



U.S. PRESIDENT'S MALARIA INITIATIVE



**MOZAMBIQUE
END OF SPRAY REPORT 2019
SPRAY CAMPAIGN:
OCTOBER 28-DECEMBER 14, 2019**

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ACRONYMS

BMP	Best Management Practices
DCV	Data Collection Verification
DEC	Data Entry Clerk
DOS	Directly Observed Spraying
ECO	Environmental Compliance Officer
IEC	Information, Education and Communication
IRS	Indoor Residual Spraying
ITN	Insecticide-Treated Nets
M&E	Monitoring and Evaluation
MASA	Ministry of Agriculture and Food Security
MITADER	Ministry of Land, Environment and Rural Development
MOH	Ministry of Health
MSP	Mobile Soak Pit
NMCP	National Malaria Control Program
ODK	Open Data Kit
PDH	Provincial Directorate of Health
PMI	President's Malaria Initiative
PMT	Performance Monitoring Tracker
PPE	Personal Protective Equipment
PSECA	Pre-Spray Environmental Compliance Assessment
SBC	Social and Behavior Change
SDSMAS	<i>Serviços Distrital de Saúde Mulher e Ação Social</i> /District Services for Health, Women and Social Welfare
SEA	Supplemental Environmental Assessment
SMS	Short Message Service
SOP	Spray Operator
TL	Team Leader
TOT	Training of Trainers
WHO	World Health Organization

EXECUTIVE SUMMARY

In Mozambique, Abt Associates implements the U.S. President’s Malaria Initiative (PMI) VectorLink Project in close collaboration at the national level with Mozambique’s National Malaria Control Program (NMCP). At the provincial and district levels, Abt collaborates with the Provincial Directorate of Health in Zambezia Province, the District Services for Health, Women and Social Welfare, the Ministry of Agriculture and Food Security, and the Ministry of Land, Environment and Rural Development.

In addition to indoor residual spraying (IRS) and entomological monitoring activities in Zambezia Province, in 2019, VectorLink Mozambique continued to support the NMCP at the national and provincial levels in carrying out entomological activities and to enhance the NMCP’s IRS capacity.

In the 2019 approved work plan, VectorLink Mozambique identified an estimated 331,360 eligible structures for spraying in five targeted districts: Maganja da Costa, Milange, Molumbo, Mopeia, and Morrumbala. The project led community mobilization activities in coordination with all key stakeholders to raise community awareness and acceptance of IRS.

At the end of the spray campaign, spray operators (SOPs) reported 350,172 eligible structures found and 338,330 eligible structures sprayed, a spray coverage of 96.6%. The spray campaign protected 1,484,191 people including 209,747 children under 5 years of age, and 77,084 pregnant women.

Major challenges include the delay in the arrival of insecticides, SOPs not recording some unsprayed structures, localized weak mobilization efforts in all districts, and community refusals in Maganja da Costa due to dissatisfaction with an aid distribution program that had been implemented there after Cyclone Idai.

VectorLink Mozambique demobilized all its operations sites after the spray campaign and held its post-spray evaluation meeting on December 21, 2019. The 2019 spray campaign results are summarized in Table ES-1.

Table ES-1: 2019 Spray Campaign Results at a Glance

Number of districts covered by PMI-supported IRS in 2019	Five districts in Zambézia Province: Maganja da Costa, Milange, Molumbo, Mopeia and Morrumbala.
Insecticide class	Neonicotinoid (SumiShield®50WG) and Neonicotinoid/Pyrethroid combination-Fludora® Fusion
Number of structures targeted for PMI-supported IRS in 2019 (based on structures found by SOPs in 2018 as amended in consultation with NMCP)	331,360
Number of structures found by SOPs in 2019	350,172
Number of structures sprayed by PMI-supported IRS in 2019	338,330
2019 spray coverage	96.6%
Spray progress (based on structures targeted)	102.1%
Population protected by PMI-supported IRS in 2019	1,484,191: Pregnant women: 77,084, children under 5: 209,747
Dates of PMI-supported IRS campaign	October 28–December 14, 2019
Length of 2019 spray campaign	35 days
Number of people trained with U.S. Government funds to deliver IRS*	1,446

*Based on the PMI indicator definition, this number includes only spray personnel such as SOPs, team leaders, brigade supervisors, and base supervisors. It excludes data entry clerks, monitoring and evaluation assistants, database coordinators, drivers, washers, porters, pump technicians, mobilizers, security guards, and other categories not specified above.

I. COUNTRY BACKGROUND

Since 2006, the U.S. President’s Malaria Initiative (PMI) has protected millions of people in Africa from malaria through indoor residual spraying (IRS), which kills the mosquitoes that transmit malaria by spraying insecticide on the walls, ceilings, and other indoor places where those mosquitoes rest. In September 2017, the United States continued its commitment to tackle this deadly disease, launching the five-year PMI VectorLink Project. Working across 24 countries in sub-Saharan Africa as well as in Cambodia and Latin America, PMI VectorLink equips countries to plan and implement integrated vector control, including safe and cost-effective IRS programs, conducts entomological monitoring activities, and provides support for the deployment of insecticide-treated nets (ITNs).

IRS continues to be a critical component of Mozambique’s National Malaria Control Strategy, as reflected in the most recent strategy, launched in December 2017 for 2017–2022. Mozambique implements IRS in five provinces: Maputo, Gaza, and Inhambane (supported by public-private partnership and Global Fund funding), Nampula (Government of Mozambique funding), and Zambezia (PMI/USAID funding).

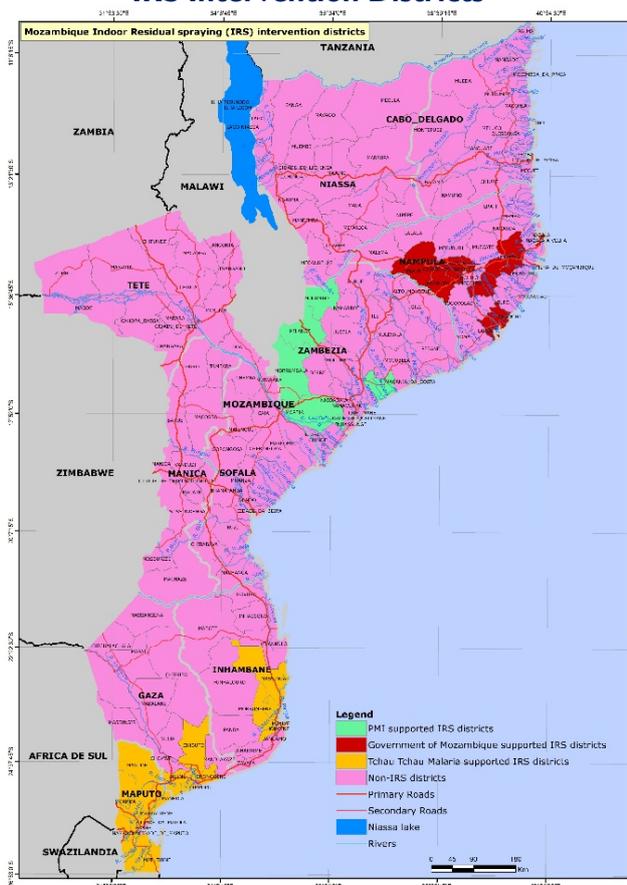
Through the support of PMI, Zambezia Province implemented six spray rounds of IRS under the Africa Indoor Residual Spraying (AIRS) Project (2011–2017). In 2019, Zambezia implemented its second spray campaign under the new PMI VectorLink Project. As outlined in the VectorLink Mozambique’s approved 2019/20 work plan, for the period March 1, 2019, through February 29, 2020, the 2019 spray campaign covered five targeted districts in the province: Maganja da Costa, Milange, Molumbo, Mopeia, and Morrumbala. The spray campaign took place from October 28 through December 14, 2019.

VectorLink Mozambique worked with the Mozambique Ministry of Health (MOH) through the National Malaria Control Program (NMCP), Zambezia’s Provincial Directorate of Health (PDH), relevant District Services for Health, Women and Social Welfare (SDSMAS), and other stakeholders such as the Ministry of Agriculture and Food Security (MASA) and the Ministry of Land, Environment and Rural Development (MITADER).

Specific objectives of the 2019 VectorLink Mozambique spray campaign were the following:

- Achieve at least 85% spray coverage of targeted structures in the five districts.
- Support national and provincial government IRS program capacity building.
- Provide regular monitoring and evaluation (M&E) of the PMI VectorLink Project.
- Carry out a logistics assessment in all districts and arrange all international and local procurements.
- Ensure safe and correct insecticide application, thereby minimizing human and environmental exposure to IRS insecticides, in compliance with the Safer Use Action Plan in the approved 2015 Supplemental Environmental Assessment (SEA).

Figure 1: Map of Mozambique Showing IRS Intervention Districts



- Lead community mobilization; information, education, and communication (IEC) campaigns; behavior change communication sensitization; and mobilization activities to increase community awareness and acceptability of IRS.
- Monitor the quality of insecticide application and insecticide decay rates in Zambezia.
- Provide technical assistance to Nampula Province to conduct quality of insecticide application and insecticide decay rates in support of the NMCP IRS campaign.
- Promote cost efficiency through due diligence and efficient operations.

2. IRS IMPLEMENTATION ACTIVITIES

2.1 IRS PLANNING AND PARTNER COLLABORATION

2.1.1 *IRS PLANNING*

Planning for the 2019 spray campaign began with VectorLink Mozambique conducting the initial planning and quantifications based on provisions in the 2019 Malaria Operational Plan. After this initial planning, VectorLink together with the PDH and SDSMAS conducted micro-planning meetings at district and provincial levels. The district meetings focused on the following issues:

- Targeted number of districts and structures and, in particular, reduction in targeted number of structures and districts compared with 2018.
- Length of spray campaign
- Human resources requirements (recruitments, trainings, and female integration)
- Spray team performance and target setting
- Quantification of logistical, insecticide, and transportation needs
- Preparation of spray calendars, taking into account diverse geographical challenges, hard-to-reach areas, and areas that could be removed from the 2019 spray campaign due to reduction in targeted number of structures
- Monitoring and supervision plans, with the elimination of the brigade supervisor category in the supervision structure
- Potential impact of electoral and political party campaigns in spray activities
- Seasonal workers contracts with a focus on stricter disciplinary actions to curb insecticide theft and data falsification
- Official launch of the 2019 spray campaign

In addition, at the provincial-level micro-planning meeting, VectorLink Mozambique together with the PDH and SDSMAS made some key decisions as presented below:

- The 2019 spray campaign would start on October 22, 2019, after the 2019 general election. The campaign would last for 35 operational days.
- The 2019 provincial spray campaign launch would be held in Milange District on October 21.
- VectorLink would update the seasonal worker contract with specific penalties for insecticide fraud, and share the updated contract with the PDH and SDSMAS for review and finalization.
- Each district would review their spray calendar and targeted communities, and agree on possible areas that could be removed from the 2019 spray campaign due to the reduced spray targets.

2.1.2 *PARTNER COLLABORATION*

VectorLink Mozambique is part of the Mozambique IRS technical and entomology working groups, both of which the NMCP formed and chairs. In 2019, a major objective of the IRS technical working group was to harmonize the implementation of IRS in Mozambique. VectorLink participated and in some cases led discussions and activities to harmonize IRS activities. Some of the working group's decisions on IRS harmonization are presented in Table 1. Budget constraints prevented the project from implementing all the recommendations. In 2020, the project will consider those recommendations depending on availability of funds.

Table I: Mozambique IRS Technical Working Group: IRS Implementation Recommendations and VectorLink Actions

Decision Area	Technical Working Group Recommendation	Action (to be) Taken by VectorLink Mozambique
Use of PPE	Coveralls: Two-piece khaki coveralls were recommended.	<ul style="list-style-type: none"> ▪ Due to the timing of the recommendation and cost implications of replacing the coveralls, VectorLink continued using the one-piece blue coveralls in 2019. It will consider the two-piece coveralls for future campaigns.
	Gloves: 22 mil green, nitrile, nitril-solve, 19" chemical gloves were recommended.	<ul style="list-style-type: none"> ▪ No action needed. This is the glove is currently used by VectorLink.
	Neck cover: Color (khaki brown); khaki type of material; and level of coverage (entire head, chin, neck (front and back), chest, and shoulder). VectorLink's neck cover is blue and does not fully cover the front of the neck and chest.	<ul style="list-style-type: none"> ▪ For 2019, VectorLink procured the recommended neck covers. However, due to cost implications, it continued to use some blue neck covers. ▪ For the next spray campaign, VectorLink will replace all blue neck covers with the larger khaki ones, as recommended.
	Boots: Industrial leather boots used by Tchou Tchou Malaria and the NMCP were recommended.	<ul style="list-style-type: none"> ▪ VectorLink has not agreed to change from the rubber boots to the leather boots because (i) the leather boots may not be fully protective since some parts are made of absorbent material and (ii) the proposed leather boots cost MZN 3,297.45 per pair (approximately \$54), about 9 times more than rubber boots (which cost \$5.78 per pair.)
SOP bags	Cylindrical canvas material bags with no internal divisions were recommended. Regular rectangular backpacks with multiple internal compartments are not recommended as the concern was that SOPs could use compartments to put personal items, which is not allowed.	<ul style="list-style-type: none"> ▪ In 2019, the additional SOP bags that VectorLink procured were the cylindrical canvas bags. It also used the rectangular backpacks still in stock. ▪ In 2020, VectorLink will replace all backpacks with the recommended bags.
Start date and length of spray campaign	The recommendation is for all spray campaigns to be completed by the end of December of every year. There was no decision on the length of future spray campaigns. The NMCP feels that the VectorLink 35-day campaign in 2019 was too short and the Tchou Tchou Malaria 3 months-plus campaign was too long. The technical working group will discuss this further.	<ul style="list-style-type: none"> ▪ VectorLink will continue to plan for a 35-day spray campaign.
Number of days for SOP training	The recommendation is for a minimum of 8 days.	<ul style="list-style-type: none"> ▪ VectorLink did not have a budget to cover an 8-day training. Its budget was for a 5-day training. An additional 3 days of training would have increased the cost by \$45,629.67. As a compromise, VectorLink added one day to SOP training (to 6 days) in 2019 at an increased cost of \$15,200. VectorLink will discuss with PMI the feasibility of an 8-day training for 2020.
Data collection and supervisory tools, structure definition, and TOT training materials	VectorLink Spray Operator and Team Leader data collection forms, IRS supervisory tools, structure definition, and TOT training materials were adopted by the technical group	<ul style="list-style-type: none"> ▪ No action

Note: PPE=personal protective equipment, SOP=spray operator, TOT=training of trainers

2.2 TRAINING

In collaboration with the PDH and SDSMAS, VectorLink conducted all scheduled IRS trainings in September and October 2019. Each training comprised theoretical and practical sessions relevant to the targeted cadre of seasonal workers. Table 2 provides a breakdown of the different trainings. In total, VectorLink trained 3,362 people, of whom 2,725 (81.05%) were male, and 637 (18.9%) were female.

Table 2: 2019 Training Matrix

Categories of Persons Trained	IRS Delivery				Other										Total			
	TOT		SOP		Data Capture		Logistics		Finance & Admin Assistants		IEC Assistants		Community Mobilizers				Pump Technicians	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
MOH-Malaria focal points (district and provincial)	6										1						6*	0
MOH-IRS supervisors (district and provincial)	5																5	0
MOH-SDSMAS IEC coordinators	5										5						5**	0
Director of Health																	0	0
Medical chief	5																5	0
MITADER staff	5																5	0
MASA staff	5	1															5	1
Database coordinators																	0	0
M&E ass't					8	3											8	3
Data entry Clerks					23	13											23	13
Finance ass't								3	3								3	3
Logistics ass't							3	2									3	2
Storekeepers							15	6									15	6
Operations site IEC ass't											19	1					19	1
Community mobilizers													1,584	210			1,584	210
Operations site supervisors	18	1															18	1
Team leaders			146	61													146	61
Spray operators			852	336													852	336
Pump technicians															23		23	0
TOTAL male/female	49	2	998	397	31	16	18	8	3	3	25	1	1584	210	23	0	2,725	637
TOTAL	51		1,395		47		26		6		26		1,794	23			3,362	

* Horizontal summation shows 7 people trained. However, one person in this group attended two different trainings, so a total of six MOH malaria focal points received training.

** Horizontal summation shows 10 people trained. However, the same five people attended two different trainings, so a total of five IEC coordinators received training.

In addition to the formal trainings shown in Table 2, VectorLink Mozambique conducted half-day orientations on roles and responsibilities for operations site washers, drivers, and security guards on their first day of work, and for health technicians during the VectorLink Environmental Health Officer (ECO) visit to health centers during the environmental compliance greenlighting process. The project conducted these orientations—rather than formal trainings as in past years—as a cost-saving measure.

2.3 SPRAY OPERATIONS AND SUPERVISION

The 2019 spray campaign was originally scheduled to start on October 22, 2019, after the official launch on October 21. However, due to delays in the arrival and clearance of insecticides, VectorLink Mozambique postponed and staggered the start dates. Two districts (Mopeia and Morrumbala) started spraying on October 28, and the remaining three districts (Maganja da Costa, Milange, and Molumbo) started spraying on November 4.

VectorLink operated 19 operations sites. All operations sites met the best management practice (BMP) environmental compliance standards before the start of the spray campaign. Base supervisors managed each of the operations sites and team leaders (TLs) led the spray teams; each team had five SOPs.

Each spray day started at the operations site between 5 am and 6 am with a provided breakfast, followed by PPE dress-up by spray teams and health/physical checks by TLs, and then the distribution of all spray supplies, insecticides, and equipment to the spray teams for the day's work.

After dress-up and distribution of materials, base supervisors conducted a short morning assembly with all spray teams. At this assembly, base supervisors, district coordinators, SDSMAS representatives, and provincial-level supervisors gave refresher speeches on topics including house preparation, safety, insecticide mixing, quality data collection, adherence to correct spray technique and environmental compliance, and other challenges observed or reported on the previous spray days. The base supervisors then assigned spray teams to communities where they would spray that day and to vehicles for transportation to the field.

While the morning assembly was taking place, the washers and pump technicians filled spray pumps with residual insecticide/wash water from barrels 1, 3, and 5 from the previous day's washing process. This was a new practice, the purpose of which was to avoid overcrowding during the collecting of residual water and to ensure that each spray pump carried residual water to the field. The success of this initiative varied based on how well each operations site managed it. After the morning assembly, SOPs picked up their spray pumps with residual water and headed for the field.

VectorLink Mozambique targeted 331,360 structures for spraying over the 35-day campaign. To achieve this, it developed district-specific spray calendars to guide the movement and distribution of spray teams. In the field, base supervisors assigned SOPs to spray in different sections of a targeted community. The SOPs were assisted by community mobilizers and community guides (where applicable), especially in communities with scattered settlements where SOPs would find it difficult to locate structures. Community guides and other community leaders also assisted SOPs by persuading households to accept IRS and ensure that spray teams met their daily spray targets of 10 structures.

IRS supervision was well structured and coordinated at different levels. The provincial-level supervision team comprised the VectorLink Mozambique technical team and PDH, MASA, and MITADER representatives. It visited all districts to support district-level supervision of spray activities. For this group, VectorLink and PDH developed and implemented a 35-day supervision plan. At the district level, the supervision team comprised the VectorLink district coordinator and at least five¹ representatives from SDSMAS, MASA, and MITADER. At the operations site, the base supervisor and TLs provided the immediate frontline supervision. All supervisors used the standard mobile-based VectorLink supervisory tools, and TLs used the directly observed spraying (DOS) tool for supervision. Supervision focused on proper house preparation, use of correct spray technique, data collection, mobilization, and adherence to safety and environmental compliance requirements. During field supervision, some of the common issues addressed were reminding SOPs to spray roofs and eaves made of sprayable surfaces and to record unsprayed structures and house preparation. These issues were also discussed during the daily morning assembly. VectorLink Mozambique also occasionally hosted supervisory guests who included PMI Mission staff and NMCP staff from the central office.

¹ Malaria focal point person, IRS supervisor and IEC coordinator from SDSMAS, and one each representative from MASA and MITADER.

VectorLink Mozambique used both standard permanent soak pit and mobile soak pits (MSPs I and II)² for end-of-day clean-up. MSPs were used in hard-to-reach areas where camping was necessary. All five districts used MSPs at some point during the campaign.

SOPs collected spray data using the Daily SOP form. At the end of each workday, TLs verified and summarized the data onto the TL summary form, and handed the forms over to the base supervisors for further verification. After signing off on all SOP and TL summary forms, base supervisors recorded a summary of the data onto the Spray Performance Tracking Sheet at the operations site. Operations site teams used the tracking sheet to make quick decisions on spray progress and coverage rates at the operations site level. The base supervisors then sent the same information via short message service (SMS) to a central server where the senior project management team accessed the daily data to guide quick corrective actions to improve ongoing spray operations. The base supervisor also sent the SOP and TL data collection forms to the district data entry center for entry of the data into the VectorLink Collect database. VectorLink used motorbikes to transport the forms from the operations sites to the data center.

Morrumbala and Mopeia districts finished their spray campaigns on December 6, 2019, Molumbo finished on December 13, and Milange and Maganja da Costa finished on December 14. At the end of the spray campaign, all five districts had surpassed the minimum of 85% spray coverage.

2.3.1 PEOPLE HIRED TO SUPPORT THE 2019 SPRAY CAMPAIGN

VectorLink hired 3,229 seasonal workers to support implementation of the 2019 spray campaign: 723 (22.4%) were female; the remaining 2,506 were male. Table 3 lists the different cadres of seasonal workers hired in 2019 by gender.

Table 3: Number of Seasonal Personnel Hired by Cadre and Gender

Categories of Seasonal Staff	Maganja da Costa		Milange		Molumbo		Mopeia		Morrumbala		All Districts			% Females
	M	F	M	F	M	F	M	F	M	F	M	F	Total	
Spray operators	46	89	219	76	116	39	64	46	230	75	675	325	1,000	32.5%
Team leaders	20	7	43	16	22	9	14	8	46	15	145	55	200	27.5%
Base supervisors	2	0	5	0	2	0	3	1	6	0	18	1	19	5.3%
Community mobilizers	284	45	364	96	174	26	420	12	300	70	1,542	249	1,791	13.9%
Pump technicians	2	0	6	0	2	0	5	0	6	0	21	0	21	0.0%
Storekeepers	1	1	5	0	1	1	3	1	5	1	15	4	19	21.1%
Washers	2	8	0	22	0	10	0	9	0	21	2	70	72	97.2%
Security guards	2	0	12	0	6	0	8	0	12	0	40	0	40	0.0%
M&E assistants	2	0	2	0	2	0	1	1	1	1	8	2	10	20.0%
Data entry clerks	2	2	6	3	3	1	1	2	4	4	16	12	28	42.9%
Finance assistants	1	0	0	1	1	0	0	1	1	0	3	2	5	40.0%
IEC assistants	2	0	5	0	2	0	4	0	5	1	18	1	19	5.3%
Logistics assistants	0	1	1	0	0	1	1	0	1	0	3	2	5	40.0%
Total	366	153	668	214	331	87	524	81	617	188	2,506	723	3,229	22.4%

2.3.2 OPERATIONS SITES

In 2019, VectorLink Mozambique operated from 19 operations sites across the five-targeted districts. Eighteen sites had been used in previous years. The one new site was built in Borroma, in Morrumbala District, to reduce overcrowding in the Morrumbala Sede site and reduce spray team travel time to some of the targeted communities. VectorLink did not pay rent for the use of the any site except for the Nante operations site warehouse in Maganja da Costa. The soak pit at the Nante site is located on government property that the project uses rent-free. In Lualua, Mopeia District, the operations site is located on

² MSP I is built using a 25-liter bucket. MSP II is an improved version of MSP I; it is built using a 45-liter bucket and serves more SOPs.

property a community member donated. Table 4 provides information on the VectorLink operations sites for the 2019 spray campaign.

Table 4: Operations Sites: Number, Location and Ownership of Operations Sites

District	Total Sites	Number Provided by Government	Number Rented	Number Provided Rent Free by Private Individuals
Maganja da Costa	2	1	1	0
Milange	5	5	0	0
Molumbo	2	2	0	0
Mopeia	4	3	0	1
Morrumbala	6	6 ³	0	0
Total	19	17	1	1

2.3.3 KEY OPERATIONAL DETAILS

LOGISTICS AND STOCK MANAGEMENT

VectorLink hired and trained five district logistics assistants and 19 storekeepers to manage district and operations site stores. VectorLink trained them on standard logistics management procedures and introduced them to the standard VectorLink logistics management documents. Before and during the spray campaign, they maintained and updated all logistics records, including stock cards and ledger books, for each item with details of transactions, quantities, dates, and destination. Supervisors regularly audited records and conducted physical stock counts to ensure that the actual stock on hand corresponded to records on stock cards and in ledger books.

In 2019, storekeepers serialized all sachets of insecticides before distributing them to SOPs. TLs recorded the serial numbers of each sachet going to each SOP in their TL handbook. At the end of each day, the TLs used the recorded information for insecticide reconciliation: They used the serial numbers to ensure that the sachets that SOPs were bringing back from the field were the same sachets issued in the morning. In addition, VectorLink trained all SOPs to record on their Daily SOP form the serial number of each sachet that they mixed against the structure where they did the mixing. VectorLink put in place this verification and reconciliation process to strengthen insecticide stock management and reduce the risk of pilferage and to expedite investigation of any insecticide-related issue.

All operations site stores were in good condition with most items stacked on shelves or pallets and clearly labeled. However, supervisors observed that some storekeepers, especially in Morrumbala District, consistently had issues with store organization and stock management as well as record keeping. This resulted in contradicting information between warehouse record management books and actual stock in hand in some cases. VectorLink supervisors repeatedly visited these stores to offer support but in some stores, storekeeper performance remained unsatisfactory as they did not follow the instructions and guidance given in prior visits. During these visits, VectorLink conducted physical counts and usage patterns to verify that no items were missing.

SEASONAL WORKERS PAYMENT

In 2019, VectorLink Mozambique continued to pay almost all seasonal workers through Vodacom's M-pesa mobile payment system. During the recruitment process, VectorLink and SDSMAS informed all candidates that having an M-pesa account was a pre-selection requirement. VectorLink used the training period to ensure that each seasonal worker had a well-functioning M-pesa account. Seasonal workers who had problems with their accounts at that time had to procure and furnish the project's finance department with new M-pesa numbers.

VectorLink also developed a payment plan with specific payment dates. The plan was explained to all participants' during each of the eight major trainings mentioned above. In addition, VectorLink recruited seven finance assistants to support implementation of the payment plan. There were minimal issues in

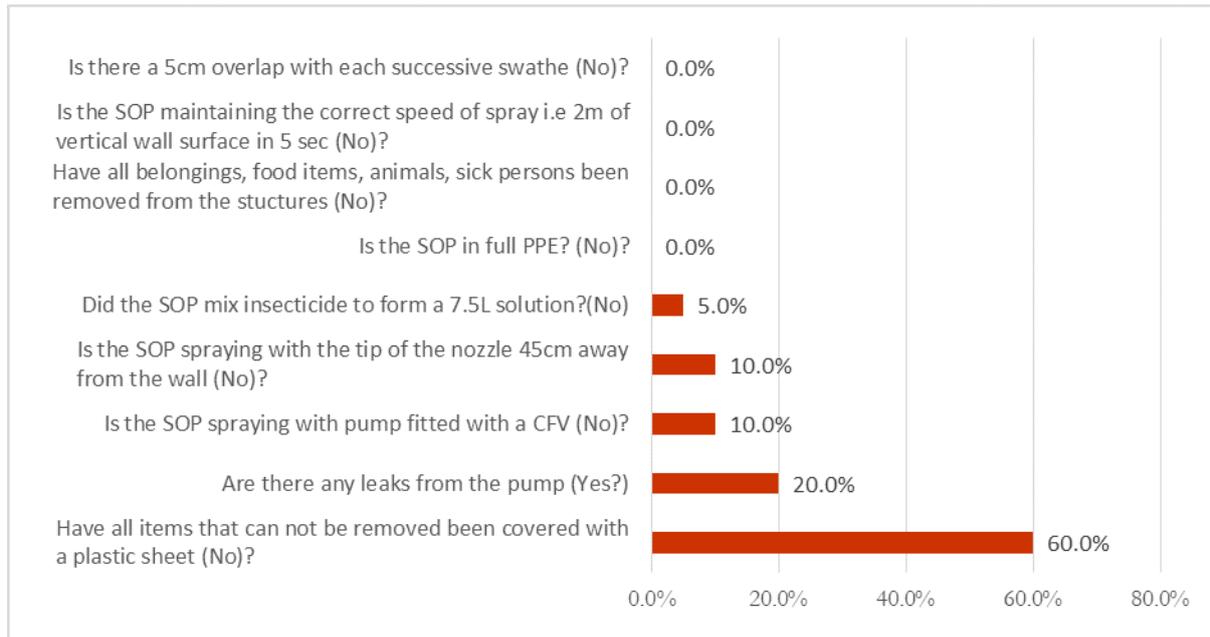
³ This includes Borroma operation site which was established in 2019.

2019 regarding payment through M-pesa. The majority of seasonal workers received their payments without difficulty. While M-pesa payments were successful for most seasonal workers, community mobilizers were paid in cash because few of them had mobile phones and therefore access to M-pesa accounts.

DIRECTLY OBSERVED SPRAYING

In 2019, VectorLink continued the use of DOS supervisor tool primarily for TLs. TLs conducted 4,149 DOS inspections throughout the spray campaign period. Of these, 4,060 (98%) did not identify any red flags. The remaining 89 inspections (2%) identified 166 red flags. The distribution of these 166 red flags that were identified and corrected by TLs are presented in Figure 2a.

Figure 2a: Distribution of DOS Red Flags by Questions Asked

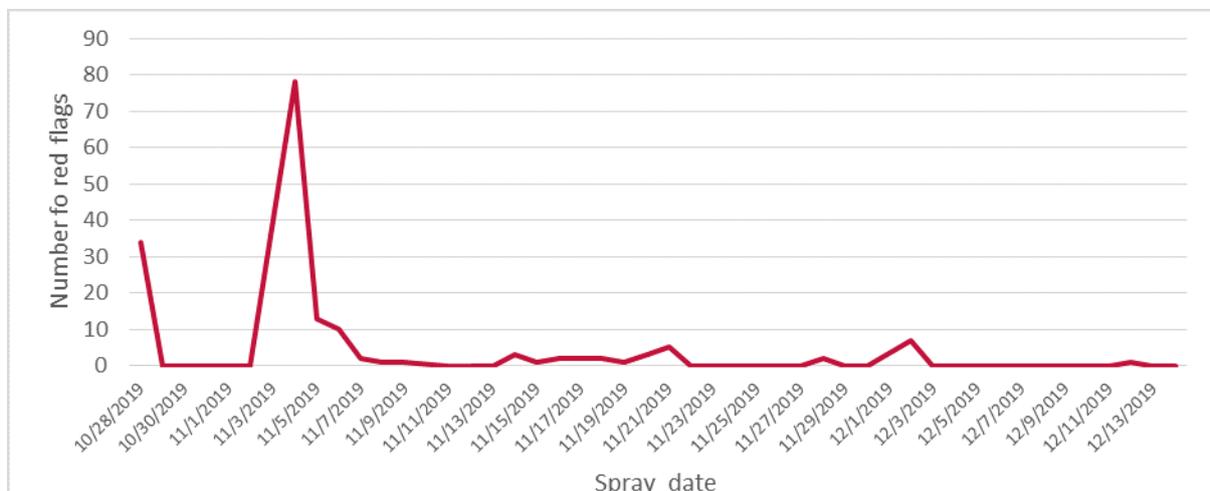


Note: CFV=control flow valve

In terms of distribution of red flags by district, Maganja da Costa had 11% (19), Milange 42% (69), Molumbo 12% (20), Mopeia 10% (16) and Morrumbala 25% (42).

There was a sharp decline in the number of red flags between the first day and the second day of the spray campaign. The subsequent days showed some level of oscillations (Figure 2b).The first spike on October 28 was the first day of spray in Mopeia and Morrumbala and the second spike on November 4, was the first day of spray in Milange, Maganja and Molumbo.

Figure 2b: Daily Distribution of Red Flags: October 28-December 14, 2019



2.4 INSECTICIDE PROCUREMENT AND INVENTORY

In 2019, VectorLink Mozambique used two types of insecticides: the clothianidin SumiShield®50WG in Mopeia and Morrumbala districts and the clothianidin/deltamethrin combination Fludora® Fusion in Milange, Maganja da Costa, and Molumbo districts.

VectorLink Mozambique targeted to spray 134,208 structures with SumiShield®50WG and 197,152 with Fludora® Fusion (331,360 structures in total). In quantifying its insecticide need, VectorLink forecasted an insecticides consumption of 2.2, 1.8, 2.3, 2.5, and 2.0 structures per unit of insecticide for Maganja da Costa, Milange, Molumbo, Mopeia, and Morrumbala districts, respectively, based on insecticide consumption rates during the 2018 spray campaign. Thus, the project calculated it would need 63,733 sachets of SumiShield®50WG and 98,466 sachets of Fludora® Fusion to spray the targeted structures. With no existing stock from 2018, VectorLink expected to receive the 63,733 sachets of SumiShield®50WG and 98,466 sachets of Fludora® Fusion from the NMCP (procured through the Global Fund).

In 2019, VectorLink experienced delays in the arrival and clearing of both SumiShield®50WG and Fludora® Fusion. Initially, VectorLink expected to receive the insecticides on time to begin the campaign on October 22. The Fludora® Fusion was scheduled to arrive in Mozambique on September 19 and SumiShield®50WG was scheduled to arrive on October 12. While the Fludora® Fusion arrived on time, its clearance was delayed due to a slow clearing process at the port and the absence of some shipping and product registration documentation from the vendor's country representative for Fludora® Fusion. The SumiShield®50WG arrived on October 19 but could not reach the VectorLink warehouse on time, again due to slow clearing process at the port. For both insecticides, activities related to the national election made it difficult to get some approvals in country. Ultimately, the SumiShield®50WG cleared customs sooner than Fludora® Fusion and VectorLink started spraying SumiShield®50WG -designated districts on October 28. With PMI Mission support, VectorLink requested and borrowed 59,468 sachets of Fludora® Fusion from government-led IRS in Nampula Province to begin spraying on November 4 in the three- Fludora® Fusion designated districts while customs cleared the project's Fludora® Fusion shipment.

In the end, VectorLink Mozambique received 56,184 sachets of SumiShield®50WG and 144,944 sachets of Fludora® Fusion from the NMCP which had received UNITAID co-payment support through the Next Generation IRS (NGenIRS) Project. VectorLink received all insecticides at its central warehouse in Quelimane. Five sachets of SumiShield®50WG and 10 sachets of Fludora® Fusion were pulled for quality testing, and the rest was distributed to the various districts. At the end of the campaign, VectorLink returned the same quantity of Fludora® Fusion received from Nampula. The project received more Fludora® Fusion and less SumiShield®50WG than it had forecasted. As a result, toward the end of the spray campaign, Mopeia and Morrumbala ran out of SumiShield®50WG. To complete the campaign, Fludora® Fusion was used to fill the gap.

At the end of the spray campaign, all districts transported both full (unused insecticides) and empty (used insecticides) sachets back to the central warehouse.

Soon after, through the Zambezia PDH, Nampula Province contacted VectorLink Mozambique for a supply of 26,000 sachets of Fludora® Fusion to support the province's spray campaign. Table 5 summarizes the insecticide inventory.

Table 5: 2019 Insecticide Inventory

Insecticide Type	2018 Stock Balance	Total Sachets Borrowed from Nampula Province	2019 Insecticide Received from NMCP	Total Sachets Available for 2019 Spray Campaign	Samples Taken for Testing ⁴	Sachets Used for 2019 Spray Campaign (by districts)	Borrowed Quatities Returned to Nampula	Additional Sachets Sent to Nampula	Current Stock of Insecticide in the Central Warehouse
Fludora® Fusion	0	59,468	144,944	204,412	10	102,053	59,468	26,000	16,881
SumiShield®50WG	0	0	56,184	56,184	5	56,077	0	0	102

The Fludora® Fusion stock is made up of batches: FLSA 1900030, FLSA 1900031, FLSA 1900032, FLSA 1900033, FLSA 1900034 with expiry date June 2021 and FLSA 1900035, FLSA 1900036, FLSA 1900037, FLSA 1900038 and FLSA 1900039 with expiry date July 2021. SumiShield®50WG is made up of batch 19320F0 with expiry date January, 2022.

2.5 IEC/SBC ACTIVITIES AND OUTCOMES

Information, Education, Communication/ Social and Behavior Change (IEC/ SBC) activities are an integral part before and during PMI VectorLink spray campaigns. For the 2019 spray campaign, VectorLink Mozambique, the PDH, SDSMAS, and community leaders collaborated to recruit 19 IEC assistants (one per operations site) and engaged 1,791 community mobilizers to support the implementation of IEC/ SBC activities. The aim of the IEC/ SBC activities were to reach as many people as possible with IRS key messages. Before the spray campaign, community mobilizers conducted a six-day house-to-house mobilization. They mobilized community members for the spray campaign, shared key messages related to IRS and vector control, and sensitized households on their roles and responsibilities. Two days before a community was sprayed, community mobilizers revisited households to confirm the arrival of spray teams to ensure SOP success and adherence to spray calendars.

Before the start of the spray campaign, each district conducted engagement meetings with community leaders. The meetings highlighted the importance of IRS and how IRS activities should be separated from the electoral and political activities that were ongoing simultaneously. There were also announcements in schools, churches, mosques, and markets to communicate IRS key messages to the targeted population. During the spray campaign, there were times, for example in Maganja da Costa, when VectorLink and SDSMAS met different groups of community and political party leaders and other influential people (including religious leaders) to solve specific community problems.

⁴ This is VectorLink independent quality assurance resting to confirm that level of active ingredient is within acceptable dosage range per the WHO specification.

Table 6 lists the different communication channels that VectorLink used to reach various targeted population with key IRS messages. It also shows the frequency and the estimated number of people reached through each channel.

Table 6: Channels of Communication, Frequency of Use, and Estimated Number of People Reached

Channel of Communication	Number of Times Used (frequency)	Estimated Number of People Reached
Church announcements	413	41,547
Schools announcement	118	23,108
Regular (daily) market announcement	122	3,241
Special one-day (usually weekly) market announcements	80	4,686
Mosque announcements	65	5,931
Soccer game announcements	62	8,821
Water point announcements	230	3,578
Health centers morning mobilization	30	1,725
Local courts	4	213
Public spaces (gardens)	4	400
Canoe river-crossing points	2	87
Traditional ceremonies	6	492
Meetings with political party leaders	3	93
Announcement at maize mills	11	280
Announcements at traditional water wells	21	208
House-to-house mobilization	1*	612,072

* House-to-house mobilization was conducted once for six days in each district.

In addition to the communication channels listed above, VectorLink engaged community radio stations in Milange, Molumbo, Mopeia, and Morrumbala. These radio stations disseminated the 2019 mobilization and spray calendars on a daily basis, and broadcast key messages and live interviews with satisfied homeowners. Below are some specific outputs from the use of radio as a mass media channel of communication.

- 1,343 radio spots (before and during spray campaign)
- 26 radio debates about IRS
- 10 radio live programs with SDSMAS staff and district VectorLink coordinators about IRS benefits
- 6,527 key messages broadcasted
- 50 new items about SOP and mobilizer training and during spray campaign
- 414 spray calendar announcements on radio
- 11 radio interviews with satisfied homeowners and community leaders

2.6 CAPACITY-BUILDING EFFORTS

To build capacity and improve the planning and implementation of IRS in Mozambique, VectorLink in collaboration with the NMCP carried out the activities described in Table 7.

Table 7: Summary of Capacity-building Efforts

Type of Activity	Description
Emergency IRS planning and implementation in Sofala Province	When Cyclone Idai hit Sofala Province, one of the major interventions that the MOH considered for malaria control was emergency IRS. VectorLink supported the NMCP with technical assistance: it sent a team (Operations Manager, ECO, and two district coordinators) to Sofala to help the PDH to plan and implement a 30-day spray campaign. This capacity building included implementing the VectorLink model of TOT, logistics planning and distribution, design and construction of soak pits, and SOP training.
Environmental compliance support to the Nampula PDH IRS project	As part of VectorLink Mozambique's technical support to Nampula province, the project conducted a 2019 Pre-Spray Environmental Compliance Assessment (PSECA) in the eight targeted districts: Angoche, Meconta, Monapo, Nacala Porto, Nampula Cidade, Murrupula, Rapali, and Ribaue. Together the VectorLink ECO, the Nampula Province deputy malaria focal person and district malaria focal persons conducted the PSECA. Their recommendations included: rehabilitation of five out of eight soak pits due to poor filtration and relocation of the Nacala Porto soak pit. After the completion of the 2019 spray campaign in Nampula, the VectorLink ECO provided support on logistics inventory and management of the incineration of contaminated waste (charcoal used in MSPs and empty insecticide sachets) from 2019 spray. The VectorLink ECO coordinated a meeting with Topack, a plastics recycling company, and provided the company technical support in building a soak pit for recycling the Nampula 2018-2019 Actellic®300CS bottles.
TOT (Tchau Tchau Malaria_ Namaacha)	In 2019, the NMCP adopted the VectorLink Mozambique model for conducting a TOT and required that all in-country IRS programs must have a TOT before the SOP training. Because of VectorLink's extensive experience in conducting TOTs, the NMCP invited VectorLink to facilitate the TOT for Tchau Tchau Malaria, an IRS program funded by a consortium of private firms and Global Fund. The TOT trained 48 participants, including government officials.
TOT (Nampula)	VectorLink together with the NMCP and in collaboration with Nampula PDH planned and implemented a TOT for Nampula Province ahead of its 2019 spray campaign. VectorLink and NMCP trained 46 participants (32 males and 14 females) in Nampula City. Participants were drawn from the eight IRS target districts and the province. The participants from the districts included the district medical chief, representatives of the departments of community health and health education, malaria focal points, and program assistants. The training and training materials were based on the VectorLink training curriculum, which had been adopted by the IRS technical working group.
VectorLink Collect training	In 2019, VectorLink implemented the VectorLink Collect database to collect and analyze spray data. VectorLink trained the Zambezia PDH M&E officer on the new DHIS2 based database and its application for IRS data. The M&E officer participated in VectorLink data entry clerk and M&E assistant training.
Entomology	PMI VectorLink supported entomology activities in Nampula Province, in two districts (Nampula City and Monapo) targeted for IRS and in a non-intervention (control) district (Erati). Activities conducted measured entomological indicators, namely malaria vector species composition, density, biting time and place, blood meal source and human blood index, infection, entomological inoculation rate, and seasonality. The vector sampling methods included pyrethrum spray catches, human landing catches, and CDC light traps. Susceptibility tests were conducted in the three districts with the same insecticides (see Entomology Chapter).Cone bioassays were also conducted to evaluate quality of spraying and monitor the decay rate of the insecticide after spraying in two districts.
Zambezia Insectary and Entomology Laboratory	VectorLink identified a vendor to build an insectary in a box for Zambezia Province. Work has not commenced at the site because rains have kept the earth very damp. Once the rains subside, the slab will be laid. The preparation of the prefabricated modules is, nevertheless, ongoing in Durban, South Africa.
Mentoring for new Zambezia PDH malaria focal person	In 2019, the Zambezia PDH was assigned a new malaria focal point person. He participated in the TOT and during the spray campaign and, in both activities, worked closely with the VectorLink Operations Manager. The Operations Manager mentored him on IRS planning and supervision activities. VectorLink will engage him further during the next work planning period to ensure that he has full understanding of these activities.

2.7 GENDER MAINSTREAMING

VectorLink continued to advocate for the integration of more females into its spray campaign activities. During the 2019 micro-planning, VectorLink discussed the importance of female integration. During the provincial-level micro-planning meeting, VectorLink and the provincial malaria focal person charged all districts to pay attention to the recruitment process to ensure that enough females were given equal opportunity to participate in the 2019 spray campaign activities.

Also, VectorLink continued its efforts to ensure a safe working environment for all staff, regardless of gender. For example, VectorLink discussed issues concerning sexual harassment in all trainings. In addition, it gave all training participants a copy of the “Freedom from Harassment’ guidelines” to read and then to sign to show their commitment to abide by the guidelines.

In 2019, VectorLink observed an increase in female participation in its activities compared with 2018. Overall, VectorLink observed an increase in the number females hired for seasonal positions, from 20.9% in 2018 to 22.4% in 2019. Table 8 provides details on where VectorLink recorded an increase or decrease in the percentage of females between 2018 and 2019. Other gender-related indicators are presented in the Monitoring & Evaluation Indicator Matrix in Annex A.

Table 8: Percentage Change of Females from 2018 to 2019 for Seasonal Worker Cadres

Category of Seasonal Worker	2018			2019			Increase/Decrease
	Total Hired	No. of Females	% Females	Total Hired	No. of Females	% Females	
Spray operators	1120	339	30.3%	1000	325	32.5%	Increase
Team leaders	224	64	28.6%	200	55	27.5%	Decrease ⁵
Brigade supervisors	78	20	25.6%	N/A	N/A	N/A	N/A
Site supervisors	20	2	10.0%	19	1	5.3%	Decrease
Community mobilizers	2208	302	13.7%	1791	249	13.9%	Increase
Pump technicians	22	0	0.0%	21	0	0.0%	No change
Storekeepers	21	1	4.8%	19	4	21.1%	Increase
Washers	67	64	95.5%	72	70	97.2%	Increase
Security guards	41	0	0.0%	40	0	0.0%	No change
Database coordinators	6	0	0.0%	N/A	N/A	N/A	N/A
M&E assistants	15	3	20.0%	10	2	20.0%	No change
Data entry clerks	33	11	33.3%	28	12	42.9%	Increase
Finance assistants	6	2	33.3%	5	2	40.0%	Increase
IEC assistants	20	2	10.0%	19	1	5.3%	Decrease
Logistics assistants	6	2	33.3%	5	2	40.0%	Increase
Water fetchers	1	0	0.0%	0	0	0.0%	No change
Total	3,888	812	20.9%	3,229	723	22.4%	Increase

Note: N/A for 2019 refers to categories of seasonal workers that VectorLink did not hire in 2019 due to cost implications. VectorLink reviewed the duties of all seasonal workers and agreed to eliminate brigade supervisor and database coordinator positions.

⁵ Seasonal worker recruitment coincided with national elections recruitment and training. Some female workers opted to work on election activities.

2.8 OVERVIEW AND RESULTS OF PILOTS

In 2019, VectorLink Mozambique piloted the use of the Goizper Group's IK smart light in Lualua operations site in Mopeia District. The IK smart light is a device that is fixed on the lance of the Goizper IK sprayer, i.e., the Goizper pump is equipped with sound and indicator light functionalities that should help SOPs maintain the nozzle tip at the correct distance (45cm) from a spray surface and to spray at the correct speed (2m sprayed every five seconds). The objective of the pilot was to test and evaluate the functionality of the IK smart light in assisting SOPs during training and actual spraying in the field.



SOPs using the IK Smart Light during Spray Technique Training

For the pilot, Goizper provided free IK smart lights to 20 SOPs in the Lualua site in Mopeia. During both the training and spray period, SOPs used the device as a guide to monitor the correct distance between the nozzle tip and the spray wall. The indicator light on the device enabled them to easily know when the nozzle tip was less than 45cm from the spray wall (blue indicator light), when the nozzle tip was more than 45cm from the spray wall (red indicator light), and when the nozzle tip was correctly 45cm from the spray wall (green indicator light). Also, the device makes a beep every second. This helps the SOP to spray at the correct speed with rhythm by counting the five seconds through a two-meter vertical wall. Additionally, the IK smart light advanced model is equipped with a memory card that stores the spray technique data and a USB port from which spray technique data can be retrieved and reviewed by supervisors, trainers, and SOPs alike.

VectorLink collected quantitative and qualitative data from SOPs and TLs about the device pertaining to its ease of installation, indicator light visibility, indicator sound audibility, ease of troubleshooting, frequency of need to troubleshoot, cleaning and maintenance, storage/security concerns, battery re-charging, and durability. VectorLink also measured two quantitative indicators: average number of structures sprayed per day per SOP and number of structures sprayed per sachet of insecticides. Initial data analysis suggests that SOPs are more likely to keep to the required 45cm distance when the indicator lights are on. When the indicator lights are off, SOPs are more likely to fail to get the correct distance. During the spray campaign, a major challenge was that the lens of the device got dirty with droplets of insecticides, especially when SOPs were spraying ceilings. This affected the device's ability to measure correctly, and sometimes gave wrong signals to the SOP about distances. This required SOPs to clean the lens at least after every two structures. VectorLink will submit detailed findings from the pilot in a separate report.

3. ENTOMOLOGY

3.1 IRS INSECTICIDE SUSCEPTIBILITY TESTS

VectorLink did larval collections of *An. gambiae* s.l. from January to April 2019 and adult collections of *An. funestus* s.l. using Prokopack aspirators from July to September, for susceptibility tests in IRS districts Maganja da Costa, Milange, and Mopeia, and in one non-IRS district, Lugela. The larvae were reared to adults on which susceptibility tests were performed. Figure 3 shows the susceptibility test results of *An. funestus* s.l. exposed to pirimiphos-methyl (0.25% and 1.25%) and permethrin (0.75% and 3.75%) in Zambezia. Figure 4 shows 24-hour or 48–72-hour mortality from the World Health Organization (WHO) tube tests or Centers for Diseases Control (CDC) bottle assays of F1 adult *An. gambiae* s.l. collected in the larval stage and reared to adults (exposed to a range of insecticides) from January to July 2019 in Zambezia.

Figure 3: 24-hour Mortality from the WHO Tube Tests of Adult *An. funestus* s.l. Collected Using Prokopack Aspirators, July–November 2019 in Zambezia

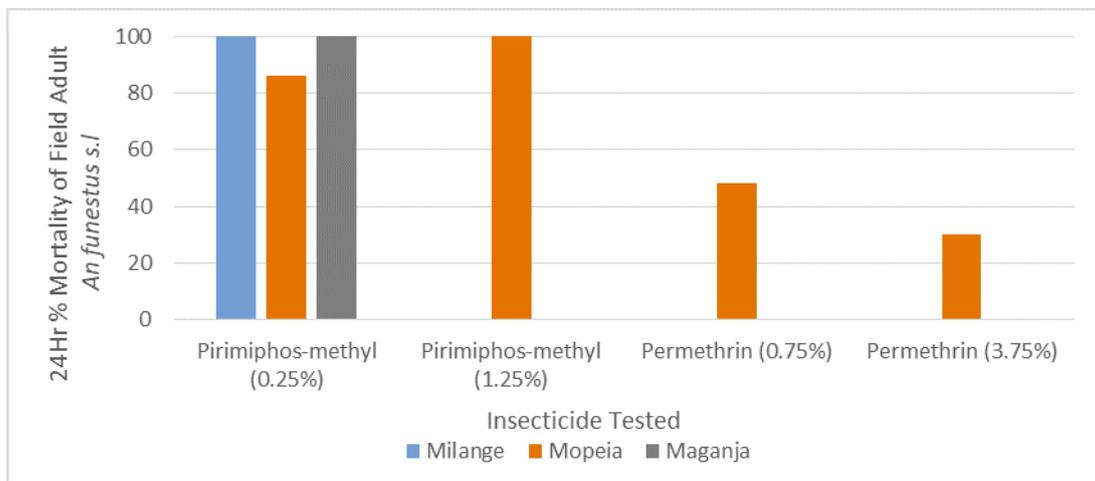
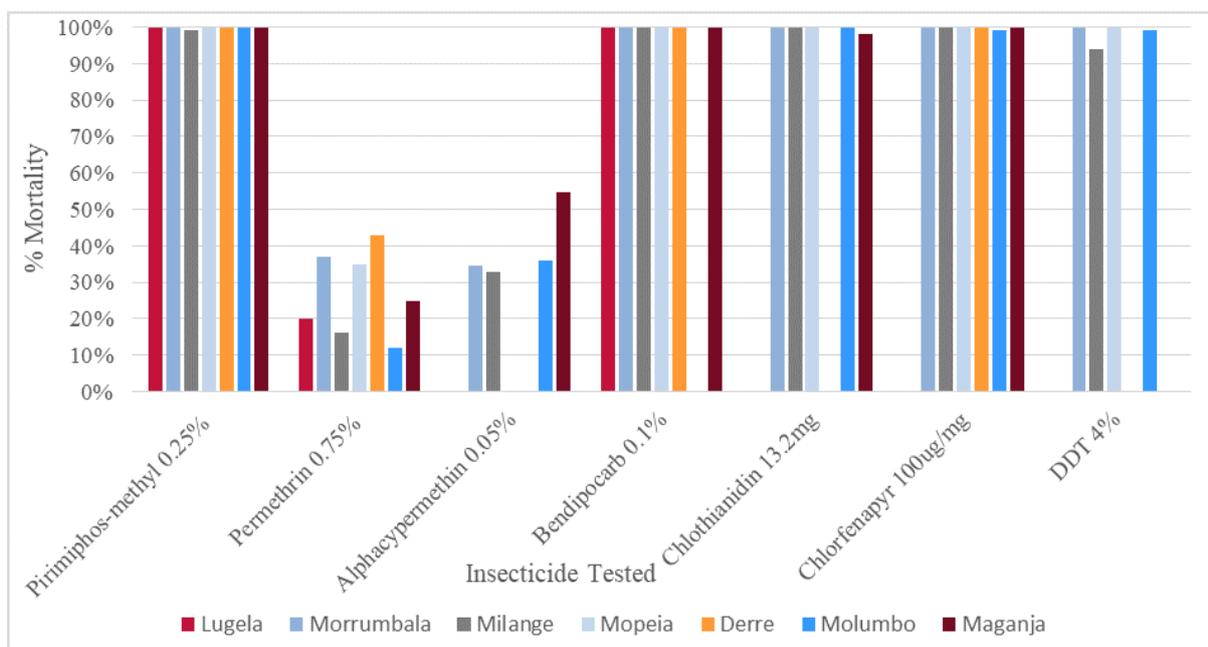
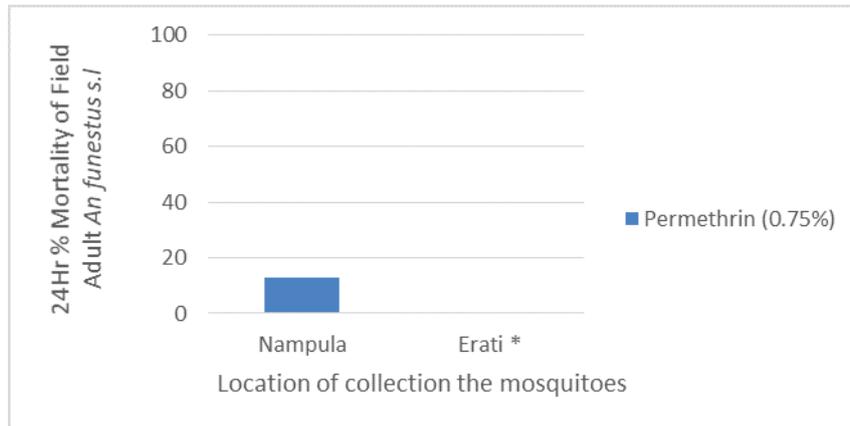


Figure 4: 24-hour or 48–72-hour Mortality of Adult *An. gambiae* s.l. Raised from Larval Collections Exposed to a Range of Insecticides at Respective Diagnostic Concentrations in Zambezia



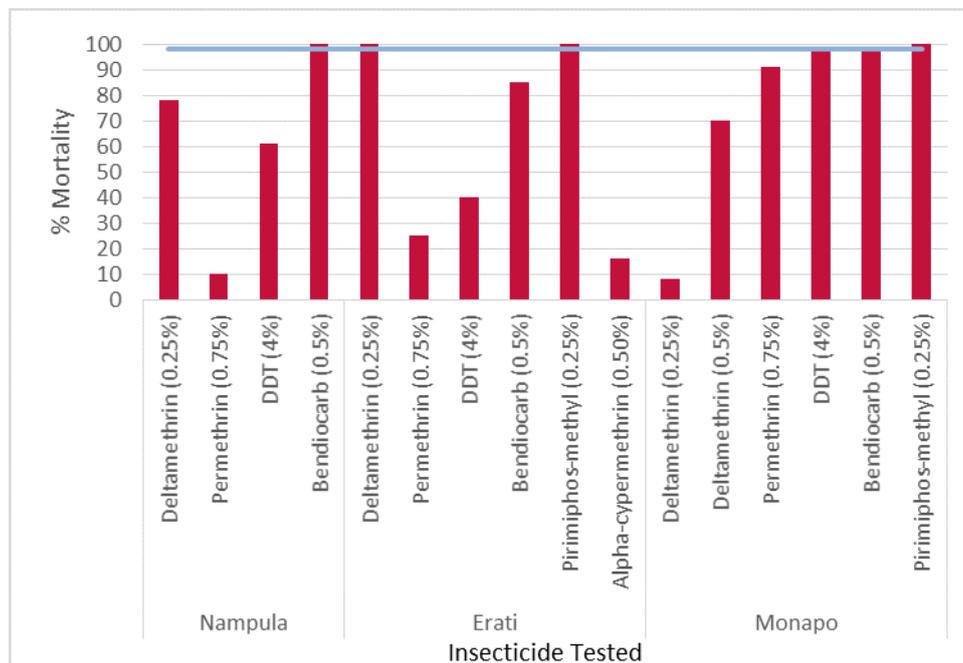
In Nampula province, adult *An. funestus* s.l. females were collected indoors using Prokopack aspirators. The blood-fed females underwent forced oviposition in the insectary and the eggs were reared to adults (F1). The WHO tests were conducted with samples from Nampula Sede and Erati on permethrin (0.75%). *An. gambiae* larvae collected from the field were reared to adults on which susceptibility tests were performed. Figures 5 and 6 show the results on susceptibility tests against *An. funestus* s.l. and *An. gambiae* s.l., respectively

Figure 5: 24-hour Mortality from the WHO Tube Tests of *An. funestus* s.l., FI Adult Mosquitoes Collected by Prokopack Aspirators in Nampula



*These tests was conducted with fewer mosquitos than the standard WHO recommended numbers, some replicates with 16 mosquitos and other replicates with 15 mosquitos. In Erati, all mosquitos exposed survived.

Figure 6: 24-hour Mortality from the WHO Tube Test of *An. gambiae* s.l., Adults Reared from Larval Collections in Nampula



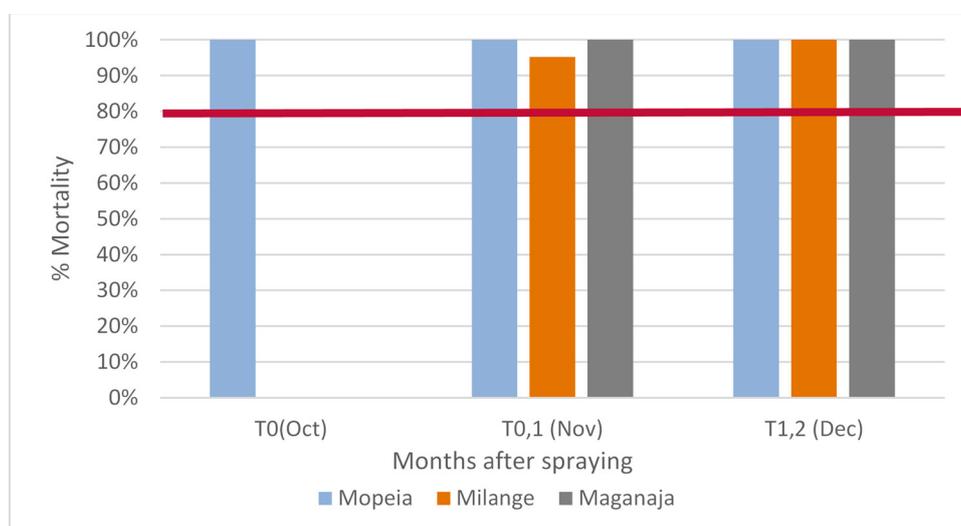
3.2 RESIDUAL EFFICACY

A spray quality assessment was performed in three of the five spray districts in Zambezia (Maganja da Costa, Milange, and Mopeia) and two of the eight spray districts in Nampula (Nampula and Monapo). In each district, one village and five houses were randomly selected. Cones attached with self-adhesive tape were placed at heights of 0.5 m, 1.0 m, and 1.5 m above the floor diagonally across a wall surface, and on the door. The control cone was affixed to a wall lined with a paperboard attached with adhesive in an unsprayed house or in the shade of a tree in the yard, away from the sprayed houses, to avoid any

airborne effect. Susceptible *An. arabiensis* KGB strain mosquitoes aged two to five days were introduced into the plastic cones in batches of 10 and left exposed on the sprayed surface for 30 minutes at different heights. Numbers of mosquitoes knocked down at the 30 minutes were recorded. At the end of this exposure period, the mosquitoes were carefully collected and transferred to paper cups and provided with 10% sugar solution soaked on cotton wool pads placed on top of the paper cups covered with net. The control mortality was followed up to the time that all test mosquitoes of the test died and for both SumiShield®50WG and Fludora® Fusion the diagnostic follow up time was 7 days. The control mortality was below 5% in all control tests and it was therefore not necessary to correct the mortality with Abbott's formula

In Zambezia, results showed acceptable quality of spray in all districts, with a mortality rate varying from 95.2% after a 168-hour holding period for Fludora® Fusion in Milange; 100% mortality after 24 hours for Fludora® Fusion in Maganja da Costa, and 100% after 48 hours for SumiShield®50WG in Mopeia. The decay rate for T1 and T2 show 100% mortality in all districts (Figure 7).

Figure 7. 48-hour Mortality (Quality Assurance and Decay Rate) of SumiShield® 50 WG(Mopeia)and Fludora® Fusion (Milange, and Maganja da Costa)in Zambézia⁶ Province



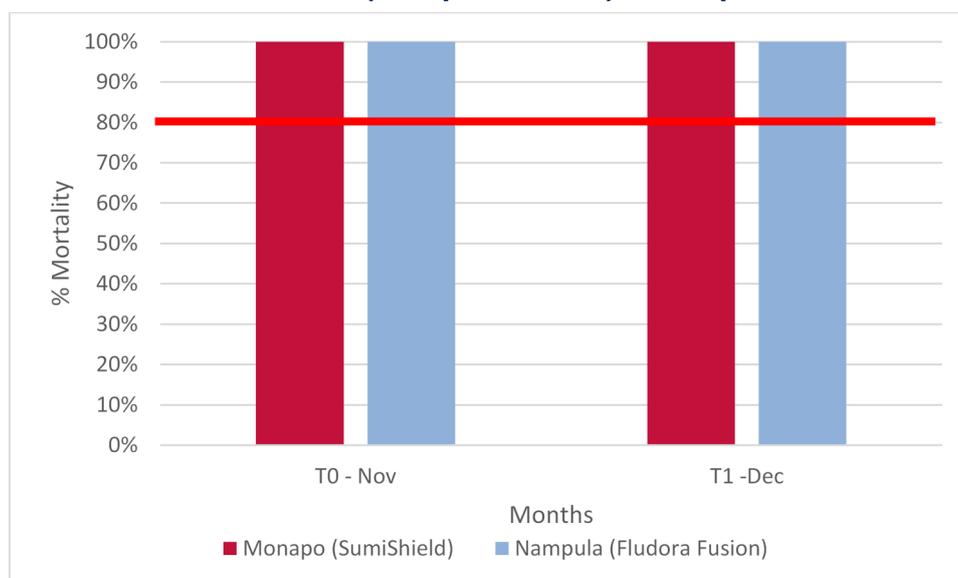
Note: In Mopeia, the cone wall assay for T0 was conducted in October and for the other districts in November; therefore, in November in Mopeia, cone wall assay is in T1 while and other districts in T0.

*Percent mortality readings were for 24 hours holding periods for Maganja at T0 and Milange at T1; 48 hours for Mopeia at T0, T1, and Maganja at T1; and 168 hours for Milange at T0.

In Nampula Province, the cone wall bioassays were conducted in Nampula and Monapo districts; the insecticides used were Fludora® Fusion and SumiShield® 50 WG, respectively. The results showed 100% mortality of the susceptible *An. arabiensis* KGB strain in both districts, and thus acceptable quality of spraying (Figure 8).

⁶ The horizontal red line on figures 7 and 8 marked at 80% is the cut-off which marks the threshold below which mortality indicates that the insecticide on the wall is not sufficient for protecting the population against malaria vector bites. After two consecutive data points of mortality below 80%, the tests are stopped.

Figure 8: Quality Assurance and Decay Rate of SumiShield® 50 WG (Monapo district) and Fludora® Fusion (Nampula district) in Nampula Province



4. ENVIRONMENTAL COMPLIANCE

4.1 IRS CAMPAIGN ASSESSMENTS

In July 2019, VectorLink in collaboration with district officers from MITADER conducted a PSECA in the 18 operations sites in the five districts targeted in 2018. VectorLink also used the PSECA period to inspect a proposed venue for a 19th operations site in Borroma, Morrumbala District. After the PSECA, VectorLink generated a worklist of recommendations to guide the planning and implementation of operations sites rehabilitations.

Based on the PSECA result, VectorLink rehabilitated 12 of 21 existing soak pits and constructed two new soak pits in Borroma and Muandua operations sites. Although there were 19 operations sites, VectorLink used a total of 23 soak pits to accommodate large numbers of SOPs in some sites. VectorLink constructed two fixed soak pits to comply with the BMP requirement that each soak pit should serve a maximum of 50 SOPs. These sites include Molumbo Sede, Morrumbala Sede, Milange Sede, and Maganja Sede. Other major renovations carried out at the operations sites included: repairing cracks in wash areas, reconstructing fence walls to prevent unauthorized entries, repairing washrooms and changing rooms, and improving security locks for some insecticides stores.

VectorLink used a total of 40 MSPs in all five districts (Maganja da Costa 10, Milange 5, Molumbo 13, Mopeia 9, Morrumbala 3). Ten of the 40 were new, built according to the MSP II model.⁷ Thirty-seven of the MSPs were used in areas where SOP camped and three were used at the Corromana site. In the Mopeia Sede site, three of the MSPs otherwise used in camping areas were used for end-of-day clean-up while problems with drainage from fixed soak pits were being fixed.

From October 7 to 12, VectorLink conducted a final PSECA to confirm that the repairs recommended in the initial PSECA had been done in all 19 operations sites and the sites met the required BMP standards. Following the confirmations from the final inspections, the VectorLink country ECO and the home office Environmental Compliance Manager reviewed reports from each operations site and gave the green light to all the 19 operations sites on October 18, 2019 to receive insecticide ahead of the start of spray campaign.

During the 2019 spray campaign VectorLink staff and partners performed mid-spray inspections to monitor compliance of all activities. The major red flags notified were leaking pumps (30 red flags), residents not informed in advance about IRS activities (25 red flags) and missing first aid kit items (34 red flags). The ECO verified with the supervisors if the submission was correct or erroneous; corrective measures were taken where appropriate. The issues reported on red flags were addressed during the morning assemblies. Red flags on missing first aid kit items were due to the fact that we did not stock aspirin and antidotes in 2019. VectorLink Mozambique will liaise with Environmental Compliance Manager to remove these two items from the checklist to make it easier for supervisors to comply with the checklist.

4.2 INCIDENT REPORTS

During the 2019 spray campaign, VectorLink recorded and reported five incidents related to insecticide theft, sale, or misuse. The incidents occurred in Morrumbala, Mopeia, and Molumbo districts. The project prepared incident reports that it shared with the home office and subsequently with PMI. Table 9 provides details of the 2019 incidents.

In the districts spraying Fludora® Fusion, in the first week, a few SOPs reported experiencing “hotness.” It was not clear whether the cause was due to insecticide exposure or the hot weather. Furthermore, there were no signs or symptoms of insecticide exposure to warrant an incident report. As a precaution, VectorLink undertook corrective actions to reinforce insecticide exposure preventive guidance: (a) re-trained all seasonal workers e.g. appropriate insecticide handling, observing wind direction before spraying eaves, etc, (b) re-emphasized safety procedures during morning mobilization and (c) reminded

⁷ MSP I are built with 25-liter buckets; MSP II are newer and are built with 45-liter buckets.

SOPs on exposure symptoms. In addition, the project provided soft face towels to SOPs on request and had Vitamin E cream available at the operations site.

To minimize data falsification and insecticide theft, VectorLink posted “Insecticide Theft and Data Falsifications ‘Prison’ warning” poster translated in Portuguese at all sites. Any insecticide related incidents were reported to the police for further action. The police responded by following up on the cases and arresting the SOPs involved e.g. in Morrumbala (Mageza Muandua site) and Mopeia (Lua-Lua site). For prevention, VectorLink continued to remind spray teams during morning mobilization meeting about the negative impact of selling or misusing insecticides and the consequence of being caught. VectorLink also sent mass messages to spray teams and supervisors to remind them not to engage in stealing, selling or misuse of insecticides. Also, IEC assistants worked with mobilizers to discourage community members from buying or requesting to buy insecticides from SOPs.

Table 9: Incident and Exposure Reports

Incident Number	Brief Description and actions taken	District
1	Health and Safety: Seasonal field assistant was bitten by a snake while searching for larvae in the field. He was treated at the district hospital and reported to be recovering well the following day.	Derre
2	Theft: Two SOPs falsified data to cover up insecticide theft. One SOP gave two sachets of insecticide to a homeowner and the other sold one sachet to another homeowner.	Morumbala
3	Theft: A TL and two SOPs falsified spray data to cover up insecticide theft. They had colluded and sold a total of eight sachets of insecticides.	Morrumbala
4	Theft: One SOP poured insecticide into a plastic bag and was caught selling it to a homeowner.	Morrumbala
5	Theft: A SOP falsified data to cover up misuse of insecticide. The SOP poured mixed insecticide on the ground and buried four sachets of insecticide because she did not want to work.	Mopeia
6	Theft: Two SOPs were discovered with six sachets of insecticides without their outer packaging in their bags. The SOPs planned to return the outer packaging as “empty” sachets at end of the day.	Molumbo

4.3 DEMOBILIZATION AND WASTE MANAGEMENT

4.3.1 DEMOBILIZATION

VectorLink began demobilizing all operations sites soon after the spray campaign ended. All logistics and spray equipment from the sites were taken to the respective district stores and later to the central warehouse in Quelimane. All site stores and soak pits were cleaned and closed. The project left a few items (such as poly tanks and barrels for triple rinsing) at the main district stores. District stores are guarded throughout the year.

VectorLink together with MITADER representatives conducted post-IRS inspections in all 19 operations sites between December 17 and 29, 2019. All 19 met the BMP standards for site demobilization. The post-spray inspections also provided recommendations to consider during the 2020 work planning activity:

- Two operation sites need to be relocated due to their closeness to sensitive receptors⁸: Maganja da Costa Sede and Chimuara in Mopeia district.

⁸ Sensitive receptors refers areas that need to be protected from contamination e.g. homes, markets, water bodies (such as wells or rivers) etc.

- Soak pits should be rehabilitated⁹ to improve drainage in five sites: Dulanha and Liciro in Milange District, Corromana in Molumbo District, and Mopeia Sede and Megaza in Morrumbala District.

4.3.2 WASTE MANAGEMENT

VectorLink developed a waste management plan to guide the management and disposal of all solid waste generated during the implementation of IRS. VectorLink posted copies of this plan at all operations site stores to guide the management and disposal of IRS-related solid waste.

During the spray campaign, solid wastes were separated by type. Storekeepers and logistics assistants stored all contaminated solid wastes separately from uncontaminated wastes, such as empty nose mask boxes, and other materials. During the demobilization process, all districts packaged their contaminated solid wastes and transported them to the central warehouse in Quelimane for final disposal. VectorLink incinerated uncontaminated waste at nearby clinics' incineration points.

In January 2020, VectorLink in collaboration with MITADER supervised the final disposal of certain solid wastes at Ceramica Okanga incinerator. It plans to supervise disposal of other wastes at Incala recycling plant and at Mavoko recycling and landfill in February. Table 10 shows the solid waste disposal plan.

VectorLink used fixed soak pits in all of its operations sites for liquid waste disposal. Where necessary, especially during camping periods, VectorLink used MSPs for the management and disposal of liquid wastes.

Table 10: 2019 IRS Solid Waste Disposal Plan

Waste Type	Amount of Waste	Disposal Method	Disposal Site	Date of Disposal
Empty bottles Actellic® 300CS	12 Bottles	Recycle	Incala Recycling Plant	010/02/2020
Empty SumiShield®50WG	58,082 sachets	Incinerated	Ceramica Okanga	January 3-4 2020
Empty Fludora® Fusion	246,999 sachets	Incinerated	Ceramica Okanga	January 3-4 2020
SOPs damaged bags	734 bags	Incinerated	Ceramca Okanga	January 3-4 2020
Dust masks	48,060 masks	Incinerated	Ceramica Okanga	January 3-4 2020
Contaminated cardboard	45kg	Incinerated	Ceramica Okanga	January 3-4 2020
Contaminated GAC	145KG	Incinerated	Ceramica Okanga	January 3-4 2020
Dry cell batteries	26,262 Batteries	Recycle	Mavoko Recycling and landfill	February 10, 2020
Damaged gum boots	320 pairs	Recycle	Mavoko Recycle and landfill	February 10, 2020
Damaged basins	81	Recycle	Incala recycling plant	February 10, 2020
Damaged barrels	75	Recycle	Incala recycling plant	February 10, 2020
Gloves	2,575 pairs	Landfill	Mavoko Landfill	February 10, 2020

⁹ Soak pit rehabilitation involves removing all old materials that were installed during the construction of a soak pit and replacing them with new materials. Rehabilitation is conducted every two years or when effluent is not percolating well through the soak pit.

5. MONITORING AND EVALUATION

5.1 DATA COLLECTION, ENTRY, AND QUALITY ASSURANCE

5.1.1 DATA COLLECTION

VectorLink used standardized data collection forms designed to capture all core PMI indicators. All data collection followed training on data capture and data quality. During the spray campaign, SOPs collected all spray data with the SOP forms each day. At the end of each spray day, TLs verified the SOPs forms for completeness and accuracy and then handed them over to the base supervisor. The base supervisor then forwarded the data collection forms to the data entry center for data entry.

5.1.2 DATA ENTRY

In 2019, VectorLink switched from the old legacy MS access database to VectorLink Collect, a DHIS2 platform database. The VectorLink M&E Manager and the Database Manager attended a training on the new database in Kigali, Rwanda, on April 25–27, 2019, and upon their return trained VectorLink project staff, M&E assistants, data entry clerks (DECs), and a PDH representative on the use of the new database. The project contracted 28 DECs and 10 M&E assistants to staff five data centers for data entry. The DECs entered both spray data and house-to-house mobilization data everyday throughout the spray campaign period following predefined data entry protocols. The DECs entered spray data at two levels, first by “totals” then by “details,” i.e., by each structure captured on the Daily SOP form. In addition, DECs and M&E assistants performed data cleaning each day. The DECs and M&E assistants completed final data entry and cleaning by December 21, 2019.

5.1.3 QUALITY ASSURANCE

The following are some of the data quality assurance strategies that VectorLink implemented:

- VectorLink used standardized data collection tools and provided comprehensive training for all seasonal workers in data collection and entry.
- TLs used the Error Eliminator form to vet SOP data collection forms to identify and correct data capturing errors.
- VectorLink used a double data entry system for spray data to ensure completeness of data. VectorLink Collect is equipped with a data-cleaning tool that matched the two independent data entries and highlighted entry errors for correction.
- VectorLink conducted the data collection verification (DCV) to ensure accuracy of data reported by SOPs for the field. Table 11 shows details of DCV data compared with SOP-reported data. There were no significant discrepancies. Table 12 describes common issues identified during DCV and actions taken to address the issues.
- VectorLink Collect is designed with locks and validation checks. The VectorLink Database Manager regularly scanned the database for irregularities and highlighted them for correction.
- VectorLink Collect is cloud based with daily automatic backups.
- All hard copies of spray and mobilization are stored in durable binders.

Table 11: DCV Data Versus SOP Data

Districts	Structures Visited	Structures Sprayed	Structures Not Sprayed	Coverage Based on DCV	2019 Spray Coverage	Difference in Coverage between SOP and DCV Data (% points*)
Maganja da Costa	504	488	16	96.8%	96.9%	-0.1
Milange	313	307	6	98.1%	94.3%	3.8
Molumbo	257	255	2	99.2%	97.6%	1.6
Mopeia	671	660	11	98.4%	98.3%	0.1
Morrumbala	119	113	6	95%	97.7%	-2.7
Total	1,864	1,823	41	97.8%	96.6%	1.2

* Negative percentage points are where DCV data found a lower spray coverage than was showed in SOP data. Positive percentage points are where DCV found a higher spray coverage than SOP data. .

Table 12: Common Issues Found and Correction Actions Taken

Errors/Issues Observed	Corrective Actions Taken
Names of head of households were not completed for some unsprayed houses	Issues were addressed with TLs, and SOPs daily at morning assemblies. SOPs were encouraged to ask close neighbors for assistance or mobilizers.
Difference between the population (number of men and women) reported in the SOP form and DCV. Some heads of household did not include children when reporting numbers of men and women living in the structures.	Issue was discussed with spray teams, and SOPs were encouraged to probe further when collecting population figures to ensure that they included all (adults and children) residents of the structure. Example: instead of asking how many “men” live in the structure, SOPs should ask how many “males” live there so that children could be reported by households.
Some eligible structures encountered by SOPs were not appropriately recorded, particularly eligible structures that were not sprayed due to refusals or when closed without any residents of neighbors.	Issue discussed with spray teams and SOPs during the morning assemblies, and SOPs were reminded to mark and record all eligible structures found, sprayed or not sprayed. SOPs used the re-visits to record eligible structures that were not previously recorded. SOPs were also given extra SOP forms to assist with the recording of unsprayed structures.
Some SOPs did not consistently mark structures with chalk as recommended.	Issue was discussed with spray teams and SOPs during the morning assemblies, and SOPs were reminded to mark and record all eligible structures found.
Some SOPs forgot to give the structure card to the homeowner after completing it.	Frequent reminders during the morning meetings were done and by the third week of the spray campaign this had been solved.

5.2 MHEALTH

In 2019, VectorLink continued to implement IRS activities using mobile phone devices. VectorLink used mHealth platforms for job aids, the performance monitoring tracker (PMT), and spray campaign supervision. For job aids, VectorLink sent out SMSs to seasonal workers throughout the spray campaign. An example of a general reminder, sent to all SOPs, TL and base supervisors on Mondays and Thursdays during the spray campaign, is: *Remove all food and food items. Only non-edible, bulky items should be placed in the center of the room and covered with a plastic sheet before spraying.* Other job aids were specific messages to specific groups to address specific issues. For example, when supervisor observed that most SOPs were not returning household cards to the store at the end of the day, a specific message was sent to SOPs: *“The household cards given to spray operators must be managed by the storekeepers at the operations site in the same way as they*

do with the insecticide. If you took ten cards and used five, at the end of the day, you must return five to the store for use the next day”

For the PMT, VectorLink base supervisors used mobile phones to transmit their daily operations performance data to a central server. The server compiled the data and sent a report to project managers to facilitate quick decision on spray progress.

For spray campaign supervision, VectorLink continued to use the Online Data Kit (ODK) and Dimagi, our m-health project partner, Commcare platforms. The ODK had programmed supervision tools for use by VectorLink staff. The same supervisory tools were programmed in Commcare for use by base supervisors and supervisors from the PDH and SDSMAS. In total, 1,913 supervisory forms were completed, 32.5% on ODK and 67.5% on the Commcare platform: 16.2% of all supervision forms were morning mobilization supervision, 3.6% were SOP transport inspections, 66.9% were homeowner preparation and SOP performance supervision, 2.9% were storekeeper performance supervision, and 10.5% were end-of-day clean-up supervisions. Some of the support given to SOPs during the homeowner and SOP performance supervision included correcting the speed of spray and proper preparation of structures before spraying is done.

5.3 RESULTS

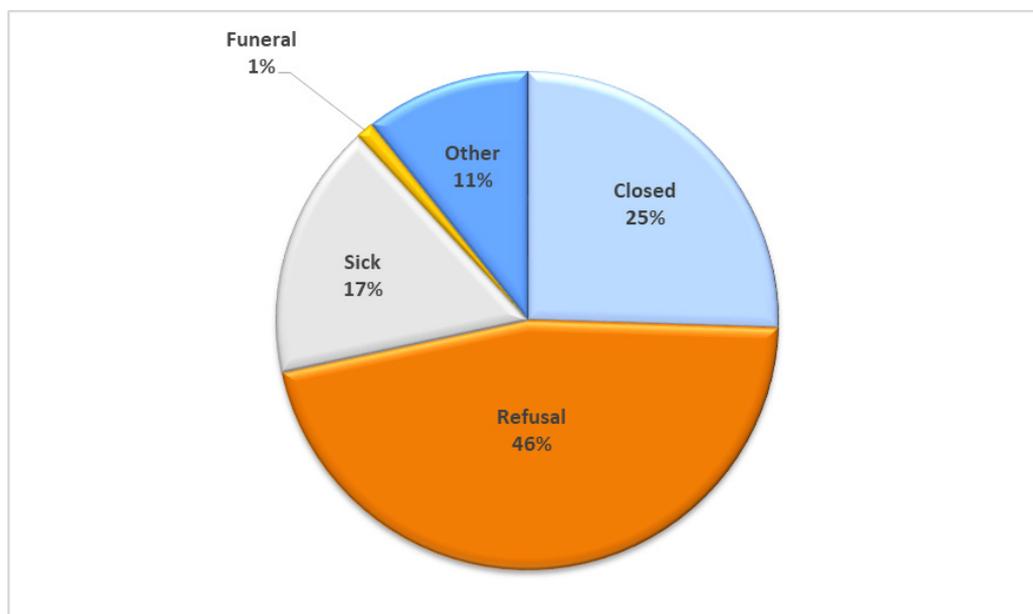
VectorLink targeted 331,360 structures to find and spray. The 350,172 structures found is almost 6% more than what VectorLink targeted for spraying. This increase had two main reasons: First, in some districts, especially Morrumbala and Mopeia, the district team sprayed areas that they had originally planned not to spray; these areas had been removed from the target as part of the reduction in the targets for all districts. However, due to some political reasons these areas had to be sprayed. Second, many people displaced by Cyclone Idai and related floods settled in IRS districts, leading to increases in the number of structures compared with 2018. By the end of the 2019 spray campaign, SOPs had found 350,172 eligible structures and sprayed 338,330, representing 96.6% spray coverage. The total population protected by IRS (all ages) was 1,484,191. This includes 209,747 children under 5 years of age and 77,084 pregnant women. Table 13 provides the overall and districts specific details.

Table 13: Spray Results by District

District	Structures Found by SOPs	Structures Sprayed	Spray Coverage	Total Population Found	Population Protected					
					Total Population	Males	Females	Pregnant Women	Children <5 Years	% of Population Found
Maganja da Costa	45,934	44,496	96.9	202,869	196,868	96,525	100,343	9,397	24,616	97.0%
Milange	106,537	100,478	94.3	500,276	475,604	232,024	243,478	25,078	66,523	95.1%
Molumbo	56,762	55,384	97.6	247,406	241,682	121,789	119,890	11,636	38,979	97.7%
Mopeia	36,760	36,144	98.3	164,359	161,550	81,561	79,987	6,285	24,200	98.3%
Morrumbala	104,179	101,828	97.7	418,122	408,487	192,696	215,791	24,688	55,429	97.7%
Total	350,172	338,330	96.6	1,533,032	1,484,191	724,595	759,489	77,084	209,747	96.8%

A total of 11,842 (3.4%) of the 350,172 structures found by SOPs were not sprayed for various reasons: 5,463 structures were not sprayed because the owners refused, 3,019 because the structures were closed at the time of the SOP visit, and 1,967 because they housed sick people. Figure 9 provides details on the breakdown of reasons why some structures were not sprayed.

Figure 9: Reasons for Not Spraying Structures



The number of structures sprayed per sachet of insecticide varied by district, with an average 2.1 structures sprayed per sachet. Table 15 provides more details on the number of structures sprayed per sachet of insecticide. It also provides details on the average number of structures sprayed per day per SOP. The value ranges from 9.8 to 11.0 with an overall of 10.1 structures per SOP per day.

Table 14. Insecticide Use and SOP Performance by District

District	Structures Found	Structures Sprayed	Total Sachets Used	Average Number of Structures Per Sachet of Insecticide	Average Number of Structures Sprayed Per SOP Per Day
Maganja da Costa	45,934	44,496	19,319	2.3	10.0
Milange	106,537	100,478	47,610	2.1	9.9
Molumbo	56,762	55,384	26,933	2.1	11.0
Mopeia	36,760	36,144	15,503	2.3	9.6
Morrumbala	104,179	101,828	48,761	2.1	9.8
Grand Total	350,172	338,330	158,126	2.1	10.1

6. CHALLENGES, LESSONS LEARNED, AND KEY RECOMMENDATIONS

6.1 CHALLENGES

- **Late arrival of insecticide:** As detailed in Section 4.4, both SumiShield®50WG and Fludora® Fusion were delayed in arriving at the central warehouse. The delay forced the postponement of the spray campaign start from October 22 to October 28 for SumiShield®50WG districts and to November 4 for Fludora® Fusion districts. This delay resulted in extra days' wages (approximately \$3,300) for security guards, store keepers and logistics assistants who were already at post before the postponement of the spray date and had to be on post since PPE, supplies and insecticides had already been distributed. When the arrival date for Fludora® Fusion was further delayed, VectorLink Mozambique incurred an extra transportation cost, for the insecticide it borrowed from Nampula Province so it could start spraying in the Fludora® Fusion districts while the port authorities finalized the processing of the insecticide's release.
- **Increased per diem rate for government staff:** Halfway through the year, after the approval of the VectorLink 2019 budget, the Ministry of Finance released new per diem rates for all government workers. These rates were 200% to 300% more than what VectorLink had budgeted. In response, VectorLink had an emergency meeting with the PDH to discuss the implications of the new rates. The PDH and VectorLink agreed to reduce the supervision time for MASA and MITADER staff from 35 days to 15 days. This reduction helped offset the unexpected increase in per diem.
- **Unrecorded structures:** Some SOPs did not record some eligible but not-sprayed structures that they visited in some communities. These structures were locked at the time of the SOP visit or homeowners refused the IRS without providing a reason to the SOPs.
- **Weak mobilization in some communities:** VectorLink observed poor mobilization by some mobilizers, especially in Milange District. For example, one mobilizer was supposed to lead three spray teams to a community of which he had limited geographical knowledge. They could not reach the community on the appointed day, and so the teams could not spray any structures. The community was later sprayed with the help of another mobilizer and spray team.
- **Refusals:** As shown in Figure 9, VectorLink witnessed some refusals in all districts. Anecdotally, reasons ranged from lack of permission from spouses to adamant refusal to have hours sprayed. However, in Maganja da Costa and Mopeia, some community leaders refused to allow their communities to be sprayed because they felt the communities had been neglected during the distribution of aid after Cyclone Idai.
- **Increased costs of a sixth day of SOP training:** VectorLink incurred an unbudgeted cost for adding one day to its normally five-day SOP training. This extra day was a compromise in response to the IRS technical working group recommendation to increase SOP training to eight days.
- **A low number of completed DCV forms,** especially in Morrumbala and Molumbo districts. This was because vehicles intended for use by M&E assistants were often used instead by supervisors and usually by supervisors headed in a different direction from the M&A assistants.

6.2 LESSONS LEARNED

In 2018, VectorLink Mozambique recommended that SDSMAS be included in the procurement process for transportation and SOP meals. In 2019, SDSMAS participated in the opening of bids for SOP transportation and meals. They also participated in the inspection of SOP transportation vehicles. This

collaboration allowed SDSMAS to learn about the procurement process. Furthermore, VectorLink did not have any issues with transport owners, the PDH, or SDSMAS concerning the procurement process for these items.

While general community engagement meetings are beneficial, there are times when it is important to identify leaders of smaller groups and meet with them to address specific issues. This strategy is what convinced initially reluctant community leaders to accept the spraying of some communities in Maganja da Costa.

6.3 KEY RECOMMENDATIONS

- To ensure that eligible, not sprayed structures are recorded, VectorLink Mozambique will continue to address this during SOP trainings and at morning assemblies during the spray campaign and through consistent and increased SOP data collection spot checks through all levels of supervision.
- For poorly mobilized communities, VectorLink will work closely with the SDSMAS and the community leaders to ensure that low performing mobilizers are not considered for the next round of spraying.
- To reduce refusals, VectorLink together with SDSMAS will continue face-to-face engagement with community leaders to address specific issues that are hindering acceptance of IRS.
- The performance of some storekeepers was disappointing despite several onsite support visits to them. VectorLink Mozambique district coordinators, the Logistics Manager, and SDSMAS will evaluate the performance of all storekeepers and logistics assistants, and the project will not rehire the poor performers.
- Coveralls were too big for some SOPs, particularly female SOPs. Facilitators at SOP trainings should pay close attention during dress rehearsals to ensure that SOPs and TLs have the correct sizes. The logistics department should also send different sizes to each district to ensure that there is a variety of sizes in all districts.
- The new government per diem rates have cost implications for project activities. VectorLink and the PDH will thoroughly discuss and resolve this issue without sacrificing vital aspects of the spray campaign. This discussion must include the number of supervision days for SDSMAS, MASA, and MITADER staff as was raised in the post-spray evaluation meeting.
- VectorLink should evaluate the cost implications of applying the IRS technical working group recommendations, discuss this with PMI, and decide how to respond.
- Community mobilizers are still paid with cash, but there is a risk involved in carrying large amounts of cash to the field. The challenge is that mobilizers often do not own phones or have access to M-pesa. Alternative payments methods would have to be used to mitigate the risk associated with cash payment.
- Due to budget constraints in 2019 and as part of VectorLink's technical approach to rational vector control decision making, households in remote areas already benefit from mass ITN distribution and where marginal increases in IRS coverage would not justify increased operations costs, these areas were not included in the 2019 IRS target. Thus, the spray campaign target was set at 86% of the structures found in 2018. As a result, each district had to eliminate some structures from 2018 in order to reach the 2019 target. During the 2019 post-spray evaluation meetings, the various SDSMASs recommended the targeted number of structures be increased so as to protect more people. However, since Mozambique implements universal coverage campaigns of ITNs, it is deemed that with proper use of ITNs these populations would be well protected against malaria.
- VectorLink will review vehicle availability and use to ensure that M&E assistants are able to conduct more DCV supervisions.

ANNEX A: MONITORING AND EVALUATION INDICATOR MATRIX

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results										
				Year 1 ¹⁰		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 (VC) Interventions														
1.1	Successfully execute IRS and other malaria vector control programs													
1.1.1	Annual country work plan developed and submitted on-time	Project records Annually	By Spray Campaign	Completed	Completed	Completed	Completed							
1.1.2	Number of eligible structures targeted for spraying	Project records Annually	By Spray Campaign	388,623	409,908	331,360	350,172							
1.1.3	Number of eligible structures sprayed with IRS	Project records Annually	By Spray Campaign	330,330	387,413	281,656 ¹¹	338,330							
1.1.4	Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	Project records Annually	By Spray Campaign	85%	94.5%	85%	96.6%							
1.1.5	Number of people protected by IRS	Project records Annually	Sex Pregnant women Children <5	1,707,941	1,663,078 (Males: 819,219; Females: 843,859) (Pregnant women: 90,089; Children <5: 237,944)	1,424,848	1,484,084 (Males: 724,595; Females: 759,489) (Pregnant women: 77,061; Children <5: 209,726)							

¹⁰ The only VC intervention in Year 1 is IRS.

¹¹ This is 85% of the value for indicator 1.1.2.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹⁰		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.1.6	EOSR submitted within 45 days after the end of spray (including completing MEP and EMMR)	Project Annually	By Spray Campaign	Completed	Completed	Completed	Completed						
1.1.7	Post-spray Data Quality Audit within 90 days of spray completion	Data Collection Forms Annually	By Spray Campaign	N/A	N/A	N/A	N/A						
1.1.8	Number of Insecticide Treated Nets (ITNs) distributed, by channel	Project Records Annually	Channel	N/A	N/A	N/A	N/A						
1.1.9	Conducted 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	Channel	N/A	N/A	N/A	N/A						
1.1.10	Operational routine monitoring systems for continuous ITN distribution established and disaggregated by channel	Project Records Annually	Channel	N/A	N/A	N/A	N/A						
1.1.11	ITN durability monitoring data collection completed on time as planned in a given project year	Project Records Annually		N/A	N/A	N/A	N/A						
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	Technical Area Job Function	2	2 ¹² Spray operations for SDSMAS staff: 2	1	2						

¹²This refers to TOT in Zambezia and Nampula.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹⁰		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.2.2	Number of NMCP and other vector control host country staff accessing DHIS2	DHIS2 Logs Annually	Job Function	0	0	2	0						
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	Sex (# and %) Job Function	1,625 ¹³	1,617 (Males:1,236 [76.4%]; Females: 381 [23.6%]) (SDSMAS :34; VL District Coordinators:6; SOPs & TL:s: 1,478; BS: 79; OSS: 20)	1,378	(Males:1,047 [72.4%]; Females: 399 [27.6%]) (SDSMAS :32; SOPs & TL:s: 1,395; OSS ¹⁴ : 19)						
1.3.2	Number of health workers receiving insecticide poisoning case management training	Project Training Records Annually	Sex (# and %)	21	24 (Males: 24 [100.0%]; Females: 0 [0.0%])	0 ¹⁵	0						
1.3.3	Number of adverse reactions to pesticide exposure documented	Incident Report Forms Annually	Type of Exposure	0	0	0	0						

¹³ SOP training and TOT.

¹⁴ OSS refers to operation site supervisor or base supervisor.

¹⁵ In 2019, VectorLink eliminated this training. Project team will visit health facilities to orient prescribers and share informational materials on insecticide products during the preparation and planning period.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹⁰		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
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	Sex (# and %) VC Intervention Type	4,043	4093 (Males: 3,275 [80.0%]; Females: 818 [20.0%]) VC Intervention Type: IRS	3,330	3,362 (Males: 2,725 [81.1%]; Females: 637 [18.9%]) VC Intervention Type: IRS						
1.4.2	Number of people trained during IRS Training of Trainers	Project Training Records Annually	Sex (# and %)	146	139 (Males: 117 [84.2%]; Females: 22 [15.8%])	58	51 (Males: 49 [96.1%]; Females: 2 [3.9%])						
1.4.3	Total number of people hired to support VC in target districts	Project Records Annually	Sex (# and %) Job Function VC Intervention Type	3,744	3,888 ¹⁶ (Males: 3,076 [79.1%]; Females: 812 [20.9%]) VC Intervention Type: IRS *See foot note job function	3,248	3,229 ¹⁷ (Males: 2,506 [77.6%]; Females: 723 [22.4%]) VC Intervention Type: IRS *See foot note job function						

¹⁶ Job function for indicator 1.4.3 - SOPs:1120; Tls: 224; base supervisors:78; OSS: 20; community mobilizers: 2208; pump technicians: 22; storekeepers: 21; washers: 67; security guards: 41; database coordinators: 6, M&E assistant: 15, DECs: 33, finance assistant: 6, logistics assistants: 6, IEC assistants: 20; water fetchers:

¹⁷ In 2019, job function for indicator 1.4.3 include: SOPs:1000; Tls: 200; OSS: 19; community mobilizers: 1791; pump technician:21; storekeepers: 19; washers: 72; security guards: 40; M&E assistant: 10, DECs: 28, finance assistant: 5, logistics assistants: 5, IEC assistants: 19;

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹⁰		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.4.4	Number of government/district officials who acted as supervisors during VC campaigns	Project Records Annually	VC Intervention Type	50 ¹⁸	34 VC Intervention Type: IRS	38	36 VC Intervention Type: IRS						
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	Returning female seasonal workers hired in a more senior capacity	1,310	812	812	723						
1.5.2	Number and percentage of women hired in supervisory roles in target areas for vector control activities	Project Records Annually	VC Intervention Type Job Function	186 ¹⁹	93 VC Intervention Type: IRS Job Function: refer to foot note ²⁰	76 (30%) ²¹	61 ²² (24.1%)						
1.5.3	Number and percentage of staff (permanent and seasonal) who have completed gender awareness training	Project Training Records Annually	Sex Job Function	4,073; 100%	1,641 ²³ (Males: 1,260 [76.8%]; Females: 381 [23.29%]) SOPs % TL: 1478, BS: 79; OSS: 20; Health technicians: 24; SDSMAS staff: 34; VL District Coordinators: 6	1,378	1,446 (Males:1,047 [72.4%]; Females: 399 [27.6%]) (SDSMAS :32; VL District Coordinator s:6; SOPs & TLs: 1,395; OSS: 19)						

¹⁸ Medical chiefs, malaria focal points, IRS supervisors, IEC supervisors, MASA representative, MITADER representatives

¹⁹ Supervisory roles include: database coordinators, M&E assistants, logistics assistants, IEC assistants, site supervisors, TLs.

²⁰ Job functions for indicator 1.5.2: database coordinators: 3, M&E assistants: 3, logistics assistants: 2, IEC assistants: 2, site supervisors: 2, brigade supervisors: 20, TLs: 64.

²¹ We expect to have a total of 401 people in supervisory roles. We are targeting 30% to be women based on 25% from 2018.

²² In 2019, supervisory roles include: M&E assistants, logistics assistants, IEC assistants, base supervisors, and team leaders.

²³ These are the total from TOT, SOP, and TL training and poison management training.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹⁰		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.5.4	Number and percentage of women in senior leadership roles in VectorLink country offices	Project Records Annually	Sex (# and %)	N/A	N/A	1	1						
1.6	Implement and support social behavioral change communication and mobilization activities												
1.6.1	Number of radio spots and talk shows hired	Project Records Annually	VC Intervention Type	4,500	908 VC Intervention Type: IRS	3,560	1,379 ²⁴						
1.6.2	Number of print materials disseminated	Project Records Annually	VC Intervention Type	5,500	10,731 ²⁵ VC Intervention Type: IRS	3,267 ²⁶	4,534 ²⁷						
1.6.3	Number of people reached with vector control and/or SBCC messages via door-to-door messaging	Project Records Annually	VC Intervention Type Sex	1,707,941	577,319 (Males: 275,142 [47.7%]; Females: 307,177 [52.3%]) VC Intervention Type: IRS	1,424,848	612,072 (Males: 290,554; [47.5%] Females: 321,518) [52.5%]						
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		N/A	N/A	N/A	N/A						

²⁴ Indicator 1.6.1 includes: 1,343 radio spots; 26 radio debates; 10 radio live programs; The results are lower than target as two radio stations in Maganja da Costa and Milange were not operational during the spray campaign so messages were not broadcasted through those districts

²⁵ T-shirts: 4,270, caps: 4,188, job aid for mobilizers: 2,208, poster for vehicles: 65

²⁶ 1,813 mobilizer Job aids, 1,451 mobilizer T-shirts

²⁷ In 2019, printed materials included: T-shirts: 2,321; caps: 290; job aid for mobilizers: 1,799; poster for vehicles: 122; guidelines for journalists: 3

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹⁰		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.6.5	Number and percentage of people with a favorable attitude toward the practice/product (i.e., ITNs, IRS)	Project Records Annually	VC Intervention Type	N/A	N/A	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	VC Intervention Type	N/A	N/A	N/A	N/A						
1.7	Environmental compliance												
1.7.1	SEAs (with EMMPs) or Letter Reports submitted at least 60 days prior to the commencement of vector control campaigns	Project Records Annually	By Spray Campaign	Completed	Completed	Completed	Completed						
1.7.2	Number and percentage of permanent and mobile soak pits inspected and approved prior to IRS campaigns	Project Records Annually	Soak Pit Type	57; 100%	58, 100% Permanent Soak pit: 23 (39.7%) Mobile Soak pit: 35 (60.3%)	56 (Permanent Soak pit: 22 and Mobile Soak pit: 35)	67 (Permanent Soak pit: 23 and Mobile Soak pit: 44)						
1.7.3	Number and percentage of storehouses inspected and approved prior to IRS campaigns	Project Records Annually	Storehouse Type	27 ²⁸ 100%	28; 100% Insecticides Store ²⁹ : 8 (28.6%) Material store ³⁰ : 20 (71.4%)	26, 100%	26, 100%						

²⁸ 1 central; 21 district stores

²⁹ These are stores that are exclusively used for insecticides

³⁰ These are stores that are exclusively used for insecticides and materials.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹⁰		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.7.4	Number and percentage of fixed soak pits that are compliant with PMI's Best Management Practices	Project Records Annually	By Spray Campaign	27; 100%	23; 100%	22	23, 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	VC Intervention Type	7 ³¹ ; 100%	7; (100%) VC Intervention Type: IRS	7(100%)	7 ³²						
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	VC Intervention	5 ³³ ; 78%	7 (100%) VC Intervention Type: IRS	7(100%)	7						

³¹ The number of sentinel sites planned for this year to monitor the mentioned indicators are 4 (3 intervention sites and 1 control) in Zambezia and 3 (2 intervention and one control) in Nampula.

³² Three in Nampula and four in Zambezia

³³ Two in Nampula and three in Zambezia

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹⁰		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	VC Intervention	7; 100%	7 ³⁴ VC Intervention Type: IRS	7(100%)	7 ³⁵ (100%)						
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	Insecticide Type	10 ³⁶ 100%	10 ³⁷	8(100%)	8 ³⁸ (100%)						
2.1.5	Number of wall bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS	Entomological Reports Annually	By spray campaign	45	25	15 (100%)	15						
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	By spray campaign	45; 100%	25 (87%)	15(100%)	15						

³⁴ Three in Nampula and four in Zambezia

³⁵ Three in Nampula and four in Zambezia

³⁶ We conduct susceptibility testing in all spray districts (6) and one control site in Zambezia, and in two spray districts and one control in Nampula, making the total number of the sites 10. All insecticide classes will be tested in all sites.

³⁷ Three in Nampula and seven in Zambezia

³⁸ Three in Nampula and five in Zambezia

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹⁰		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
2.1.7	Number of wall bioassays conducted after the completion of spraying at monthly intervals to evaluate insecticide decay	Entomological Reports Annually	Insecticide Type	280 ³⁹	50 (ongoing)	200(100%)	35(ongoing)						
2.1.8	Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites	Entomological Reports Annually	Insecticide Type	70	70(100%)	80(100%)	75						
2.1.9	Integrated vector control analytics dashboard available for decision making	Project Records Annually	By Spray Campaign	N/A	N/A	NA	N/A						
2.1.10	Number of staff (VectorLink-contracted or non-VectorLink) trained in entomological monitoring	Project Training Records Annually	Sex (# and %) Job Function	0	1	1	0						
2.2	NMCPs develop country-level IRS and other malaria vector control strategies												
2.2.1	Developed an integrated malaria vector control strategy, including a plan for monitoring and managing insecticide resistance supported by the project	Project Records Annually	By Spray Campaign	N/A	N/A	N/A	N/A						
2.2.2	Completed integrated data and visualization landscaping for vector control decision making complete	Project Records Annually	By Spray Campaign	N/A	N/A	N/A	N/A						
2.2.3	Implemented sub-national insecticide rotation as part of an IRM strategy	Project Records Annually	By Spray Campaign	Completed	Completed	Completed	Completed						
2.3	Build capacity of NMCPs and local institutions to collect, analyze, and use data for strategic malaria control decision-making												

³⁹ 3 districts in Zambezia and 2 districts in Nampula, one site per district. We estimate 15 tests in Zambezia (5 in Mopeia, 5 in Milange, and 5 in Maganja) and 10 tests in Nampula (5 houses each in the 2 districts). Monthly wall bioassays will be done in 25 houses for 8 months.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹⁰		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
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	Job Function Organization	N/A	N/A	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	Job Function Organization	N/A	N/A	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	Insecticide Type	2 ⁴⁰ 100%	2; 100% Actellic [®] 300CS : 1 SumiShield [®] 50WG: 1	2 ⁴¹ (100%)	2, 100% Fludora [®] Fusion : 1 SumiShield [®] 50WG: 1						
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	Insecticide Type	2 ⁴² 100%	2; 100% Actellic [®] 300CS : 1 shipment SumiShield [®] 50WG: 1 shipment	2 (100%)	0 ⁴³						

⁴⁰ 1 Actellic[®] 300CS 1 SumiShield[®] 50WG

⁴¹ 1 Fludora[®] Fusion and 1 SumiShield[®] 50WG

⁴² 1 Actellic[®] 300CS; 1 SumiShield[®] 50WG

⁴³ Both insecticides delayed in arrival. Due to this, the start date of the spray the 2019 spray campaign was moved from October 22 to October 28 for SumiShield[®] 50WG districts and November 4 for Fludora[®] Fusion districts.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹⁰		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 international equipment procurements, including PPE, received on-time to allow for the initiation of vector control campaigns as scheduled	Procurement Records Annually	VC Intervention Type	2; 100%	2 ⁴⁴ ; 100%	2 ⁴⁵ (100%)	2, 100%						
3.1.4	Number and percentage of local procurements for PPE received on-time to allow for the initiation of spray operations as scheduled	Procurement Records Annually	By spray campaign	3; 100%	346 100%	3	3, 100%						
3.1.5	PPE procured according to workforce composition	Procurement Records Annually		N/A	N/A	N/A	N/A						
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	VC Intervention Type Sex	32; 100%	29; 100% (Males: 25 [86.2%]; Females: 4 [13.8%])	27	26; 100% (Males: 18 [69.2%]; Females: 8 [30.8%])						
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	Insecticide Type	2147 100%	21; 100%	18 (100%)	19 (100%)						

⁴⁴ 1 shipment for Goizper pumps, 1 shipment for other PPEs and entomology supplies

⁴⁵ 1 shipment for other PPEs and 1 shipment for entomology supplies

⁴⁶ 1 for coveralls, 1 for boots, 1 for neck covers

⁴⁷ 1 central warehouse (SumiShield® 50WG and Actellic® 300CS); 20 district warehouses: 9 for SumiShield® 50WG , 11 for Actellic® 300CS

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹⁰		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
3.2.3	Successfully completed spray operations without an insecticide stock-out	Inventory and Stock Records Annually	Insecticide Type	Completed	Completed	Completed	Completed						
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	0	0	0	1						
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	Technical Area	0	0	0	0						
4.2.2	Number of individual members who use the Vector Learning Exchange	Project Records Annually		848	0	1	0						
4.2.3	Number of symposia and/or presentations submitted to and accepted at global conferences	Project Records Annually	Technical Area	0	0	0	0						
4.2.4	Number of success stories written or videos produced and shared on the VectorLink project website	Project Records Annually		1	0	1	0						
4.2.5	Number of peer-reviewed journal articles submitted and accepted	Project Records Annually	Technical Area	0	0	0	0						

⁴⁸ Chief of party, operations manager, M&E manager, ECO, finance manager, logistics manager, entomology coordinator, and IEC coordinator

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹⁰		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
4.2.6	Number of critical guidance, standards, or plans that incorporate disseminated findings/best practices	Project Records Annually	Technical Area	0	0	0	0						
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	VC Intervention Type	1	0	N/A	N/A						
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	VC Intervention Type	149	0	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	Private Sector Organization	0	0	N/A	N/A						

⁴⁹ Project-wide cost assessment

ANNEX B: ENVIRONMENTAL MITIGATION AND MONITORING REPORT (EMMR)

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
1a. Pre-contract inspection and certification of vehicles used for insecticide or spray team transport	Prior to the 2019 spray activities, all trucks were inspected. A total of 61 needed trucks passed the first inspection and qualified for the second inspections and certifications,	No issues identified.	
1b. Driver training	Orientation training for drivers was done during the certification inspections	One driver was replaced to comply with requirements.	
1c. Cell phone, personal protective equipment (PPE), and spill kits on board during pesticide transportation	All drivers had a cell phone and all trucks were equipped with spill kits	No issue identified.	
1d. Initial and 30-day pregnancy testing for female candidates for jobs with potential insecticide contact	All female candidates underwent pregnancy testing one week before the training.	Four candidates were pregnant and were not included in the training and subsequent spray, to avoid their being exposed to insecticide; however, they were encouraged to apply for the next rounds.	
1e. Health fitness testing for the spray teams	All seasonal workers underwent medical a check-up one week before training.	No issue identified.	
1f. Procurement of, distribution to, and training on the use of PPE for all workers with potential pesticide contact	All seasonal workers had good and enough PPE for protection during the spray	No issue identified.	
1g. Training on mixing insecticide and the proper use and maintenance of spray pumps	All SOPs were trained on good insecticide mixing techniques, use and pump care.	No issue identified.	
1h. Provision of adequate facilities and supplies for end-of-day clean-up	All wash facilities were equipped with enough water and soap for seasonal workers' hygiene at the end of day.	No issues identified	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
1i. Enforce spray and clean-up procedures.	During TOT and seasonal workers trainings, all participants were trained on new procedures of cleaning up which consisted of reducing the amount of water from 2 to 1 liter from barrels 4 and 6 and re-using water from barrel 7 for the next day.	No issue identified.	
2a. IEC campaigns to inform homeowners of responsibilities and precautions	Door-to-door campaigns were done by the mobilizers 6 days before the spray day and on the spray day by SOPs in which homeowners were informed of their responsibilities and precautions.	No issues identified.	
2b. Prohibition on spraying houses that are not properly prepared	All seasonal workers were trained to not spray houses that were not ready for spray and sensitize the homeowner to get the house ready for spray.	No issue identified, however there was some false positives submissions in Commcare. The ECO followed up, to verified that the response was erroneous.	
2c. Two-hour exclusion from house after spraying.	All homeowners were instructed to not enter the houses until 2.5 hours after spray	No issue identified.	
2d. Instruct homeowners to wash itchy skin and go to health clinic if symptoms do not subside	All homeowner were instructed to wash itchy skin and to go the health center in case the symptoms persisted.	No issue identified.	
3a. Indoor spraying only	All SOP were instructed to only spray indoors	No issue identified.	
3b. Training on proper spray technique	All SOPs, TL and site supervisors were trained on good spray techniques.	No issue identified.	
3c. Maintenance of pumps	All pumps were serviced before the spray, and during the spray each site had one pump technician to help in case of need	Some pumps had problems such as CFV blockage, but were repaired as needed.	
4a. Choose sites for disposal of liquid wastes, including mobile soak pit sites, according to PMI BMPs.	All operations sites were equipped with fixed soakipts to absorb all effluents from the wash area. Also, MSPs were used in areas where it would be challenging to use fixed soak pits	No issue identified.	
4b. Construct fixed and/or mobile soak pits with charcoal to adsorb pesticide from rinse water	2 new fixed soak pits were constructed and 10 MPS II constructed according to the BMP manual.	No issue identified.	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
4c. Maintain soak pits as necessary during season.	Soak pits were monitored during the spray	Two soak pits had drainage problems. The problem will be solved before 2020 spray season.	
4d. Inspection and certification of solid waste disposal sites before spray campaign	Solid disposal site was inspected and certified for incineration. For recycling, the company has certification to do the recycling.	No issue identified.	
4e. Monitoring waste storage and management during campaign.	Done during the spray.	No issue identified.	
4f. Monitoring disposal procedures post-campaign	Done for incineration.	No issue identified.	
5a. Maintain records of all pesticide receipts, issuance, and return of empty sachets/bottles	Done daily during the spray in all operations sites and report was submitted everyday also.	No issue identified.	
5b. Reconciliation of number of houses sprayed vs. number of sachets/bottles used	This was done daily and report submitted daily.	No issue identified.	
5c. Visual examination of houses sprayed to confirm pesticide application	Observations of houses sprayed was done daily by supervisors using DOS, supervision, and DCV checklist.	Some houses were found not sprayed during supervision and incident reports were submitted.	
5d. Perform physical inventory counts during the spray season	Physical counts were done during warehouse inspections.	No issue identified.	