1; 100%								
1.1.7	Number of IRS country programs that conduct a Post-spray Data Quality Audit within 90 days of spray completion	Data Collection Forms Annually	Country	N/A	1								

¹¹ 85% of 1.1.2

¹² 85% of targeted population from Annex B (population to be found)

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.1.8	Number of Insecticide Treated Nets (ITNs) distributed, by channel	Project Records Annually	Country Channel	0	0								
1.1.9	Number and percentage of ITN country programs that conduct at least one process assessment of the quality of ITN distribution planning, the quality of household registration, and or ITN distribution implementation during a mass ITN distribution campaign	Project Records Annually	Country Channel	0	0								
1.1.10	Number and percentage of ITN country programs with operational routine monitoring systems for continuous ITN distribution, disaggregated by channel	Project Records Annually	Country Channel	0	0								
1.1.11	Number and percentage of countries completing ITN durability monitoring data collection on time as planned in a given project year	Project Records Annually	Country	0	0								
1.2	Provide technical assistance and planning support for IRS and other integrated malaria vector control activities												
1.2.1	Number of VC project training workshops targeting NMCP and other host country staff	Project Training Records Annually	Country Technical Area Job Function	1	2 ¹³								
1.2.2	Number of NMCP and other vector control host country staff accessing DHIS2	DHIS2 Logs Annually	Country Job Function	39 ¹⁴	62 ¹⁵								
1.3	Ensure safe and judicious use of insecticides and other malaria vector control products												
1.3.1	Number of vector control personnel trained in environmental compliance and personal safety standards in vector control implementation	Project Training Records Annually	Country Sex (# and %) Job Function	3,327 ¹⁶	3,448 ¹⁷								

¹³ 2 ZAMEP workshops, 1 in Unguja and 1 in Pemba, 1 NMCP pending workshop.

¹⁴ 18 NMCP staff, and 21 (DMOs, DMFPs and DHOs)

¹⁵ 32 in Mainland and 30 in Zanzibar

¹⁶ 246 Drivers, 64 Site Supervisors, 2,348 SOPs, 374 TLs, 93 Storekeepers, 88 Washers, 64 Pump Technicians, 1 Pemba Warehouse Storekeeper, 49 Government personnel (28 DIITs [DMFPs, DIECs, DVCOs and DHOs], 15 Unguja National supervisors, and 6 Pemba National supervisors)

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.3.2	Number of health workers receiving insecticide poisoning case management training	Project Training Records Annually	Country Sex (# and %)	52	56								
1.3.3	Number of adverse reactions to pesticide exposure documented	Incident Report Forms Annually	Country Type of Exposure	0	0								
1.4	Strengthen capacity of NMCPs, vector control personnel, and other institutions to implement and manage IRS and other vector control activities												
1.4.1	Total number of people trained to support VC in targeted areas	Project Training Records Annually	Country Sex (# and %) VC Intervention Type	3,707 ¹⁸	3,849 ¹⁹								
1.4.2	Number of people trained during IRS Training of Trainers	Project Training Records Annually	Country Sex (# and %)	487 ²⁰	526 ²¹								
1.4.3	Total number of people hired to support VC in target districts	Project Records Annually	Country Sex (# and %) Job Function VC Intervention Type	3,328 ²²	3,510 ²³								
1.4.4	Number of government/district officials who acted as supervisors during VC campaigns	Project Records Annually	Country VC Intervention Type	49 ²⁴	60 ²⁵								

¹⁷ 217 Drivers, 69 Site Supervisors, 2,442 SOPs, 388 TLs, 102 Storekeepers, 93 Washers, 67 Pump Technicians, 1 Pemba Warehouse Storekeeper, 69 Government personnel (2 TPRI representatives, 7 DMFPs, 21 DITTs [DIECs, DVCOs and DHOs], 39 National (ZAMEP, ZEMA, and NMCP), and Regional representatives).

¹⁸ 64 Supervisors, 2,348 SOP, 374 TLs, 64 Mobilizers, 93 Storekeepers, 88 Washers, 64 Pump Tech., 180 Security Guards, 73 DECs, 9 MEA, 52 Health Care Workers, 246 Drivers, 2 Financial Assistants, 1 Pemba WH Storekeeper, 28 DITT members, 15 Unguja National supervisors, 6 Pemba National supervisors.

¹⁹ 69 Supervisors, 2,442 SOP, 388 TLs, 69 Mobilizers, 102 Storekeepers, 93 Washers, 67 Pump Tech., 189 Security Guards, 76 DECs, 11 MEA, 56 Health Care Workers, 217 Drivers, 1 Pemba WH Storekeeper, 28 DITT members, 2 TPRI representatives, 39 National and Sub-National supervisors.

²⁰ 28 DITT members, 15 Unguja National supervisors, 6 Pemba National supervisors, 64 Supervisors, and 374 TLs.

²¹ 28 DITT members, 39 National and Sub-National representatives, 2 TPRI representative, 69 Supervisors, and 388 TLs.

²² 64 Supervisors, 2,236 SOPs, 374 TLs, 64 Mobilizers, 88 Storekeepers, 88 Washers, 88 Water fetchers, 64 Pump Techs., 180 Security Guards, 63 DECs, 9 MEAs, 1 Pemba WH Storekeeper, 7 DMFPs, 2 Financial Assistants

²³ 69 Supervisors, 2,323 SOPs, 388 TLs, 69 Mobilizers, 93 Storekeepers, 93 Washers, 80 Water fetchers, 67 Pump Techs., 189 Security Guards, 67 DECs, 11 MEAs, 1 Pemba WH Storekeeper, 27 DITTs, 27 National and Sub-national supervisors, 6 External Supervisors.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.5	Promote gender equality in all facets of planning and implementation												
1.5.1	Number of women hired to support VC campaigns	Project Records Annually	Country Returning female seasonal workers hired in a more senior capacity	1,331 ²⁶ ;	1,274								
1.5.2	Number and percentage of women hired in supervisory roles in target areas for vector control activities	Project Records Annually	Country VC Intervention Type Job Function	182 ²⁷ ; 40%	194 ²⁸ 37%								
1.5.3	Number and percentage of staff (permanent and seasonal) who have completed gender awareness training	Project Training Records Annually	Country Sex Job Function	3,741 ²⁹ ; 100%	3,883 103.8%								
1.5.4	Number and percentage of women in senior leadership roles in VectorLink country offices	Project Records Annually	Country Sex (# and %)	2 ³⁰ ; 40%	2; 40%								

²⁴ 28 DITT members (7 DMFPs, 7 DIECs, 7 DVCO, 7 DHO), 15 Unguja National supervisors, and 6 Pemba National supervisors

²⁵ 27 DITT members (7 DMFPs, 7 DIECs, 7 DMOs, 6 DHO), 27 National and Sub-national supervisors, 6 External Supervisors

²⁶ 40% of indicator 1.4.3

²⁷ 40% of 7 DMFPs, 64 Supervisors, 374 TLs and 9 M&E Assistants hired

²⁸ 8 DITT members (DMFPs, DIECs, DMOs, DHO), 7 National and Sub-national supervisors, 2 External Supervisors, 18 Supervisors, 157 TLs and 2 M&E Assistants hired

²⁹ 64 Supervisors, 2,348 SOP, 374 TLs, 64 Mobilizers, 93 Storekeepers, 88 Washers, 64 Pump Tech., 180 Security Guards, 73 DECAs, 9 MEA, 52 Health Care Workers, 246 Drivers, 2 Financial Assistants, 1 Pemba WH Storekeeper, 28 DITT members (7 DMFPs, 7 DIECs, 7 DVCO, 7 DHO), 15 Unguja National supervisors, and 6 Pemba National supervisors, and 34 Abt Permanent Staff

³⁰40% of 5 leadership roles (Chief of Party (COP), Operations Manager, Finance and Administration Manager (Deputy Chief of Party (DCOP), M&E Manager, and Environmental Compliance Officer)

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results										
				Year 1		Year 2		Year 3		Year 4		Year 5		
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result	
1.6	Implement and support social behavioral change communication and mobilization activities													
1.6.1	Number of radio spots and talk shows aired	Project Records Annually	Country VC Intervention Type	114 Radio Spots 5 Talk Shows ³¹	192 Radio Spots 144 Radio Announcements									
1.6.2	Number of print materials disseminated	Project Records Annually	Country VC Intervention Type	12,311 2,006 Q&A brochures 7,113 fact sheets 3,192 posters	12,005 1,956 Q&A brochures 6,937 fact sheets 3,112 posters									
1.6.3	Number of people reached with vector control and/or SBCC messages via door-to-door messaging	Project Records Annually	Country VC Intervention Type Sex	N/A ³²	N/A ³³									
1.6.4	Number and percentage of people who feel that the proposed action (sleeping under an ITN/accepting IRS) will reduce their risk of malaria	Project Records Annually	Country	N/A	N/A									
1.6.5	Number and percentage of people with a favorable attitude toward the practice/product (i.e., ITNs, IRS)	Project Records Annually	Country VC Intervention Type	N/A	N/A									
1.6.6	Number and percentage of people who believe that the majority of their friends and community members practice the behavior	Project Records Annually	Country VC Intervention Type	N/A	N/A									

³¹1 Geita, 1 Kagera, 1 Kigoma, 1 Mwanza, and 1 Zanzibar

³²No Enumeration in 2019 FY Plan

³³No Enumeration in 2019 FY Plan

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.7	Environmental compliance												
1.7.1	Number and percentage of SEAs (with EMMPs) or Letter Reports submitted at least 60 days prior to the commencement of vector control campaigns	Project Records Annually	Country	1; 100%	1; 100%								
1.7.2	Number and percentage of permanent and mobile soak pits inspected and approved prior to IRS campaigns	Project Records Annually	Country Soak Pit Type	88; 100%	93; 100%								
1.7.3	Number and percentage of storehouses inspected and approved prior to IRS campaigns	Project Records Annually	Country Storehouse Type	88; 100%	93; 100%								
1.7.4	Number and percentage of fixed soak pits that are compliant with PMI's Best Management Practices	Project Records Annually	Country	88; 100%	93; 100%								
2. Entomological and Epidemiological Data to Drive Decision-Making													
2.1	Vector control activities monitored via entomological and epidemiological data												
2.1.1	Number and percentage of project-supported entomological sentinel sites established to monitor vector bionomics and behavior (vector species, distribution, seasonality, feeding time, and location)	Entomological Reports Annually	Country VC Intervention Type	N/A	N/A								
2.1.2	Number and percentage of entomological monitoring sentinel sites measuring all five basic PMI entomological monitoring indicators (i.e., species composition, abundance, and seasonality of malaria vector; insecticide susceptibility and resistance intensity; mechanism of resistance; quality assurance and residual efficacy monitoring of IRS programs; or vector behavior: feeding time &, location)	Entomological Reports Annually	Country VC Intervention	N/A	N/A								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
2.1.3	Number and percentage of entomological monitoring sentinel sites measuring at least one advanced PMI indicator (i.e., identification of mosquito infectivity; parity rates; or blood-meal analysis)	Entomological Reports Annually	Country VC Intervention	N/A	N/A								
2.1.4	Number and percentage of insecticide resistance testing sites that tested at least one insecticide from pyrethroid, organophosphate, carbamate, clothianidin, and chlorfenapyr insecticides	Entomological Reports Annually	Country Insecticide Type	N/A	N/A								
2.1.5	Number of wall bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS	Entomological Reports Annually	Country	N/A	N/A								
2.1.6	Number and percentage of cone bioassays conducted within two weeks of spraying with greater than 98% test mortality recorded	Entomological Reports Annually	Country	N/A	N/A								
2.1.7	Number of wall bioassays conducted after the completion of spraying at monthly intervals to evaluate insecticide decay	Entomological Reports Annually	Country Insecticide Type	N/A	N/A								
2.1.8	Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites	Entomological Reports Annually	Country Insecticide Type	N/A	N/A								
2.1.9	Number of countries with an integrated vector control analytics dashboard available for decision making	Project Records Annually	Country	N/A	N/A								
2.1.10	Number of staff (VectorLink-contracted or non-VectorLink) trained in entomological monitoring	Project Training Records Annually	Country Sex (# and %) Job Function	N/A	N/A								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
2.2	NMCPs develop country-level IRS and other malaria vector control strategies												
2.2.1	Number and percentage of countries with an integrated malaria vector control strategy, including a plan for monitoring and managing insecticide resistance supported by the project	Project Records Annually	Country	N/A	N/A								
2.2.2	Number and percentage of countries with integrated data and visualization landscaping for vector control decision making complete	Project Records Annually	Country	N/A	N/A								
2.2.3	Number and percentage of countries that implement sub-national insecticide as part of an IRM strategy	Project Records Annually	Country	N/A	N/A								
2.3	Build capacity of NMCPs and local institutions to collect, analyze, and use data for strategic malaria control decision-making												
2.3.1	Number of individuals trained from NMCPs and national institutions to review and interpret data for integrated vector control decision making	Project Training Records Annually	Country Job Function Organization	N/A	N/A								
2.3.2	Proportion of targeted individuals who report using new analytical tools and/or skills in their planning, resourcing, implementation, or measurement activities	Capacity Assessments Thrice Over Project Life	Country Job Function Organization	N/A	N/A								
3. Procure insecticides for IRS and support the delivery and storage of IRS and other malaria vector control products													
3.1	Cost-effective procurement mechanism established												
3.1.1	Number and percentage of insecticide procurements that had a pre-shipment QA/QC test at least 60 days prior to spray campaign	Procurement Records Annually	Country Insecticide Type	2 ³⁴ ; 100%	2 100%								
3.1.2	Number and percentage of insecticide procurements received on-time to allow for the initiation of spray operations as scheduled	Procurement Records Annually	Country Insecticide Type	1 ³⁵ ; 100%	1 ; 100%								

³⁴ SumiShield 50WG (Mainland) and Actellic 300CS (Zanzibar)

³⁵ SumiShield 50WG (Mainland)

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
3.1.3	Number and percentage of targeted countries with international equipment procurements, including PPE, received on-time to allow for the initiation of vector control campaigns as scheduled	Procurement Records Annually	Country VC Intervention Type	1; 100%	1; 100%								
3.1.4	Number and percentage of targeted countries with local procurements for PPE received on-time to allow for the initiation of spray operations as scheduled	Procurement Records Annually	Country	1; 100%	1; 100%								
3.1.5	Number and percentage of countries with PPE procured according to workforce composition	Procurement Records Annually	Country	1; 100%	1; 100%								
3.2	Robust inventory management and logistics systems established												
3.2.1	Number and percentage of logistics and warehouse managers trained in vector control supply chain management	Project Training Records Annually	Country VC Intervention Type Sex	94 ³⁶ ; 100%	103; 100%								
3.2.2	Number and percentage of operations site warehouses where physical inventories can be verified by daily stock records	Inventory and Stock Records Annually	Country Insecticide Type	88 ³⁷ ; 100%	93; 100%								
3.2.3	Number and percentage of IRS countries that successfully completed spray operations without an insecticide stock-out	Inventory and Stock Records Annually	Country Insecticide Type	1; 100%	1; 100%								
4. Innovation													
4.1	Conduct operational research or monitoring to scale up new tools, methods, and approaches												
4.1.1	Number of operational research studies on promising new tools or new methods/approaches to existing tools that are implemented	Project Records Annually	Type of Innovation	N/A	N/A								

³⁶ 93 Storekeepers, 1 Pemba WH Storekeeper

³⁷ 88 operations site store

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results										
				Year 1		Year 2		Year 3		Year 4		Year 5		
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result	
4.2	Create and share knowledge through dissemination of best practices and lessons learned													
4.2.1	Number of innovations, best practices, and other data or lessons learned shared with other partners or international institutions for global reporting on the Vector Learning Exchange	Project Records Annually	Country Technical Area	1	9 ³⁸									
4.2.2	Number of individual members who use the Vector Learning Exchange	Project Records Annually	N/A	N/A	N/A									
4.2.3	Number of symposia and/or presentations submitted to and accepted at global conferences	Project Records Annually	Country Technical Area	1	0									
4.2.4	Number of success stories written or videos produced and shared on the VectorLink project website	Project Records Annually	Country	3	2 2 videos									
4.2.5	Number of peer-reviewed journal articles submitted and accepted	Project Records Annually	Technical Area	1	0									
4.2.6	Number of critical guidance, standards, or plans that incorporate disseminated findings/best practices	Project Records Annually	Technical Area	2 ³⁹	1 ⁴⁰									
4.3	Develop and deploy cost-savings approaches													
4.3.1	Number of innovative or novel approaches implemented to achieve cost savings in IRS and integrated malaria vector control programs	Project Records Annually	Country VC Intervention Type	1	5 ⁴¹									

³⁸ Innovations: 1. *Skirts for female SOPs in Pemba*, 2. *Introduction and rollout of VectorLinkCollect database* 3. *Introduced the mobiliser form*. Best practices: 1. *Introduced external supervisors in Mainland* 2. *Sister-slabs to decongest IRS sites in Zanzibar* 3. *Solar emergency lights for site stores in Mainland* 4. *Facilitate access to Vodacom simcards for M-Pesa payments* 5. *Water breaks for Zanzibar SOPs to prevent dehydration during the sunny and heat season* 6. *Provide heavier and balanced breakfast to field workers from biscuits and juice to tea, chapatti, beans, and eggs*.

³⁹ IRS guideline documents for Mainland and Zanzibar

⁴⁰ PMI VectorLink Factsheet: <https://www.usaid.gov/documents/1860/presidents-malaria-initiative-vectorlink>

⁴¹ 1) Did not hire seasonal Finance Assistant for Bukoba, team coordinated well to accomplish the payments; 2) ZAMEP covered the cost for 116 spray operators for three sites (Shakani, Mombasa A, and Mombasa B); 3) Quasi based IRS saved 9 days on ground transport for spray operators; 4) community based IRS saved 27 days on ground transport for spray operators by using bicycles; 5) IRS site store spaces were government contributed as opposed to renting spaces.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
4.3.2	Number of cost effectiveness assessments of existing approaches in the implementation of IRS and integrated malaria vector control programs	Project Records Annually	Country VC Intervention Type	N/A	N/A								
4.4	Cultivate public-private partnerships												
4.4.1	Number of private sector entities engaged with to establish public private partnerships to increase the quality and coverage of malaria vector control activities globally	Project Records Annually	Country Private Sector Organization	0	0								

ANNEX I: IRS QUALITY ASSURANCE METHODS AND TOOLS

Issue	Method/Tools for Quality Assurance	Party Responsible at Country Level
Insecticide procurement	<ul style="list-style-type: none"> Pre-shipment testing 	<ul style="list-style-type: none"> Procurement manager Logistics coordinator
SOP safety	<ul style="list-style-type: none"> Pre-spray training Spray operations checklist Field supervision Adverse incidence reports 	<ul style="list-style-type: none"> Operations manager District/field coordinator Spray team supervisor Team leaders
Insecticide warehousing/transport	<ul style="list-style-type: none"> Store manager/driver training Warehousing operations manual Spot checks 	<ul style="list-style-type: none"> Operations manager Procurement/logistics coordinator District/field coordinators
Warehouse/stores and logistics	<ul style="list-style-type: none"> Monthly/bi-weekly physical stock audit and comparison with stock movement records Inventory tracking systems 	<ul style="list-style-type: none"> Procurement/logistics coordinator District/field coordinators Spray team supervisors
Environmental compliance	<ul style="list-style-type: none"> Pre-spray training Geographical information systems mapping Spot checks during spray operations 	<ul style="list-style-type: none"> ECO District environmental health officer
Spray data integrity	<ul style="list-style-type: none"> EE form: Paper checklist form that helps M&E assistants check the completeness and correctness of sampled SOP data forms before they are entered into the database DCV form: Tool used in structure spot checks to interview households about IRS treatment and the number of people protected; used to cross-check data reported on the daily SOP forms Number of bottles issued to SOPs vs reported structures sprayed Average number of structures sprayed per bottle Average number of structures sprayed daily by SOPs Multiple levels of data verification to eliminate errors: team leader, site supervisor, M&E assistant, and DEC 	<ul style="list-style-type: none"> Country operations manager M&E manager Database manager M&E officer District/field coordinators Spray team supervisors