



U.S. PRESIDENT'S MALARIA INITIATIVE



**MOZAMBIQUE
END OF SPRAY REPORT
SPRAY CAMPAIGN:
OCTOBER 16-NOVEMBER 28, 2018**

—

Recommended Citation: The PMI VectorLink Project Mozambique. January 2019. Mozambique End of Spray Report: Spray Campaign: October 16-November 28, 2018. Rockville, MD, USA: The PMI VectorLink Project, Abt Associates Inc.

Contract: AID-OAA-I-17-00008

Task Order: AID-OAA-TO-17-00027

Submitted to: United States Agency for International Development/PMI

Submitted: January 11, 2019

Approved: March 5, 2019



Abt Associates Inc. | 6130 Executive Boulevard
| Rockville, Maryland 20852 | T. 301.347.5000 | F. 301.913.9061
| www.abtassociates.com

CONTENTS

Acronyms	v
Executive Summary	vii
1 Introduction.....	1
1.1 Project Objectives in 2018.....	1
1.2 Spray Districts	2
1.3 Insecticide Selection	3
2 Pre-Spray Activities	5
2.1 Micro-planning.....	5
2.2 Logistics Needs and Procurement	6
2.3 Human Resources Requirements	7
2.4 Training	9
2.5 Logistics and Material Distribution.....	13
2.6 Race to the Starting Line.....	13
3 Communications Activities	15
3.1 Organogram.....	15
3.2 Preparation Stage (Pre-Spray)	15
3.3 During Spray Mobilization Activities	18
3.4 IEC Materials.....	19
4 Spray Activities	20
4.1 Spray Operations.....	20
4.2 Directly Observed Spraying	23
4.3 Logistics and Stock Management.....	24
5 Post-Spray Activities.....	26
5.1 Demobilization.....	26
5.2 Post-Spray Inspection	27
5.3 Post-Spray Evaluation Meeting	27
6 Environmental Compliance	28
6.1 Pre-Season Environmental Assessment.....	28
6.2 Safety and Environmental Compliance Before, During, and After the Spray Campaign.....	30
6.3 Management of Insecticide Adverse Effects.....	32
6.4 Solid Waste Management.....	32
6.5 Incident Reports.....	32
6.6 Mitigation of Incidents.....	33
6.7 Post-Spray Inspections.....	33
7 Entomology	35
7.1 Quality Assurance of IRS Program.....	35
7.2 Residual Efficacy of Actellic® 300 CS and SumiShield 50WG	35
7.3 Airborne Effect of Actellic® 300CS and SumiShield 50WG.....	36

8	Monitoring and Evaluation	37
8.1	Key Objectives and Approach.....	37
8.2	Data Collection and Management.....	37
8.3	Data Entry.....	39
8.4	Data Storage.....	39
8.5	Reporting.....	39
8.6	Mobilization Data	40
8.7	Spray Operations Data.....	41
8.8	Mobile Data Collection, Messaging, and Reporting (mHealth)	43
9	Technical Assistance to the National Government	45
9.1	Technical Assistance to Nampula Province	45
10	Challenges and Solutions	48
10.1	Low Spray Coverage in Derre District	48
10.2	Non-recording of Unsprayed Structures.....	48
10.3	Data Falsification	48
10.4	Insecticide Theft and Waste.....	49
10.5	Rains.....	49
10.6	Support to Nampula.....	49
11	Recommendations	50
11.1	Procurement: Spray Team Transportation	50
11.2	Seasonal Worker Recruitment.....	50
11.3	Trainings: ToT and TLs.....	50
11.4	Operations Site Rehabilitation and Relocation	50
11.5	IEC Activities	51
	Annex A: Data Collection and Quality Assurance Tools	53
	Annex B: Spray Campaign Supervisory Tools	55
	Annex C: Post-Spray Campaign Inventory	57
	Annex D: Environmental Mitigation and Monitoring Report (EMMR)	63
	Annex E: Solid Waste Management Plan	69
	Annex F: Monitoring and Evaluation Indicator Matrix	71
	Annex G: Questionnaire for Barrier Analysis	83

LIST OF TABLES

Table 1: 2018 Spray Campaign Results At A Glance.....	vii
Table 2: PMI-Funded IRS Coverage in Zambezia Province, 2007–2018.....	3
Table 3: 2018 Seasonal Personnel Recruited by Numbers and Gender.....	8
Table 4: Change in Percent of Females from 2017 to 2018 in Different Seasonal Personnel Cadres.....	8
Table 5: 2018 Training Dates and Description.....	10
Table 6: 2018 Training Matrix.....	12
Table 7: People Trained to Deliver IRS with U.S. Government Funds.....	13
Table 8: Channels Of Communication And Frequency Of Their Use.....	19
Table 9: IRS Campaign Communication Activities.....	19
Table 10: Distribution of Spray Teams by District and Operations Site.....	20
Table 11: Post-Spray Insecticide Inventory.....	27
Table 12: Rehabilitation and Improvement of Operations Sites.....	29
Table 13: Pre-Spray Medical Check-Up.....	30
Table 14: Pre-Spray and Mid-Spray Pregnancy Test Results.....	30
Table 15: Incident and Exposure Reports.....	33
Table 16: Cone Wall Bioassay Test Results Summary.....	35
Table 17: Zambezia One-Month post-spray (T ₁) Cone Wall Bioassay Test Results Summary.....	36
Table 18: Number of Structures Visited Using the DCV Form.....	37
Table 19: Use of DCV: Common Issues Found and Corrective Actions Taken.....	38
Table 20: Data Collection Verification Based on DCV By District.....	38
Table 21: Total Mobilization Data by District.....	41
Table 22: 2018 Spray Results Summary by District.....	42
Table 23: Insecticide Use By District.....	42
Table 24: Reasons for Non-Spraying.....	43
Table 25A: Nampula One-Month Post-Spray (T ₁) Cone Wall Bioassay Test Results.....	47
Table 25B: Nampula Two-Months Post-Spray (T ₂) Cone Wall Bioassay Test Results.....	47
Table 25C: Nampula Three-Months Post-Spray (T ₃) Cone Wall Bioassay Test Results.....	47

LIST OF FIGURES

Figure 1: Map of Zambezia Province.....	2
Figure 2: DOS Red Flags over Time (N=1,017 over 35 days).....	23
Figure 3: DOS Red Flags per District (over 35 days).....	24

ACRONYMS

AIRS	Africa Indoor Residual Spraying
BA	Barrier Analysis
BCC	Behavior Change Communication
BMP	Best Management Practices
BS	Brigade Supervisor
COP	Chief of Party
D2D	Door-to-Door Mobilization
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
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
OSS	Operations Site Supervisor
PDH	Provincial Directorate of Health
PMI	President's Malaria Initiative
PMT	Performance Monitoring Tracker
PPE	Personal Protective Equipment
PSECA	Pre-Spray Environmental Compliance Assessment
RFQ	Request for Quotations
RSL	Race to the Starting Line
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
WHO/PQ	World Health Organization/ Prequalification

EXECUTIVE SUMMARY

In Mozambique, Abt Associates implements the 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 (PDH) in Zambezia Province, the District Services for Health, Women and Social Welfare (SDSMAS), the Ministry of Agriculture and Food Security (MASA), and the Ministry of Land, Environment and Rural Development (MITADER).

In addition to entomological monitoring activities in Zambezia, in 2018, 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 2018 approved work plan, VectorLink Mozambique identified an estimated 388,632 structures for spraying in the six target districts: Derre, Maganja da Costa, Milange, Molumbo, Mopeia, and Morrumbala. The project led community mobilization activities in coordination with all key stakeholders to raise community awareness of IRS and to encourage beneficiary and stakeholder ownership and acceptance. At the end of the spray campaign, SOPs reported 409,908 eligible structures found and 387,413 structures sprayed, resulting in 94.5 percent spray coverage.

The total population protected during the campaign was 1,663,078. Of these, 237,944 were children under five years, and 90,089 were pregnant women. The 2018 Post-Spray Evaluation Meeting is tentatively scheduled for February 21, 2019, with the NMCP, PDH, and respective SDSMAS’ to discuss spray coverage, lessons learned, challenges, and recommendations for the 2019 spray campaign. The 2018 spray campaign results are summarized in Table 1.

Table 1: 2018 Spray Campaign Results At A Glance

Number of districts covered by PMI-supported IRS in 2018	Six districts in Zambézia Province: Derre, Milange, Molumbo, Mopeia, Morrumbala and Maganja da Costa
Insecticide class	Organophosphate (Actellic® 300CS) and the neonicotinoid clothianidin (SumiShield 50WG).
Number of structures targeted for PMI-supported IRS in 2018 (based on structures found by SOPs in 2017 as amended in consultation with NMCP)	388,623
Number of structures found by SOPs in 2018	409,908
Number of structures sprayed by PMI-supported IRS in 2018	387,413
2018 spray coverage	94.5%
Spray progress (based on structures targeted)	99.7%
Population protected by PMI-supported IRS in 2018	1,663,078 (Pregnant women: 90,089) (Children under five: 237,944)
Dates of PMI-supported IRS campaign	October 16–November 28, 2018
Length of 2018 spray campaign	35 days
Number of people trained with U.S. Government funds to deliver IRS*	1,577

*Based on the PMI indicator definition, this number includes only spray personnel such as SOPs, team leaders, brigade supervisors and operation site 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 INTRODUCTION

I.1 PROJECT OBJECTIVES IN 2018

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 resting places of those mosquitoes. In September 2017, the United States continued its commitment to tackling this deadly disease, launching the five-year PMI VectorLink Project. Working across 23 countries in sub-Saharan Africa as well as in Cambodia, the project is equipping countries to plan and implement safe, cost-effective, and sustainable IRS programs and other proven life-saving malaria vector control interventions with the overall goal of reducing the burden of malaria.

Indoor residual spraying (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. Through the support of PMI, Mozambique implemented six spray rounds of IRS under the Africa Indoor Residual Spraying (AIRS) Project (2011–2017). In 2018, Mozambique implemented its first spray campaign under the new PMI VectorLink Project. As outlined in VectorLink Mozambique’s approved 2018/19 work plan, for the period March 1, 2018, through February 28, 2019, the 2018 spray campaign covered six target districts in Zambezia Province: Derre, Maganja da Costa, Milange, Molumbo, Morrumbala, and Mopeia. Mopeia District was partially sprayed in 2016 and 2017 as part of a cost-effectiveness of IRS study and in 2018, the entire district was sprayed. The spray campaign took place from October 16 through November 28, 2018.

As with previous projects, VectorLink Mozambique worked with the Mozambique Ministry of Health (MOH) through the National Malaria Control Project (NMCP, Zambezia’s Provincial Directorate of Health PDH), the 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 VectorLink Mozambique spray campaign included the following:

- Achieve at least 85 percent spray coverage of targeted structures in the six districts.
- Support national and provincial government IRS capacity building.
- Apply lessons learned and take other steps to improve gaps highlighted in the PMI AIRS Mozambique 2017 spray campaign.
- 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 procurement, shipping, customs clearance, timely delivery, and storage of spray pumps, spare parts, insecticide, and personal protective equipment (PPE).
- Conduct an environmental compliance desk review to inform an amendment to the 2015–2020 Supplemental Environmental Assessment (SEA) for IRS in Mozambique. The amendment will authorize for use in 2018 of clothianidin, a new IRS insecticide that received World Health Organization/ Prequalification (WHO/PQ) in 2017, in addition to a combination clothianidin/deltamethrin product (when approved by WHO/PQ).

- 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 SEA.
- 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.

1.2 SPRAY DISTRICTS

PMI has supported IRS in Zambezia Province since 2007. Zambezia (Figure 1) is located in central Mozambique and has a total population of 5.1 million according to the 2017 population census data. It is divided into 22 districts.

Table 2 provides an overview of the number of sprayed structures and population protected since 2007, and the insecticides used. As the table shows, in 2018, VectorLink Mozambique conducted IRS in six districts, spraying about 1,185 neighbourhoods (*bairros*) in 56 localities. It operated from 20 operations sites with complete wash areas, soak pits, refurbished stores, and men's and women's segregated changing rooms and latrines. The selection of operations sites for 2018 remained the same as in 2017, with the exception of Mopeia District, where VectorLink Mozambique rehabilitated a new operations site in Lualua.

Figure 1: Map of Zambezia Province

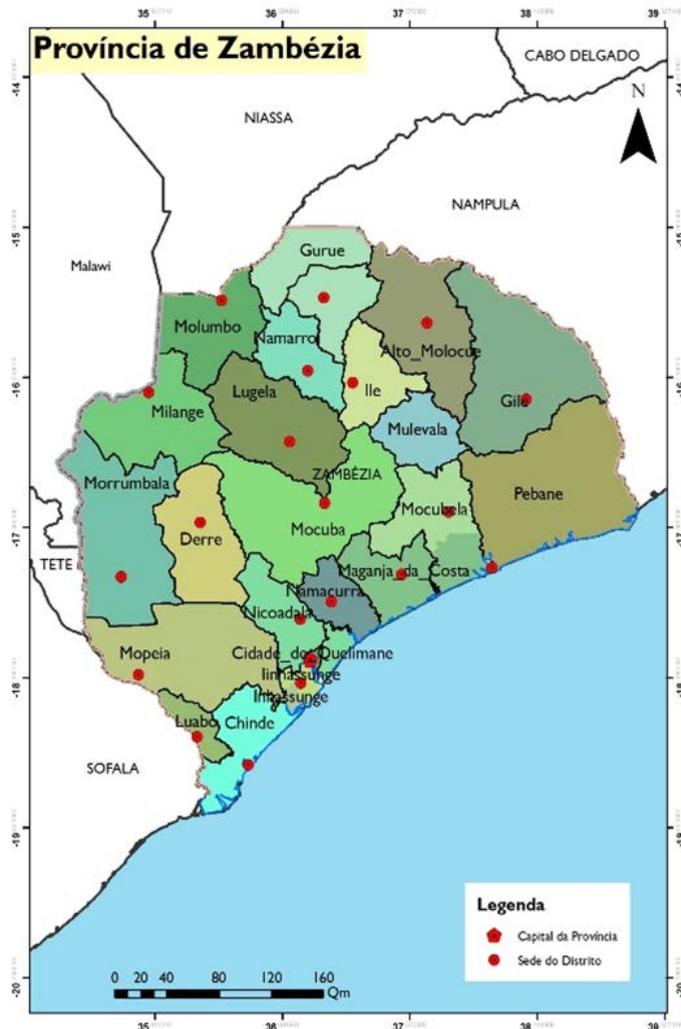


Table 2: PMI-Funded IRS Coverage in Zambezia Province, 2007–2018

Year	No. and Names of Districts Covered	Insecticide Used	No. of Structures Sprayed	Population Protected
2007*	8 districts – Maganja da Costa, Milange, Mocuba, Mopeia, Morrumbala, Namacurra, Nicoadala, and Quelimane	DDT	363,962	1,572,413
2008*	8 districts – Maganja da Costa, Milange, Mocuba, Mopeia, Morrumbala, Namacurra, Nicoadala, and Quelimane	DDT	412,433	1,457,142
2009*	8 districts – Maganja da Costa, Milange, Mocuba, Mopeia, Morrumbala, Namacurra, Nicoadala and Quelimane	DDT (Mocuba only); PY (all others)	560,023	1,985,729
2010*	8 districts – Maganja da Costa, Milange, Mocuba, Mopeia, Morrumbala, Namacurra, Nicoadala, and Quelimane	PY	618,290	1,943,643
2011*	8 districts – Maganja da Costa, Milange, Mocuba, Mopeia, Morrumbala, Namacurra, Nicoadala, and Quelimane	PY	660,762	2,018,730
2012	6 districts – Milange, Mocuba, Morrumbala, Namacurra, Nicoadala, and Quelimane	PY	536,558	2,716,176
2013	4 districts – Milange, Mocuba, Morrumbala, and Quelimane	PY	414,232	2,181,896
2014	5 districts – Milange, Mocuba, Mopeia, Morrumbala, and Quelimane	PY	445,118	2,327,815
2015	6 districts – Derre,** Milange, Mocuba, Molumbo,*** Morrumbala, and Quelimane	PY (Milange, Molumbo, and Quelimane); OP (all others)	337,433	1,631,058
2016	7 districts – Derre, Milange, Mocuba, Molumbo, Mopeia, Morrumbala, and Quelimane	OP	405,597	1,929,654
2017	7 districts – Derre, Maganja da Costa, Milange, Mocuba, Molumbo, Morrumbala, and Mopeia	OP	381,463	1,711,518
2018	6 districts – Derre, Maganja da Costa, Milange, Molumbo, Mopeia, and Morrumbala	OP (Milange, Molumbo, Derre, and Maganja da Costa); Clothianidin (Mopeia and Morrumbala)	387,413	1,663,109

Note: DDT= Dichlorodiphenyltrichloroethane, PY=pyrethroid, OP=organophosphate

*2007-2011 data from NMCP and PMI

** Derre District was carved out of Morrumbala District in late 2014.

*** Molumbo District was carved out of Milange District in late 2014.

1.3 INSECTICIDE SELECTION

With the emergence of insecticide resistance throughout Africa, insecticide selection for IRS is a critical issue. In accordance with PMI technical guidance for entomological monitoring, the project conducts insecticide resistance tests annually to inform insecticide selection for IRS and assess the resistance and susceptibility status of the malaria vector against the insecticides available for public health use.

The project conducted this vector susceptibility study in January and February 2017 to help guide appropriate insecticide selection, and reported the results in the 2017 Annual Entomological Monitoring Report. As in

previous years, high resistance to most pyrethroid insecticides was found to be prevalent across the country. In a few places, resistance to bendiocarb and DDT was demonstrated. Full susceptibility was recorded with pirimiphos-methyl (organophosphate).

A new neonicotinoid formulation for malaria control, SumiShield 50WG (water-dispersible granules), with clothianidin as its active ingredient, became a WHO prequalified product for IRS in November 2017¹. The neonicotinoid with its unique mode of action does not share targets with the other insecticides classes, making cross-resistance with other classes very unlikely. Therefore, based on the routine monitoring data, and with the introduction of new insecticide products on the market to fight insecticide resistance, PMI VectorLink Project, in partnership with the NMCP, selected the organophosphate insecticide pirimiphos-methyl (Actellic® 300CS) and a clothianidin (SumiShield 50WG) for use in the 2018 spray campaign.

¹ WHO (2018) Prequalified list of vector control products. https://www.who.int/pq-vector-control/prequalified-lists/PQT_VC_17July2018.pdf?ua=1

2 PRE-SPRAY ACTIVITIES

2.1 MICRO-PLANNING

In 2018, IRS micro-planning meetings took place at district and provincial levels. District-level meetings, held on July 3–4, 2018, were led by VectorLink district coordinators and the respective SDSMAS. These meetings focused on the following issues:

- Targeted number of structures and the length of spray campaign
- Human resources requirements
- Spray team performance and target setting
- Quantification of logistical and insecticide needs
- Quantification of transportation needs
- Preparation of spray calendars, taking into account diverse geographical challenges and hard-to-reach areas
- IEC structure
- Monitoring and supervision plans
- Recruitment of spray team members
- Official launch of the 2018 spray campaign and beginning of spraying
- Partner roles and commitments

The six districts completed their plans and presented them at the provincial-level micro-planning meeting, held in Quelimane on July 16–17, 2018. The objective of the meeting was to consolidate the district-level micro-plans into an overall provincial plan. The provincial micro-planning meeting was attended by participants from the NMCP, the PDH, and the SDSMASs, and from the VectorLink Mozambique team. VectorLink Mozambique and the PDH jointly led the meeting. Each district's SDSMAS presented the district plan with the respective VectorLink district coordinator.

Several key decisions were made during provincial micro-planning meeting:

- The project would implement door-to-door (D2D) mobilization using community mobilizers who were selected and approved by community leaders. The PDH tasked each SDSMAS with holding a meeting with community leaders. The purpose of that meeting was to discuss the mobilization process, including district-level challenges to mobilization encountered in 2017, and the role of community leaders in selecting community mobilizers.
- The spray campaign was scheduled to start October 16, 2018, and would last 35 days. The start date was initially set for October 8, but it was postponed due to municipal elections in Maganja da Costa and Milange districts on October 10.
- The respective SDSMAS would contract mobilizers, spray operators (SOPs), team leaders (TLs), and guards at the district level. Abt Associates, contracted by PMI to lead spray operations, would contract directly other seasonal worker categories, including brigade supervisors (BS), operations site supervisors (OSSs), IEC assistants, logistics assistants, and storekeepers.
- SOP training would last for six days and would be held at the operations site level in each of the six districts.

- The 2018 Provincial Spray Launch would be held in in Mopeia district.
- VectorLink would continue to pay all seasonal staff with mobile banking (M-Pesa) and ensure that all M-Pesa information was collected and verified before the start of payments. Also, VectorLink would develop a clear plan on how non-payments would be handled.
- All timelines for all preparatory activities including recruitment and training were finalized. These agreed timelines guided the roll-out and implementation of all activities and fed into the project's Race to the Starting Line (RSL) of the spray campaign.

2.2 LOGISTICS NEEDS AND PROCUREMENT

Quantification was based on the number of structures to be targeted for spraying in 2018 as agreed in micro-planning meetings, the logistics assessment, and the spray campaign duration.

VectorLink Mozambique conducted a logistics needs assessment to identify the supplies and materials required for implementation. The assessment team visited existing and potential district operations sites to identify work to be conducted and review inventory and stock levels of all supplies and materials at the central warehouse.

The assessment included an evaluation of all spray pumps and the development of an action plan to service them for use in the spray campaign. VectorLink Mozambique determined that some old Hudson pumps needed to be replaced with Goizper pumps. The project procured 448 new Goizper pumps and repaired more than 820 old Hudson spray pumps.

The information gathered from the assessment allowed VectorLink Mozambique to quantify the amount of PPE, and other spray materials and supplies and the number of operations sites, spray personnel, vehicles, and breakfasts, etc. that were needed for the 2018 spray campaign.

2.2.1 QUANTIFICATION OF INSECTICIDES

VectorLink Mozambique used two types of insecticides: Actellic® 300CS (in Molumbo, Milange, Derre, and Maganja da Costa) and SumiShield 50WG (in Morrumbala and Mopeia). According to the 2018 VectorLink Mozambique approved work plan, the targeted number of structures for the 2018 spray campaign was 388,623 (238,715 structures in Actellic districts and 149,908 structures in SumiShield districts). Using this number of structures and with an average of 1.85 structures per unit of insecticide from the 2017 spray campaign, the 2018 campaign required 128,107 bottles of Actellic® 300CS and 80,634 sachets of SumiShield 50WG.

In 2018, VectorLink Mozambique received 44,248 bottles of new Actellic® 300CS from the NMCP, procured through the Global Fund. In addition, the NMCP provided 8,948 bottles of Actellic® 300CS left over from spraying in Niassa, Tete, and Cabo Delgado provinces. Together with the 59,948 bottles left from 2017 spray campaign in Zambezia, the total amount of Actellic® 300CS bottles available for 2018 was 113,144. Two bottles were randomly sampled for quality analysis testing and 45 bottles were given to the PDH upon their request. These 45 bottles were to be used to spray some structures in Quelimane and other districts including Gurue during visits by the President of the Republic of Mozambique and Zambezia's provincial governor. This left 113,097 bottles to be used for the 2018 spray campaign.

VectorLink Mozambique received 75,250 sachets of SumiShield 50WG from the NMCP procured through the Global Fund.

The Global Fund procured insecticide received the UNITAID co-payment through the Next Generation IRS project (NgenIRS).

The insecticides were stored at the central warehouse in Quelimane. Actellic® 300CS was distributed to the districts on a weekly basis, and SumiShield was distributed every two weeks after the initial pre-spray distribution. Usage and requirements at the operations sites determined the distribution pattern.

2.2.2 PROCUREMENT

VectorLink Mozambique began its procurement activities in May 2018. In close collaboration with the home office backstop team, the project identified which items to procure internationally and locally to ensure cost effectiveness, quality, and timely delivery. It used data from the quantification process to inform development of a procurement plan that:

- Laid out the key procurement activities together with timeline for each activity (quantification, preparation of requests for quotations [RFQs], home office review and approval of relevant RFQs, etc.);
- Determined that the deadline for all procurement would be August 25, 2017, six weeks from the start of the spray campaign; and
- Completed a list of items and services to procure together with the associated procurement steps (e.g., purchase method, development of RFQ, approval of RFQ, issuance of RFQ, closing date, evaluation of bids, home office approvals, issuance of purchase orders, and delivery dates).

To track progress, the home office and site office had a weekly procurement meeting to review progress and to discuss any challenges encountered.

Local procurement included head and shoulder protectors, household stickers, boots, socks, and other items. International procurement included helmets, face shields, gloves, dust masks, Hudson spray pump spare parts, Goizper spray pumps and other supplies and materials for environmental compliance and human safety.

The project conducted all procurements in accordance with established procurement procedures, open and public procurement and bidding processes, vendor analysis, source selection, and contract award. The procurements ensured that items would be available and distributed by the date of the spray campaign.

During the spray campaign, the project received complaints in Molumbo and Derre that some of the vehicles contracted through the procurement process did not belong to residents of those districts. In 2019, the project will deal with this challenge by, for example, opening bids for vehicles at the district level in the presence of district administrators and the SDSMAS directors to show there is transparency in receipt of bids and awarding of contracts.

2.3 HUMAN RESOURCES REQUIREMENTS

VectorLink Mozambique calculated human resources requirements for the 2018 campaign based on a 35-day spray campaign. The project recruited a total of 3,888 seasonal workers of various categories in the six districts, of which 812 (20.9 percent) were women, a 4.6 percentage point decrease from the 25.5 percent in 2017.² Table 3 lists the different categories of seasonal workers hired in 2018 by gender, and shows the percentage of each category that was female. Table 4 shows the same categories of seasonal workers, total hired, and percentage that were female, for both 2017 and 2018. There was a decrease in the percentage of females in 2018 compared to 2017 for the categories of SOPs, TLs, community mobilizers, storekeepers, and water fetchers. However, for pump technicians, security guards, database coordinator, and finance assistants, there was no change, and for BSs, OSSs, washers, M&E assistants, data entry clerks (DECs), IEC assistants, and logistics assistants, there was an increase in the percentage of females hired in 2018.

² In 2017, a total of 3,705 seasonal workers were hired.

Table 3: 2018 Seasonal Personnel Recruited by Numbers and Gender

Type of Personnel	No. of Males	No. of Females	Total	% Females
Spray operators	781	339	1120	30.3%
Team leaders	160	64	224	28.6%
Brigade supervisors	58	20	78	25.6%
Site supervisors	18	2	20	10.0%
Community mobilizers	1906	302	2208	13.7%
Pump technicians	22	0	22	0.0%
Storekeepers	20	1	21	4.8%
Washers	3	64	67	95.5%
Security guards	41	0	41	0.0%
Database coordinators	6	0	6	0.0%
M&E Assistants	12	3	15	20.0%
Data entry clerks	22	11	33	33.3%
Finance assistants	4	2	6	33.3%
IEC assistants	18	2	20	10.0%
Logistics assistants	4	2	6	33.3%
Water fetchers	1	0	1	0.0%
Total	3,076	812	3,888	20.9%
Percentage	79.1%	20.9%	100.00%	

Table 4: Change in Percent of Females from 2017 to 2018 in Different Seasonal Personnel Cadres

Type of Personnel	2017			2018			Change in % of Females (2017 to 2018)
	Total Hired	No. of Females	% Females	Total Hired	No. of Females	% Females	
Spray operators	974	348	35.7%	1120	339	30.3%	Decrease
Team leaders	197	81	41.1%	224	64	28.6%	Decrease
Brigade supervisors	68	13	19.1%	78	20	25.6%	Increase
Site supervisors	25	0	0.0%	20	2	10.0%	Increase
Community mobilizers	2,153	401	18.6%	2208	302	13.7%	Decrease
Pump technicians	30	0	0.0%	22	0	0.0%	No change
Storekeepers	24	4	16.7%	21	1	4.8%	Decrease
Washers	78	73	93.6%	67	64	95.5%	Increase
Security guards	53	0	0.0%	41	0	0.0%	No change
Database coordinators	6	0	0.0%	6	0	0.0%	No change
M&E assistants	17	3	17.6%	15	3	20.0%	Increase
Data entry clerks	39	11	28.2%	33	11	33.3%	Increase
Finance assistants	3	1	33.3%	6	2	33.3%	No change
IEC assistants	26	2	7.7%	20	2	10.0%	Increase
Logistics assistants	7	2	28.6%	6	2	33.3%	Increase
Water fetchers	5	4	80.0%	1	0	0.0%	Decrease
Total	3,705	943	25.45%	3,888	812	20.88%	Decrease

VectorLink Mozambique advertised all seasonal staff positions online, and at the district and operations sites. Also, the local leadership system announced these vacancies in their meetings. Applicants submitted their resumés to the VectorLink office or registered their interest at the various SDSMAS offices with copies of their identification. Oral interviews were conducted by SDSMAS and relevant VectorLink staff (for all positions except mobilizers) before final candidates were selected. Candidates for some positions, especially SOPs and TLs, also took a written test administered by SDSMAS and the VectorLink district coordinators to ascertain their ability to read and write. The SDSMAS and VectorLink district coordinators selected the candidates who were sufficiently literate to participate in training and eventually in the campaign.

SDSMAS contracted SOPs, TL, washers, security guards, and community mobilizers directly. In particular, for mobilizers, the application process required identification of the candidates by the local leaders, who submitted a list of candidates' names to the local health facility. The district health directorates collected the lists for further processing and recruitment.

In this way, the recruitment process was done collaboratively by VectorLink, SDSMAS, and community leaders.

All seasonal personnel who worked with insecticides took a medical examination for fitness. Also, female candidates took a pregnancy test as part of the initial medical examination and another pregnancy test 30 days after the initial test. Candidates who passed the medical checks were invited to participate in training.

In anticipation of drop-outs during the training and spray operations, the project trained an additional 10 percent seasonal spray workers as a buffer.

2.4 TRAINING

In collaboration with the PDH and SDSMAS, the project conducted training sessions in September and October 2018 (Table 5). All trainings involved theoretical and practical sessions relevant to each cadre of spray campaign worker. A total of 4,039 people were trained; 3,275 were male, and 818 were female (Table 6).

VectorLink Mozambique led the training of trainers (ToT) in Quelimane. The ToT was conducted in two sessions in order to manage the number of participants. The first session, held September 10–14, was for participants from Maganja da Costa, Mopeia, and Milange districts. The second session, held September 17–21, was for participants from Derre, Molumbo, and Morrumbala districts. Participants included OSSs, the SDSMAS's malaria team (malaria focal point, IRS supervisor, and IEC supervisor), and representatives from PDH, NMCP, MASA, and MITADER.

Table 5: 2018 Training Dates and Description

Training Dates	Training Location	Participants	Type of Training	Description of Training
August 4–6, 2018	Quelimane	Logistics assistants and storekeepers from each of the 20 operations sites stores	Warehouse and stock management	Supply chain system, stock card use and logistics transaction recording, use of delivery note, storage and handling of insecticide, use of PPE and other materials, loss of inventory, health and environmental risks related to IRS implementation
September 14–21, 2018	Quelimane	Representatives from NMCP, PDH, SDSMAS health offices (malaria supervisor, IRS coordinator / supervisors, and IEC coordinator), seasonal workers (base supervisors and BSs), representatives of district offices of MASA and MITADER	ToT	IRS concept, supervision of IRS, IRS spray technique, stock control of insecticide, data recording, spray pump maintenance, IRS spray schedule and reporting, environmental compliance for IRS, gender balance and equity, use of PPE, general personal and community safety for IRS, and community mobilization
September 24–26, 2018	Quelimane	Database coordinators, M&E assistants, DECs	M&E and database training	Introduction to the PMI VectroLink Access database as a tool, roles, and responsibilities of the M&E team, data collection tools, data entry and cleaning processes, and report generation. Data collection forms filing, storage, and security. Use of supervision tools, data-handling protocols, data security, electronic data submission, computer use and care, and communication flow for IRS data
October 1–6	All 20 operations sites	SOPs, TLs	SOP training	<p>Training comprised both theoretical and field practical demonstrations. The theory component included: IRS concept; spraying techniques; insecticide mixing and handling of Actellic and SumiShield; health and environmental protection; environmental compliance for IRS; care for IRS equipment; spray pump parts and their maintenance; stock control of insecticides and other materials and equipment; proper use of PPE; gender equity; data collection and reporting; and general personal and community safety during the spray campaign. The practical exercises focused on spray techniques, house preparation, mixing of insecticide, and progressive rinsing.</p> <p>One day was set aside to provide leadership training for TLs on effective supervision in the field and use of supervisory tools.</p>

Training Dates	Training Location	Participants	Type of Training	Description of Training
October 1	Quelimane	Nurses and/or technicians from health facilities in the 20 operations sites	Insecticide exposure and treatment	Insecticide toxicity, routes of exposure to insecticides, measures to prevent insecticide contamination and exposure, and treatment for exposure
October 2	Quelimane	Pump technicians from each of the 20 operations sites	Pump technicians training	Spray pump parts and functions, use of pump repair kits, pump repair, calibration, and maintenance
October 12	Derre, Maganja da Costa, Milange, Molumbo, Morrumbala, Mopeia	Washers from each of the 20 operations sites	Washer training	Environmental compliance for IRS, procedures and standards for handling and washing PPE, and personal safety measures
October 12	Derre, Maganja da Costa, Milange, Molumbo, Morrumbala, Mopeia	Security guards from each of the 20 operations sites	Operations sites security guards	Security standards and requirements before, during, and after the spray campaign
October 13	Mocuba	Drivers from each of the contracted transportation service providers (trucks and SUVs)	Driver training	Transport of spray personnel, safety and security of people, insecticide, and PPE, and road safety, including spillage handling

Table 6: 2018 Training Matrix

Categories of Persons Trained	Training on IRS Delivery												Other Trainings										TOTAL				
	Training of trainers		Spray operations		Data capture		Logistics		Environmental compliance		Poison management		IEC mobilizers		Finance assistant		Technical maintenance		Site security		Washing				Transport & security		
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
MOH – central, provincial, and district	30	4								30	4	24	0	5	1											54	4
VL district coordinators	5	1								5	1															5	1
Data entry clerks					29	15																				29	15
M&E assistants					13	5																				13	5
Database coordinators					8	0																				8	0
SOPs and TLs			1,119	359						1119	359															1,119	359
Site supervisors	18	2								18	2															18	2
BSs	64	15								64	15															64	15
Storekeepers							25	4																		25	4
Security guards																		45	0							45	0
Pump technicians																	22	0								22	0
Washers																					4	66				4	66
Drivers																							88	2		88	2
Mobilizers													1,758	338												1,758	338
IEC assistants													18	2												18	2
Journalist													4	1												4	1
Finance assistants															1	4										1	4
TOTAL male/female	117	22	1119	359	50	20	25	4	1236	381	24	0	1785	342	1	4	22	0	45	0	4	66	88	2	3275	818	
TOTAL	139		1478		70		29		1617		24		2127		5		22		45		70		90		4093		

2.4.I REAL-LIFE TRAINING: “LIVE FIRE”

In 2018, VectorLink maintained “live fire” training as part of the ToT and SOP trainings to overcome the challenges of classroom-only training for SOPs and TLs, which does not expose these categories of worker to the actual challenges they face when spraying. During the live-fire field demonstrations, SOPs and TLs went into homes in communities for a demonstration of the entire spraying process. This training enabled SOPs and TLs to practice the following skills: determining the eligibility of structures, including identifying sprayable and non-sprayable surfaces; preparing a structure before spraying; and spraying around obstacles and roofs.

Table 7 shows the number of people trained based on PMI indicator definition; it includes only spray personnel such as SOPs, TLs, BSs and OSS. It excludes DECAs, drivers, washers, pump technicians, mobilizers, and security guards.

Table 7: People Trained to Deliver IRS with U.S. Government Funds

Type of Training	Males	Female	Total
IRS delivery ToT	82	17	99
Spray operations	1,119	359	1478
Total	1,201	376	1,577

2.5 LOGISTICS AND MATERIAL DISTRIBUTION

Before implementation of the 2018 spray campaign began, VectorLink Mozambique prepared a consolidated activity implementation plan to harmonize implementation of all activities. The project developed a detailed logistics distribution plan to guide the distribution of all supplies and materials to the operation sites. Districts were scheduled to receive their items on different dates from the central warehouse in Quelimane.

Based on recommendations from the pre-spray environmental compliance assessment (PSECA), distribution of insecticide and materials began after completion of the rehabilitation activities at each operations site.

VectorLink Mozambique planned to ensure the readiness of all operations sites for the spray campaign at least two weeks before the start of the campaign. By September 30, all operation sites had received their supplies and materials. This allowed enough time for logistics assistants and store keepers to record all items in their ledger books, document all items on the correct inventory forms, and identify any shortfalls or missing items. By October 10, insecticides had arrived at each of the operation sites for the start of the campaign.

2.6 RACE TO THE STARTING LINE

The RSL is a week-by-week Gantt chart of key activities that have to happen over at least 12 weeks leading up to the start of the spray campaign. It maps out the activity, when to complete it, and who is responsible for the activity. The RSL lists indicators from the PSECA of the operation sites and stores, rehabilitation work plan, transportation plan, pre-contracting inspection and vehicle contracting, recruitment and contracting of seasonal workers, spray calendar completion, training schedules, etc. Adherence to the RSL is critical to ensure all spray preparations are on track, monitored, and completed ahead of the spray campaign. In addition to the tool, RSL weekly meetings are held with the site office to monitor progress against the RSL.

In 2018, the project used the RSL effectively. Strict adherence to the RSL ensured all spray preparations were on track, monitored, and completed ahead of the spray campaign as planned. Weekly RSL meetings were attended by the chief of party (COP) and country technical managers, for example, the environmental compliance officer (ECO), M&E manager, operations manager, finance manager, procurement manager, IEC coordinator, and logistics manager, and their home office counterparts.

3 COMMUNICATIONS ACTIVITIES

Social mobilization is integral to any successful campaign. For the 2018 spray campaign, VectorLink Mozambique implemented communication and mobilization activities in collaboration with the PDH of Zambezia, SDSMAS of the six target districts, community leaders (with some working as community mobilizers), religious leaders, and other local and influential leaders at all levels.

3.1 ORGANOGRAM

In 2018, VectorLink recruited a new IEC coordinator to lead all communication and social mobilization activities at the provincial level. At the district level, the SDSMAS IEC representatives and VectorLink district coordinators led these activities, and at the operations site level, IEC assistants led the activities. The IEC assistants, recruited in close collaboration with the SDSMAS, reported to their SDSMAS IEC supervisor and the VectorLink district coordinator. At the community level, community mobilizers, who lived within their assigned communities, led the communication and social mobilization activities. They reported to the IEC assistants.

As indicated in the 2018 work plan, community mobilizers were selected and approved by community leaders. Where possible, community leaders worked as mobilizers in their communities. This strategy had positive results, as was observed during field supervision: in many of those communities, community members had been sensitized and in most instances would willingly prepare their houses for spraying. The community members also acknowledged that the leaders had earlier informed them of the spray campaign.

3.2 PREPARATION STAGE (PRE-SPRAY)

During the preparation stage, VectorLink Mozambique held meetings at the district level to create awareness about the upcoming spray campaign and to engage communities. Following this, SDSMAS and other district leadership held engagement meetings with community leaders at the locality level rather than at the district headquarters as in previous campaigns. The main goal of these meetings was to ensure that all community leaders were aware of IRS and the role that they had to play in the spray campaign. These meetings were also an opportunity to appeal to community leaders to select responsible and respected persons to work as community mobilizers in each of the targeted communities within their localities. One meeting was held at the district headquarters for selected influential community leaders in all the six districts. These meetings were led by the provincial director of health and representatives from the provincial level including the head of public health and the provincial medical chief. The project held 22 community meetings (six in Milange, five in Morrumbala, four in Maganja da Costa, three each in Molumbo and Derre, and one in Mopeia) before the spray campaign in September and October. Information dissemination began in September and continued throughout the spray campaign.

VectorLink Mozambique conducted trainings in interpersonal communication, mobilization strategies, key IRS messages, the mobilization calendar, and the mobilizer activity plan for SDSMAS IEC coordinators and IEC assistants. Training on IRS key messages and mobilization strategies was also conducted for journalists from the six targeted districts (one journalist from each of the radio stations we worked with in each district). Finally, a one-day mobilization training was conducted for community mobilizers. These trainings were led by the district SDSMAS IEC coordinator and IEC assistants. Together, IEC assistants, journalists, and community mobilizers disseminated information about the spray campaign throughout the communities.

3.2.1 DOOR-TO-DOOR MOBILIZATION BEFORE SPRAY

VectorLink Mozambique trained 2,096 and engaged 2,208³ community mobilizers to conduct the D2D mobilization in the six districts between September 24 and 28. Unlike in 2017, when D2D mobilization was done simultaneously in all districts and communities, in 2018, VectorLink staggered the D2D mobilization. This was done to give IEC assistants enough time to supervise community mobilizer activities. It also meant that communities were mobilized closer to when they were sprayed. Mobilizers visited the structures within their communities to deliver IRS messages and sensitize households to the upcoming spray campaign by: 1) explaining the roles and responsibilities of households before, during, and after spraying; 2) correcting any misconceptions the households might have about IRS; and 3) informing households that the mobilizers were the first point of contact should the household have issues with IRS. Once mobilizers finished their work in a house, they registered the household on their mobilizer form. In 2018, community mobilizers did not give out household cards to householders; instead, SOPs did this during their spray visits. This strategy was adopted to ensure that there was efficient and economic use of household cards.

A major challenge to D2D mobilization was the number of days allowed for it. VectorLink Mozambique observed that in some communities, especially larger ones, six days were not enough for mobilizers to visit all households. As a result, some areas were not well mobilized. Mobilizers also encountered some household resistance to mobilization, because some residents mistakenly believed that IRS attracted fleas to their houses. Through community leaders, local government members, radio spots, and personal contacts, VectorLink and SDSMAS continued to educate households and dispel the misconception about fleas. The project succeeded in overcoming the “bloodsucker” myth that was quite prevalent in Derre and Mopeia districts in the 2017 spray campaign. The issue was addressed through D2D mobilization and community leader’s engagement meetings. As a result, the “bloodsucker” issue was not encountered as a reason for IRS refusals in 2018.

3.2.2 MEDIA

Community radio stations were of paramount importance before and during the 2018 spray campaign. They disseminated awareness and advocacy messages about IRS and encouraged discussion with VectorLink district coordinators, SDSMAS malaria focal points, SDSMAS IEC coordinators, and other district health staff through listener participation via phone calls. VectorLink Mozambique established partnerships with media channels, including radio stations, to produce and broadcast spots and radio programs. Radio stations also disseminated the 2018 mobilization and spray calendars daily. Radio programs were broadcast in Portuguese and in the predominant local languages in the districts between 5 am and 8 pm by following a media plan that VectorLink developed in collaboration with the radio stations. The following radio stations were used to disseminate IRS messages:

- Rádio Comunitária Tumbine (Portuguese, Chichewa, and Marengo) reached Milange and some areas of Molumbo districts.
- Rádio Comunitária de Morrumbala (Sena, Lomue, Chuabo, and Portuguese) reached Morrumbala and some areas of Derre districts.
- Rádio Comunitária Cua – Mopeia (Sena, Portuguese, and Phoso) reached Mopeia.
- Rádio Comunitária da Maganja da Costa (Portuguese, Lomue, and Nharinga) reached Maganja da Costa.
- Rádio Comunitária de Molumbo (Portuguese, Nharinga, and Chicheua) reached Molumbo.

In total, there were:

- 700 radio spots (pre-spray, and during spray campaign)

³ This figure is higher than the number trained because some mobilizers were not part of the main training; they were recruited and trained later when the project realized that some communities needed additional mobilizers.

- 20 radio debates about IRS
- 108 spray calendar announcements on radio
- 80 radio interviews, with satisfied homeowners who shared their stories and with community leaders who emphasized the importance of IRS and the role of homeowners.

3.2.3 BARRIER ANALYSIS

Spray coverage in Derre in 2017 was 76 percent; this was below the minimum requirement of 85 percent.⁴ As a way to improve the spray coverage and based on recommendations from the 2017 post-spray evaluation meeting, PMI VectorLink conducted a Barrier Analysis (BA) study in Derre led by Population Services International, a VectorLink subcontractor. A BA is a rapid assessment tool used to investigate why recommended healthy behaviors are adopted reluctantly or not at all. For this BA, the healthy behavior was “acceptance of IRS.” The BA used mixed-method survey data and combined rigorous qualitative data with structured quantitative analysis to understand the factors that can influence acceptance for IRS. Analysis results were used to modify communication and behavioral change strategies to improve acceptance of IRS and ensure higher spray coverage.

Staff training and data collection was conducted from July 9–13 in four communities in Derre. In accordance with the BA methodology, a total of 88 heads of household were interviewed (48 “Doers,” household heads who had accepted IRS in 2017, and 40 “Non-doers,” household heads who refused IRS in 2017). The households were interviewed using a standardized questionnaire template (Annex G), and responses were subsequently coded, tabulated, and compared.

The main findings were as follows:

- ***Heads of household connect IRS spraying with malaria prevention and are inclined to accept spraying when they feel it will be effective.*** Doers overwhelmingly cited malaria/disease prevention as both a positive consequence of spraying and a factor that made it easier for them to practice the behavior.
- ***There is a perception among Non-doers that the chemical is not efficacious and could actually provoke fleas.*** Non-doers mentioned that spraying was less effective in 2017. They also noted an increase in fleas post spraying, to the point where they had to sleep outside.
- ***Social support is perceived to be high and support of community leaders is critical.*** Doers were significantly more likely than Non-doers to mention that most people approve of spraying and that “nobody” disapproves of it. They particularly cited community leaders as critical supporters of the behavior. Non-doers were more likely to mention that their spouses did not approve.
- ***Divine will is an influencing factor.*** Doers were significantly more likely to feel that God approves of spraying.

Based on the BA findings, and on recommendations from a study published by the National Institute of Health (*Instituto Nacional de Saúde*) on the acceptance of IRS in Zambezia and Nampula,⁵ VectorLink Mozambique made changes to its mobilization strategies:

- Updated its key messages on IRS to include a message on fleas: “The insecticide for spraying does not bring fleas. Fleas already live in our homes and they are always hidden. If you see fleas after spraying is done, it suggests that the insecticide is making the fleas feel uncomfortable and therefore, they start coming out of their hiding places to look for other places to hide. The insecticide is very

⁴http://apps.who.int/iris/bitstream/handle/10665/177242/9789241508940_eng.pdf;jsessionid=1497757A755C84CADD862075304B0BA4?sequence=1

⁵ Amílcar Magaço et al. n.d. Community knowledge and acceptance of indoor residual spraying for malaria prevention in Mozambique: a qualitative study. *Unpublished*.

potent not just to kill mosquitoes, but also other insects and therefore irritates fleas and makes them come out of their burrowing places, the dust on the floor. One of the best ways to avoid fleas and other insects is to always keep our homes clean by regularly wetting the floor of the house before sweeping.”

- In collaboration with SDSMAS, identified all the different categories of leaders at the district and community levels and scheduled meetings with these leaders in their localities. These meetings were led by the SDSMAS, district administrators, and VectorLink district coordinators, who explained IRS, its benefits, and the role of community leaders in the mobilization process. The local meetings were followed by a larger, district-level meeting led by the provincial director of health and other PDH representatives. This contrasts with the practice in prior campaigns, when the project conducted a single meeting at district headquarters, which not all community leaders were able to attend.
- Focused on religious and other influential leaders as change agents for IRS acceptance. The community leaders’ meetings mentioned above included heads of religious organizations. They were sensitized so they could talk about IRS during their religious gatherings and/or would give IEC assistants and community mobilizers the opportunity to discuss it. In Derre, when IRS acceptance was persistently low in some communities with many Seventh Day Adventists, the district team and church leaders arranged for spraying in their community to be done on Sunday instead of Saturday, which is the Seventh Day Adventist day of worship. This arrangement greatly increased coverage. VectorLink will continue improving these relationships for the benefit of future spray campaigns.

3.3 DURING SPRAY MOBILIZATION ACTIVITIES

Various entities were used to carry out communication and social mobilization activities during the 2018 spray campaign:

3.3.1 COMMUNITY LEADERS AND INFLUENCERS

Community leaders constituted the core of the mobilization effort. Spray team mobilizers sought them out first when entering a community and, together, they mobilized the area’s population. They also accompanied the SOPs into the houses and, in case of refusal, worked to persuade the family to agree to spraying. In communities where there were large numbers of refusals, the chiefs of administrative posts and/or localities called meetings with all leaders in the area to remind them of their responsibility in the campaign. This measure helped greatly, especially during the revisits.

Also of assistance were other influential people – residents of the community who are well-respected despite not being part of the formal local government leadership. These include religious/faith leaders, teachers, and retired military men and women whom the project recognized and brought into the mobilization effort when necessary. These people played a very important role, mainly in areas biased by politics, because they are non-partisan and have credibility with the population.

3.3.2 PEERS: NEIGHBORS, FRIENDS, AND FAMILY

In addition to community leaders and influential people, testimonials from neighbors and relatives who had had their houses sprayed helped encourage families to accept IRS, especially during mop-up periods. Such peers participated in small meetings to describe how their families have not had malaria since their homes were sprayed in 2017. For example, in Maganja da Costa, an IEC assistant and the community leader had gone for a market day mobilization. They encountered a group of women who were chatting. The IEC assistant talked with the women about spraying and called other women to join the chat. A woman whose house had already been sprayed shared her story. The women who had not yet been visited by a spray team stated that they would accept IRS in their structures.

3.3.3 COMMUNITY-BASED MOBILIZERS

During the spray campaign, community mobilizers ensured that residents knew at least two days in advance about the exact spray dates for their community. On the day of spray, they helped ensure that each household was ready for spraying. In some cases, they helped households pack belongings and served as guides for SOPs within the community. During mop-up, community mobilizers scouted for unsprayed structures and led spray teams to such structures.

3.3.4 OTHER COMMUNICATION CHANNELS

The 2018 communication strategy focused on expanding the channels through which households could be reached with key IRS messages. The strategy was to target areas and places where people naturally gather and use the places as strategic points to disseminate IRS messages. Sites identified included churches, mosques, schools, markets, water points, and soccer games. Table 8 lists the channels identified and the frequency of use of each channel across all six districts. IEC assistants and community mobilizers used these channels to disseminate key IRS messages. In general, VectorLink Mozambique observed that the majority of households had enough information about IRS. This was shown through the readiness of most households for spraying before the spray teams reached their homes. In the future, the project will further improve the use of these channels in its mobilization efforts.

Table 8: Channels Of Communication And Frequency Of Their Use

Channel of Communication	Number of time used (frequency)
Church announcements	269
Schools announcement	139
Regular (daily) market announcement	103
Special one-day markets (usually once a week) market announcements	38
Mosques announcements	29
Soccer games announcements	60
Water points announcements	46

3.4 IEC MATERIALS

For the 2018 spray campaign, the project produced and distributed the following IEC materials: guidelines for journalists, posters for vehicle identification, and T-shirts and hats for mobilizers, community leaders, and volunteers who worked as guides for SOPs in the communities. Table 9 shows the types of IEC materials produced and distributed.

Table 9: IRS Campaign Communication Activities

IEC materials	Quantity
Posters for vehicle identification	65
Mobilization guide for mobilizers	2,121
T-shirts	4,270
Hats	4,188
Guidelines for journalists	5

4 SPRAY ACTIVITIES

4.1 SPRAY OPERATIONS

VectorLink Mozambique aimed to spray 388,623 structures in 35 days. To achieve this, it developed district-specific spray calendars to guide the movement and distribution of spray teams in the field. In collaboration with the PDH and SDSMASs, the project launched the 2018 spray campaign on October 23. The main launch ceremony was in Mopeia district; the remaining five districts also held district-level opening ceremonies on that day. In each district at least one house, of a village chief or other influential community leader, was sprayed. Actual spraying started on October 16 in all six districts with a planned end date of November 24. While all districts used a total of 35 days of spraying, not all ended spraying on the planned date; some continued for a few days to compensate for spray days lost to rain or disruptions due to district administrative issues. Molumbo and Morrumbala did not miss any spray day and thus finished their spray campaigns on November 24. Mopeia and Derre finished on November 26. Milange and Maganja da Costa finished on November 28.

Spray operations were conducted from 20 operations sites. All sites met all environmental compliance requirements according to the best management practice (BMP) standards. Each operations site was managed by an OSS. A spray team comprised five SOPs and was led by a TL. Three spray teams formed a brigade, led by a BS. Table 10 provides details on the distribution of spray teams across the 20 operations sites in the six spray districts.

Table 10: Distribution of Spray Teams by District and Operations Site

District	Operations Site	No. of SOPs	No. of TLs	No. of BSs	No. of OSS
Maganja da Costa	Maganja Sede	90	18	6	1
	Nante	55	11	4	1
Derre	Derre Sede	50	10	4	1
	Guerissa	20	4	2	1
Morrumbala	Chire	60	12	4	1
	Megaza	40	8	3	1
	Morrumbala Sede	95	19	6	1
	Muandiua	75	15	5	1
	Pinda	45	9	3	1
Molumbo	Corromana	70	14	5	1
	Molumbo Sede	100	20	7	1
Milange	Dachudua	55	11	4	1
	Dulanha	60	12	4	1
	Liciro	35	7	3	1
	Milange Sede	95	19	6	1
	Carico	60	12	4	1
Mopeia	Chimuara	30	6	2	1
	Posto Campo	15	3	2	1
	Mopeia Sede	50	10	4	1
	Lualua	20	4	1	1
Total		1,120	224	79	20

Each spray day started at the operations site with breakfast followed by distribution of all the spray supplies and equipment the teams would use for the day's work: PPE, spray pumps, insecticide, and data recording tools, among others. A short morning assembly followed, which was led by the OSS and other district- or provincial-level supervisors who were present. District coordinators and SDSMAS representatives provided refresher speeches during the morning assembly, on topics including safety, insecticide mixing, quality data collection, and adherence to correct spray technique and environmental compliance. The site supervisor then assigned spray teams to the communities they would spray that day and to vehicles for transportation. TLs assessed their team members to ensure that each SOP was fit for the day's work, and filled out health check forms for each SOP. The SOPs would collect leftover residual insecticide/wash water from barrels 1, 3, 5, and 7, for insecticide mixing in the field. The daily spray target for each SOP was 10 structures a day.

Site supervisors, TLs, BSs, district coordinators, VectorLink managers and PDH and SDSMASs representatives supervised daily. TLs used the directly observed spraying (DOS) tool for supervision, while other supervisors used the standard VectorLink supervisory tools. Supervision focused on proper house preparation, use of correct spray technique, data collection, mobilization, and adherence to safety and environmental compliance requirements. In addition, TLs, BSs, and OSSs played key roles in the distribution of spray teams in the field to ensure optimal coverage of all targeted communities and structures.

Within the communities, the spray teams worked with local leaders, community volunteers (also referred to as guides) and community-based mobilizers, who identified the households and facilitated household acceptance for spraying.

VectorLink Mozambique used both standard permanent soak pit and mobile soak pits (MSPs) for end-of-day clean-up. MSPs were used in hard-to-reach areas. All six districts used MSPs at some point.

SOPs collected spray data using the SOP daily form.⁶ At the end of each work day, TLs verified the data, summarized the data onto the TL summary form, and handed the forms over to the BS for verification before submission to the OSS. The OSS transferred 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 the progress of the spray campaign at the operations site level. The OSSs sent the same information via short message service (SMS) to a central server where the senior project management team accessed the data to guide quick corrective actions to improve ongoing spray operations. The data points reported through the Performance Management Tracker SMS included:

- number of structures found;
- number of structures sprayed;
- number of insecticide bottles used; and
- number of SOPs who worked that day.

Once the OSS sent the SMS, the OSS sent the SOP and TL data collection forms to the district data entry center for entry of the data into the VectorLink database. For quick data turnaround, VectorLink used motorbikes to transport data cards from the operations sites to the data center.

As explained above, four districts continued spraying for at least two days beyond the initially planned end date of November 24 to recover spray days lost to rain and other issues. In Derre, miscommunication between the District Administrator and District Health officials led to interruption of spray activities for two days. The project adjusted spray calendars by district and operations sites based on number of days lost, so that each operations site would spray all areas and achieve the required spray coverage target.

⁶ VectorLink Mozambique does not collect data on insecticide-treated bed nets on its SOP report forms.

4.1.1 VILA VALDEZ

In 2017, Vila Valdez, an island in Maganja da Costa, was not sprayed. AIRS Mozambique, PDH, and SDSMAS representatives had visited the island before the spray campaign to assess the possibility of spraying there. They found there were no secure boats to transport insecticides, logistical items, and spray teams safely across the river.

In 2018, VectorLink together with representatives from the Maganja da Costa SDSMAS visited Vila Valdez to again explore the feasibility of spraying the island, based on requests that its community leaders made through the SDSMAS and PDH. During the visit, the team observed that at the river bank, there was a canoe used for transporting people, and medicines and other items to the health facility on the island. It took roughly one minute to cross the river in the canoe. Foot paths led from the river to the center of the island, where structures are located. There were no vehicles on the island. VectorLink and Maganja da Costa SDSMAS met with the island leadership to discuss the possibility of spraying. Land close to the health facility was identified as a place that spray teams could use as a campsite. Existing facilities close to the health facilities could be used to store spray equipment and insecticide. The leadership committed to build temporary bathrooms for the spray teams and to make water available for washing. However, VectorLink would have to transport drinking water for the spray teams since there was no potable clean water on the island.

Based on the discussions and findings of the assessment visit, a three-day spray visit was planned for the island to be sprayed. VectorLink transported spray teams, spray equipment and insecticide, and other supplies and materials to the island according to BMP. A MSP was used for end-of-day clean-up. Once on island, spray teams used the “walk to work” (W2W) strategy to move from campsite to island communities that they sprayed, since there were no vehicles. During the planning, the SDSMAS estimated there were 1,300 structures; in the end, spray teams found a total of 1,576 structures and sprayed 1,361 of them.

4.1.2 SUPERVISION OF SPRAY ACTIVITIES

VectorLink Mozambique ensured that there was adequate supervisory presence at all levels throughout the spray campaign. The project developed a 35-day supervision plan that distributed all supervisors to field and specific operation sites. The plan specified the type of supervisory tools to use, by whom, and usage frequency. The list of the supervisory tools is in Annex B.

The provincial-level supervision team comprised the COP, operations manager, M&E manager, database manager, IEC coordinator, ECO, and PDH representative who would serve across the districts to support district supervision teams. At the district level, the supervision teams comprised the VectorLink district coordinator and SDSMAS representatives, at least five people per district.⁷ At the operations site, the OSS, BS, and TLs provided supervision.

In the first week, the project used a specific supervision strategy to address start-up issues and set the right tone for the spray campaign. Each operations site had a dedicated senior supervisor (the same person from day 1 to day 5). The supervisors came from VectorLink, the PDH, or the SDSMAS. Rotation of supervisors started in the second week of the spray campaign. Some of the issues observed and corrected in week 1 included a delay in the distribution of PPE and insecticide in the morning and congestion during end-of-day clean-up. Other issues observed and corrected throughout the campaign included clogging of some constant flow valves and non-washing or improper washing of valves and face shields.

During field supervision, some of the common issues addressed included reminding SOPs to spray roofs and eaves; carrying the residual insecticide and wash water from the previous day’s end-of-day clean-up activities from barrels 1, 3, 5, and 7; insecticide mixing; and house preparation. These issues were also discussed during the daily morning assembly.

⁷ Malaria focal point person, IRS supervisor, IEC coordinator, representative from MASA, and representative from MITADER.

4.2 DIRECTLY OBSERVED SPRAYING

One of the most important technical requirements of IRS is the application of the right amount of insecticide on a sprayable surface. While SOPs received training on the correct application of the spray technique, field performance varies. VectorLink Mozambique continued the use of the DOS supervisory tool to help supervisors directly observe and monitor the quality of key SOP activities. The DOS included questions on the correct use of PPE, appropriate functioning of equipment, structures preparation for spraying, and correct insecticide mixing and application, with special emphasis on spray quality. If supervisors noted errors, they provided correction and feedback immediately. However, the supervisor would still note the type of error on the DOS form and use it as part of the morning assembly debriefing and re-training, as appropriate.

For 2018, TLs were the primary users of the DOS form. They were to observe each SOP under their supervision at least once a day, using the form. All TLs received training on how to use the DOS form. The training included how to provide instant feedback and on-the-spot corrective measures if any red flag issues arose. Despite the trainings, field supervision revealed that some TLs did not use the DOS form correctly or did not understand its correct use. This is an issue that VectorLink will address in future trainings, specifically by allocating more time for TLs to practice the use of the DOS form during training.

To monitor the use of the DOS form and the number of errors TLs observed and corrected, VectorLink Mozambique implemented a database to capture data on the DOS form. In total, TLs completed 13,614 DOS inspections during the spray campaign. Of these, 12,821 (94 percent) did not identify any red flags. The remaining 793 inspections (6 percent) identified 1,017 red flags. DOS data showed that about 38 percent of the red flags were due to leakage of pressure from some spray pumps (Figure 2). Mopeia is the district with the largest number of red flags (472), followed by Milange (209) and Derre (178) (Figures 3).

Figure 2: DOS Red Flags over Time (N=1,017 over 35 days)

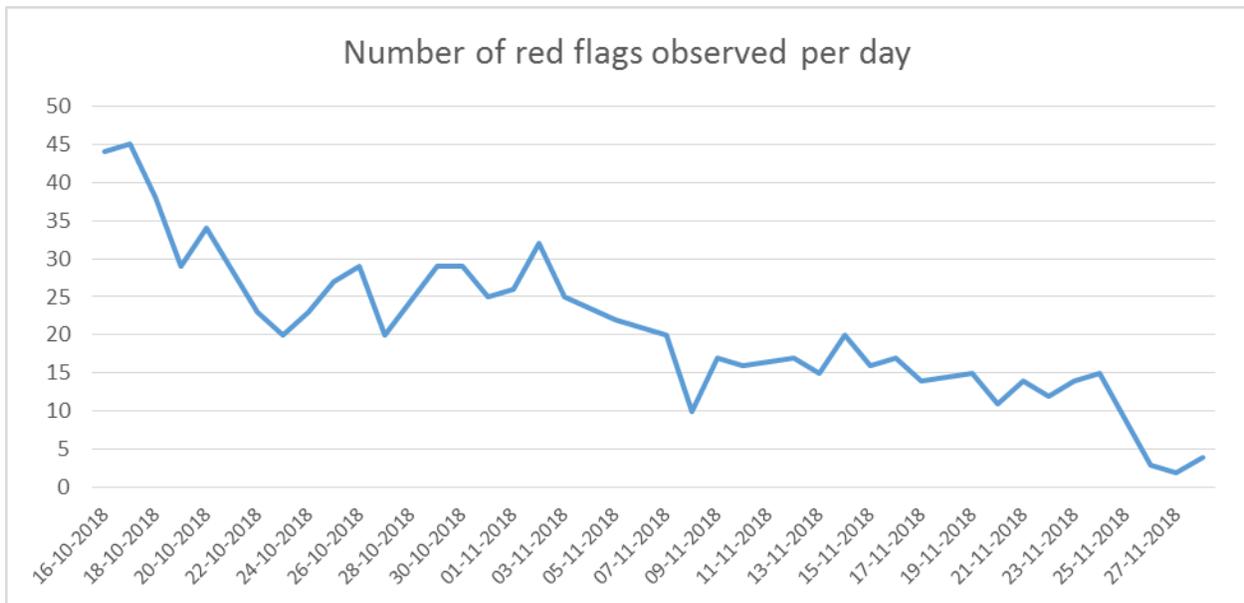
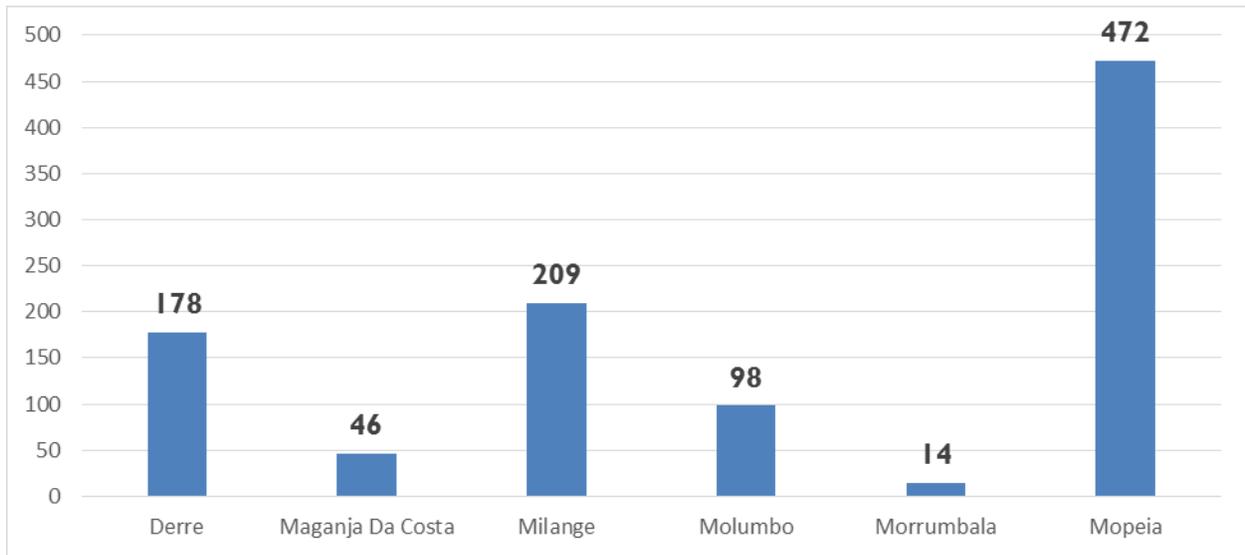


Figure 3: DOS Red Flags per District (over 35 days)



4.3 LOGISTICS AND STOCK MANAGEMENT

The project trained and hired six district logistics assistants and 20 storekeepers to manage district and operations site stores. They were trained on standard logistics management procedures and were introduced to all 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 involved, dates, and destination. Supervisors (COP, operations manager, logistics manager, ECO, and district coordinators) regularly checked records and conducted physical stock counts to ensure that the actual stock corresponded to records on stock cards and ledger books.

Logistics assistants and storekeepers completed daily and weekly inventory updates. The project used these updates to approve requests for IRS materials and to reconcile central warehouse stock management. To ensure tracking of goods, signed copies of requests and delivery notes accompanied each logistical transaction. Also, flat files contained copies of these documents at the central warehouse and operations site stores. Storekeepers used insecticide tracking sheets to record the quantities of insecticide bottles issued daily to each TL. TLs also used a TL insecticides tracking booklet to record and monitor the distribution of insecticides between TL and SOPs.

At the operation sites, the bottles and sachets had SOP codes at the point of daily distribution. Each day, SOPs returned the used and unused insecticide bottles and sachets to the stores. Storekeepers and TLs performed a thorough cross-check to ensure the issued and returned bottles and sachets matched. On a weekly basis, logistics assistants moved empty insecticide bottles and sachets from the operations site stores to the district stores and subsequently to the provincial stores. At the same time, the VectorLink logistics manager distributed insecticide to the districts and operations site stores.

Of the 113,097 bottles of Actellic® 300CS available for the 2018 spray campaign, 112,364 bottles were used. Out of the 75,250 sachets of SumiShield 50WG, 72,463 sachets were used.

In addition, spray teams returned PPE and other equipment to the operations site store every day; the items were re-issued for use for the next spray day.

4.3.1 E-INVENTORY

VectorLink Mozambique continued to use the e-inventory system introduced in 2017. The e-inventory system uses a daily inventory management tool based in MS Excel that monitors the movement of insecticides. Project storekeepers sent their current insecticides stock balances via daily SMS to a central phone number. The logistics manager then retrieved the data and entered it into the e-inventory Excel file. From this file, the logistics manager could analyze the data and predict which operations sites were approaching the minimum stock level – enough insecticide stock for at least 3–5 days based on the size of the store. The minimum stock level for each operations site was pre-determined by multiplying the number of SOPs by the expected insecticides usage for each SOPs per day. This information then informed the distribution of insecticides to operations sites.

VectorLink Mozambique discussed the e-inventory system in the training of storekeepers and logistics assistants. The training paid off as all storekeepers sent information on time. In addition, during implementation, the project experienced no interruption in the mobile network as it did in 2017. E-inventory was very helpful not only to manage distribution of insecticides across districts but, given that Actellic® 300CS bottles take up a lot of space and stores did not have enough space for a large supply, it was essential to track bottles on a daily basis to facilitate re-supply. With SumiShield, districts could go for weeks without a need for re-supply due to small amount of space sachets take up.

5 POST-SPRAY ACTIVITIES

5.1 DEMOBILIZATION

The 2018 spray campaign ended on November 28, 2018. All operations sites demobilized immediately after the spraying ended. Demobilization was complete by December 7 in all six districts.

Washers washed all PPE, including SOP bags, plastic cover sheets, and rinsing barrels. They cleaned the wash areas of the soak pits and covered all soak pits. Storekeepers and logistics assistants updated inventory lists, cleaned stores, and sent all supplies and materials to the district-level stores, which were in turn sent to the central warehouse in Quelimane. Items that were returned to the central warehouse include unused insecticides. At the central warehouse, the logistics and warehouse manager will supervise the sorting of all logistics items into usable and unusable items and count them. The results of this sorting and counting activity will guide the 2019 logistics needs assessment, quantification, and procurement.

The project also organized transportation of all solid waste items (used face masks, hand gloves, empty Actellic® 300CS bottles and empty SumiShield 50WG sachets) together with recovered insecticide from insecticide misuse incidents were transported to the central warehouse in Quelimane to await proper and final waste disposal in accordance with BMP standards and the VectorLink Mozambique waste-management plan.

Annex C shows the remaining inventory currently in the central warehouse as of the end of the spray campaign.

5.1.1 INSECTICIDE STOCK

VectorLink Mozambique began its campaign with 113,097⁸ bottles of Actellic® 300CS and 75,250 sachets of SumiShield 50WG and used 112,364 bottles of Actellic and 72,463 sachets of SumiShield. By the end of the spray campaign, 733 bottles and 2,781 sachets remained. Six SumiShield sachets were sent for analysis. The remaining insecticide, 733 bottles of Actellic and 2,781 sachets of SumiShield, were then issued to Maputo Province through the Zambezia PDH at the end of the Zambezia spray campaign.

Table 11 provides information on insecticide stock.

⁸ This figure excludes insecticide given to the Zambezia PDH for spraying in other districts and insecticides used for testing

Table 11: Post-Spray Insecticide Inventory

Insecticide type	2017 Stock Balance	Insecticide Received from Other Provinces	2018 Insecticide Received from NMCP	Total Insecticide Available for 2018	Samples Taken for Testing	Insecticides requested by PDH	Actual Number Available for 2018 Spray Campaign	Used for 2018 Spray Campaign (by districts)	Post Spray Campaign Balance (unused)	Quantity Transferred to Maputo	Current Stock of Insecticide in the Central Warehouse
Actellic® 300CS	59,948	8,948*	44,248	113,144	2	45**	113,097	112,364	733	733	0
SumiShield 50WG	0	0	75,250	75,250	6	0	75,250	72,463	2,781	2,781	0

* These are insecticides received from Tete (1,200 bottles), Niassa (2,000), and Cabo Delgado (5,748).

** These are bottles the PDH requested for spraying. They were used to spray some houses in Quelimane and in other provinces including Gurue. These houses were sprayed during the visit of the President of the Republic of Mozambique to Zambezia Province and during visits by the provincial Governor to some Zambezia districts.

5.2 POST-SPRAY INSPECTION

The VectorLink Mozambique ECO conducted the environmental compliance post-spray inspection in the six spray districts between December 4 and 11, 2018. The ECO coordinated with the district officers of MASA and MITADER for this activity. Details are provided in the following chapter.

5.3 POST-SPRAY EVALUATION MEETING

The 2018 post-spray evaluation meeting is planned for February 21, 2019, in Quelimane, Zambezia. Participants will include representatives of the NMCP, PDH, each of the spray districts' SDSMASs, district MASA and MITADER offices, VectorLink Mozambique management and technical teams, and PMI Mozambique.

The meeting will discuss the lessons learned in the spray campaign and, based on these lessons, agree on areas of improvement in future campaigns.

6 ENVIRONMENTAL COMPLIANCE

PMI approved an SEA for implementing PMI-supported IRS in Mozambique in 2015. It authorizes IRS nationwide in Mozambique, using all World Health Organization Pesticide Evaluation Scheme (WHOPES)-recommended insecticides in the pyrethroid, carbamate, organochlorine, and organophosphate classes and chlorfenapyr (when it receives WHO/PQ), a pyrrole. Insecticide use is contingent on registration with the government of Mozambique. The SEA is valid for the period 2015–2020.

With the introduction of clothianidin and clothianidin/deltamethrin combination products, VectorLink Mozambique drafted an amendment to the existing 2015–2020 SEA, which was approved by PMI. The SEA amendment outlines the characteristics, benefits, and potential hazards of clothianidin and the clothianidin/deltamethrin combination, as well as the legal and regulatory status of the active ingredients in Mozambique and in the United States.

VectorLink Mozambique used the project approved Environmental Mitigation and Monitoring Plan (EMMP) as a guide to the specific actions to be taken under each category of activity to mitigate the environmental impacts of IRS. The EMMP identifies the person responsible for monitoring compliance with the plan, the indicator to be used, and the method and frequency of monitoring. The status of mitigation throughout the IRS campaign is reported in Environmental Mitigation and Monitoring Report (Annex D) based on the submissions of environmental and supervisory checklists by smart phone.

6.1 PRE-SEASON ENVIRONMENTAL ASSESSMENT

In May 2018, VectorLink Mozambique conducted PSECA at its 20 operations sites, including one new site in Mopeia District. The project conducted the PSECA using smartphones pre-programmed with environmental assessment checklists. The data for the PSECA were submitted to a central database on an automated server at Abt's office in Rockville. The system auto-generated a work list that was instantly shared with the COP, operations manager, and ECO to guide the work plan for the rehabilitation of the operations sites for the 2018 spray campaign.

The ECO identified the new operations site in Mopeia District by considering criteria such as: (a) an appropriate location (outside of any flood plain and distance from protected areas); (b) adequate space for storage, bearing in mind the type of insecticide, and sufficient ventilation; and (c) suitability area for soak pits and/or MSPs.

Nineteen operations sites in the six districts are located in SDSMAS premises; one site (Lualua site, Mopeia) is located on private property. The owner gave the premises when she was approached by the Mopeia SDSMAS. Due to bad road conditions in all six districts, the need to maximize the use of resources and minimize travel distances and time spent traveling from the operations sites to some targeted communities, and the quest for proper protection of the environment, the project increased the number of MSPs for the 2018 spray campaign.

A summary of the rehabilitation and/or improvement of the operations sites and use of MSPs is in Table 12.

Table 12: Rehabilitation and Improvement of Operations Sites

District	Operations Sites Rehabilitation
Molumbo 2 operation sites (Molumbo Sede and Corromana)	2 wash areas rehabilitated in both sites 1 data center rehabilitated in Molumbo sede 2 changing rooms segregating female and male personnel rehabilitated in Molumbo sede 2 operation site fence rehabilitated in both sites 6 MSPs used
Maganja da Costa 2 operation sites (Maganja Sede and Nante)	3 wash areas rehabilitated, 2 in Maganja sede and 1 in Nante 1 storeroom floor rehabilitated in Nante 1 soak pit rehabilitated 1 changing room for males and females rehabilitated in Maganja sede 2 wash facilities rehabilitated in Maganja sede 2 operation sites fenced, 1 in each site 18 MSPs used
Morrumbala 5 operations sites (Morrumbala Sede, Megaza, Chirre, Muandia, and Pinda)	2 toilets and 2 wash facilities rehabilitated in each of two sites, Morrumbala sede and Megaza 3 wash facilities rehabilitated, in Pinda, Muandua, and Chire 3 storerooms rehabilitated, in Pinda, Megaza, and Muandua Changing rooms rehabilitated in Pinda Chire and Muandua Fences rehabilitated in Chire, Megaza, and Muandua 2 soak pits re-itemized in Chire and Muandua 6 MSPs used
Milange 5 operations sites (Milange Sede, Carrico, Dulanha, Liciro, Dachudua)	3 store rehabilitated, in Dulanha, Liciro, and Dachudua 1 soak pit re-itemized, in Dulanha Fences rehabilitated in Dulanha, Carrico Milange sede, Liciro, and Dachudua Damaged roof of changing rooms for males and females rehabilitated in Dulanha 2 roofs improved in Dachudua, 1 from changing room and 1 from store (to increase light inside of store) 2 soak pits re-itemized, in Dachudua and Liciro 19 MSPs used in Milange district
Derre 2 operation sites (Derre Sede and Guerissa)	1 soak pit re-itemized, in Derre sede Changing rooms for males and females rehabilitated in both Derre and Guerissa Storeroom rehabilitated in Derre sede and connected to electricity source 2 fences rehabilitated, in Derre sede and Guerissa Wash facilities rehabilitated in Derre sede and Gerrisa 1 data center rehabilitated, in Derre sede 1 hospital water pump repaired to facilitate operations in Guerissa 10 MSPs used
Mopeia 4 operation sites (Mopeia Sede, Posto Campo, Chimuara, Lualua)	1 soak pit rehabilitated, in Mopeia Sede Storerooms rehabilitated in Mopeia Sede, Posto Campo, and Chimuara Washrooms rehabilitated in Posto Campo Changing rooms for males and females rehabilitated in Posto Campo 1 soak pit re-itemized, in Chimuara Operation site fences constructed in Lualua, Chimuara, and Posto Campo 1 wash area and 1 soak pit built in Lualua 2 wash facilities and 2 toilets built in Lualua Changing rooms for males and females built in Lualua 6 MSPs used for 2018 spray campaign

6.2 SAFETY AND ENVIRONMENTAL COMPLIANCE BEFORE, DURING, AND AFTER THE SPRAY CAMPAIGN

6.2.1 MEDICAL HEALTH

All prospective seasonal personnel underwent a general medical check-up to ensure they were physically and medically fit to participate in the spray campaign. Table 13 provides details on the number of prospective seasonal personnel who underwent the general medical check and the number that passed.

Table 13: Pre-Spray Medical Check-Up

District	Total Tested	Total Passed
Milange	431	392
Morrumbala	424	415
Molumbo	230	226
Maganja da Costa	209	209
Mopeia	180	180
Derre	106	94
Total	1,580	1,516

In addition to the general medical check-up, all eligible females took pregnancy tests. A second round of pregnancy testing was conducted on November 10 in all six districts. Females found pregnant were assigned duties that did not involve handling insecticides, such as assisting in fetching water. Table 14 shows the number of women who underwent pre- and mid-spray pregnancy tests. A smaller number of women were tested during the mid-spray tests round because some women were dismissed for unacceptable behavior such as insecticide misappropriation or left the program voluntarily, for example, to prepare for national exams or to accept a more permanent job.

Table 14: Pre-Spray and Mid-Spray Pregnancy Test Results

District	Pre-Spray			Mid-Spray		
	Total Women	Total Women Tested	Total Positive	Total Women	Total Women Tested	Total Positive
Morrumbala	90	90	8	82	82	4
Milange	112	111	1	111	110	1
Molumbo	72	72	0	72	72	1
Maganja da Costa	75	75	3	57	57	0
Derre	18	18	0	18	18	0
Mopeia	44	44	0	44	44	0
Total	411	410	12	384	383	6

6.2.2 ENVIRONMENTAL COMPLIANCE AND SAFETY

To reduce the number of environment compliance and safety incidents, the project trained all staff and supervisors in insecticide handling for both Actellic® 300CS and SumiShield 50WG (i.e., best practices in mixing and using insecticide, identification of the symptoms of intoxication, the negative impact of insecticide on the environment, and the importance of correct use of full PPE).

Mitigation measures included:

- Provision and use of complete PPE (coveralls, head and neck protector, gloves, boots, socks, helmets, face shields, and dust masks) throughout the campaign.
- Training and reinforcement of safety and compliance messages through morning mobilization and through job aids.
- Use of tarpaulins to cover insecticide containers when transporting them from the central warehouse to the district stores and the operations site to ensure no insecticide fell off during transportation and that insecticides were protected from rain. The project also equipped each transport vehicle with spill kits, a first aid kit, material safety data sheets, accident/emergency procedures sheets, and a fire extinguisher.
- Retrofitting of trucks that transported SOPs from operations sites to the field with railings, seats, and seat belts. Before contracting vehicles to carry out project activities, the project conducted two inspections of each in line with PMI BMPs for IRS, to ensure compliance with environmental and safety requirements. The first inspection was to ensure that the trucks were in good mechanical condition. The second was to ensure that specific modifications needed for IRS were in place. Vehicles that passed both inspections were issued a certificate by the VectorLink ECO. Throughout the spray campaign, the project again inspected all trucks to ensure that safety measures were observed at all times. In 2018, installed seat belts in the trucks. Though there was considerable resistance from vendors, the project has learned that this safety feature is feasible and will be continued in the future.
- Monitoring of fixed and mobile soak pits throughout the campaign by the project ECO in collaboration with other supervisors. Teams used plastic sheeting at the wash areas to create MSPs to ensure insecticide-contaminated effluent did not pollute the environment. The teams replaced the damaged sheets where and when necessary. The project installed fences and gates around the perimeter of the operations site to prevent unauthorized access to the fixed soak pits and wash areas.
- The project continued using the progressive rinsing procedure, consisting of introducing pressure into the spray pump and discharging it through the hose and lance at barrel stations 3, 5, and 7. This progressive rinsing procedure was discussed and practiced during the ToT and SOP training.
- Training of washers to wash used overalls in the washing area of the soak pit throughout the spray campaign. This enabled SOPs to receive clean PPE at the operations site each day before leaving for the field.
- Provision of wash facilities and soap at each operations site. This enabled SOPs and other seasonal personnel to wash up at the end of the spray day before leaving for their homes.
- Transport of clean PPE from the nearest fixed operations site to sites with MSPs, in compliance with best practices. Again, this enables all SOPs to receive clean PPE each day.
- Pulling of the MSP at the end of the camping period. The team then filled the pit with clean soil to avoid accidents and return the site to its original status. After use, the team transported MSPs to the central warehouse for capacity testing to determine if they are suitable for use in next year's spray campaign.
- Doing mid-spray environmental compliance inspections during the campaign in all 20 operations sites and locations using MSPs. The ECO in collaboration with other supervision staff monitored compliance with procedures for disposing of liquid waste and adherence to mitigation measures to avoid seasonal worker exposure to pesticide.
- Doing systematic and continuous inspections of operations sites and spray personnel by VectorLink supervisory team during the campaign. The team inspected operation sites to assess the accuracy and timeliness of store recordkeeping, proper warehousing of insecticide and other spray materials and supplies, and appropriate storage and handling of different waste. Inspections also ensured that stores had first aid kits, spill kits, and fire extinguishers to respond to an emergency.

- Doing regular supervision of spray team to ensure correct spray technique, consistent use of full PPE, adequate preparation of households for spraying, correct handling of insecticide, and accurate reconciliation of full and empty bottles of insecticide to prevent and identify any theft of insecticide.

6.3 MANAGEMENT OF INSECTICIDE ADVERSE EFFECTS

Each district had a resource team responsible for handling adverse effects. The team comprised a doctor based at the district hospital, and nurses based at each health center affiliated with an operations site. These teams were responsible for conducting pregnancy tests and medical checks of all candidates and addressing any adverse effects seasonal workers or community members experienced during spray operations. Before the start of the spray campaign, the resource teams received training in Quelimane on management of adverse IRS effects. The government provided the antidote, atropine, for Actellic® 300CS to all health centers adjacent to operations sites for use in case of adverse human exposure. There were no reported instances of human exposure to insecticide during the 2018 campaign.

6.4 SOLID WASTE MANAGEMENT

Before the 2018 spray campaign began, VectorLink Mozambique prepared a waste management plan and submitted it to the home office for approval (Annex E). After approval, the ECO translated the document into Portuguese and shared it with the entire VectorLink Mozambique team. This familiarized all project staff with the best way to manage, store, and transport waste produced during the IRS process. This plan was also discussed as part of training for logistics assistants and storekeepers.

According to this plan, all contaminated waste items were separated from uncontaminated items and stored separately. Separation and packaging of waste started at the operations site level, then moved to the district level and then to the central warehouse level in Quelimane, where final waste disposal was done. Weekly, hired vehicles moved waste from operations sites to district warehouses and from district warehouses to central warehouse in Quelimane. At the central warehouse, staff separated, counted, and re-packed the solid waste for final disposal.

In January 2019, the VectorLink ECO will coordinate with the provincial-level MITADER department to incinerate (where applicable) waste at the Ceramica Okanga incinerator in Nicoadala District in Zambezia. Ceramica Okanga is certified by MITADER, the government organization responsible for ensuring that incinerators meet environmental standards.

During the campaign, SOPs triple-rinsed empty insecticide bottles. At the central warehouse, to prepare empty bottles for recycling, washers will remove all labels and provide an additional wash to ensure the bottles contain no insecticide residue. VectorLink Mozambique will continue to work with two recycling companies, Incala in Zambezia and Topack in Maputo, on recycling the bottles. The VectorLink ECO will supervise the process in coordination with MITADER Zambezia to ensure both companies follow all environmental procedures and best practices in their memoranda of understanding.

6.5 INCIDENT REPORTS

Table 15 shows the incidents reported during the 2018 campaign.

Table 15: Incident and Exposure Reports

Incident Number	Brief Description	District
1	Theft; Two SOPs falsified data. One gave two sachets of insecticide to a homeowner while the other sold two sachets to another homeowner.	Morumbala
2	Fraud; Two SOPs, 1 TL, and 1BS were found under a tree at mid-day. Review of SOP forms revealed data falsification and misuse of insecticide.	Maganja daCosta
3	Fraud; Two SOPs were found to have not sprayed any structures. SOP forms were blank. One SOP had partial empty bottle and other one full empty bottle of insecticide.	Milange
4	Theft; Three SOPS involved in insecticide theft and/ dumping of insecticide and data falsification to cover up insecticide theft and/misuse	Derre
5	Theft; SOP found emptying two sachets of insecticide into two plastic bags behind the warehouse.	Morrumbala
6	Fraud; Seasonal M&E assistant and field supervisors turned in different mobile phones in place of the original phones issued by VectorLink.	Molumbo

6.6 MITIGATION OF INCIDENTS

VectorLink Mozambique incorporated into 2018 training the lessons learned and recommendations from 2017.

In 2018, Mozambique did not have any vehicle-related incidents. This was attributed to changes in the project's driver selection and monitoring practices – in addition to the regular driver license, we required drivers to be licensed to transport people, which is a separate license. In prior years, vehicle owners would assign their vehicles to other drivers without project approval. This year, the ECO worked with the district coordinators to ensure that no persons other than the project-trained and -certified drivers drove hired vehicles. Finally, the ECO set up a WhatsApp group with drivers through which she communicated with them regularly, in particular to send out job aids.

Using the Open Data Kit (ODK) and CommCare m-health systems has contributed greatly to environmental monitoring. It gave the ECO and other senior members on the VectorLink team timely knowledge of issues in the field and enabled them to take rapid corrective action and/or mitigation measures

In-depth discussions took place during the environmental compliance training on the possible immediate and long-term impacts of insecticide on human health and the environment. The discussions helped SOPs and other spray team members understand the importance of managing, mixing, and correctly applying insecticide.

Communications by radio, mobilizers, and community meetings contributed to achievement of the goals of the Mozambique Environmental Mitigation and Monitoring Plan. VectorLink Mozambique will continue working to reduce possible negative health and environmental impacts of IRS.

6.7 POST-SPRAY INSPECTIONS

The VectorLink ECO conducted post-IRS inspections in all 20 operations sites between December 4 and 11, 2018, in coordination with the government's departments of Environment and Agriculture.

Out of the 20 the operation sites inspected, 16 passed on the initial post-spray inspection visit. The remaining four had issues to correct. This was done and the four sites were also passed.

The post-IRS inspections produced recommendations for the next spray season:

- The following operations sites should be considered for relocation because they are now less than 15 meters away from homes, water sources, and others sensitive receptors:
 - Maganja sede, in Maganja da Costa
 - Muandiua, in Morrumbala
 - Morrumbala sede, in Morrumbala
 - Chimuara operation site, in Mopeia
- The following soaks pits must be rehabilitated before the start of the next spray campaign, since supervisors observed that it would take some time for water to drain after the PPE cleaning:
 - Corromana soak pit, in Molumbo
 - Milange sede (old) soak pit, Dulanha site soak pit, and Dachudua site soak pit, in Milange
 - Derre sede soak pit, in Derre

7 ENTOMOLOGY

7.1 QUALITY ASSURANCE OF IRS PROGRAM

The spray quality assessment performed in three of the six spray districts (Maganja da Costa, Milange, and Mopeia) is critical for evaluating spray quality on sprayed surfaces. In each district village, five houses were randomly selected. Cones were placed at heights of 0.5 m, 1.0 m, and 1.5 m above the floor, arranged diagonally across a wall surface. Cones lined with self-adhesive tape were fixed on the sprayed walls for the assay. The control cone was affixed on a wall lined with a paperboard with adhesive in an unsprayed house or in the shade of a tree in the yard, away from the sprayed houses to avoid any potential 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 30th minute were recorded, marking the end of exposure period. At the end of the 30-minute 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. As shown in Table 16, results showed acceptable quality of spray in all districts, with a mortality rate varying from 99.5 percent to 100 percent after the 24-hour holding period for Actellic® 300CS in Maganja da Costa and Milange and 72-hour holding period for SumiShield in Mopeia.

Table 16: Cone Wall Bioassay Test Results Summary

District	Wall Surface Types	# Houses	# of Test Mosquitoes Exposed	% Exposure Mortality after 24 Hrs*	% Exposure Mortality after 72 Hrs*	# of Control Mosquitoes Exposed	% Control Mortality after 24 or 72 hrs
Maganja da Costa	Mud and burned brick	5	200	99	NA	50	2
Milange	Mud	5	200	100	NA	50	0
Mopeia	Mud and cement	5	200	NA	100	50	2

*Abbott's formula not applied to any of the test mortality results

7.2 RESIDUAL EFFICACY OF ACTELLIC® 300 CS AND SUMISHIELD 50WG

The methodology in section 7.1 above is repeated in the same villages and houses after every month post-spray (thirty days) to monitor the residual efficacy of the sprayed insecticides. We hereby report the residual efficacy of Actellic® 300CS and SumiShield® 50WG based on quality assurance testing at T₁ (one month after spraying) in Maganja da Costa, Milange, and Mopeia. The results remained acceptable, with mortality rates varying from 96.5 percent in both Maganja da Costa and Milange, which were sprayed with Actellic® 300CS, to 100 percent in Mopeia, sprayed with SumiShield® 50WG (Table 17). We will continue to measure the residual life of the two insecticides monthly until mortality reaches below the standard cut-off point of 80 percent for two consecutive months.

Table 17: Zambezia One-Month post-spray (T_i) Cone Wall Bioassay Test Results Summary

District	Wall Surface Types	# Houses	# Mosquitoes Exposed	% Exposure Mortality after 24 Hrs*	% Exposure Mortality after 72 Hrs*	# of Control Mosquitoes Exposed	% Control Mortality after 24 or 72 hrs
Maganja da Costa	Mud and burned brick	5	200	96.5	NA	50	0
Milange	Mud	5	200	96.5	NA	50	0
Mopeia	Mud and cement	5	200	NA	100	50	0

*Abbott's formula not applied to any of the test mortality results

7.3 AIRBORNE EFFECT OF ACTELLIC® 300CS AND SUMISHIELD 50WG

Tests for the airborne effect of pirimiphos-methyl (Actellic® 300CS) and clothianidin (SumiShield® 50WG) were conducted using susceptible *An. arabiensis* KGB strain mosquitoes aged two to five days. Test mosquitoes were exposed for 30 minutes to potential airborne insecticidal effect by introducing them into a mosquito netting cage, hung 10 cm away from the sprayed wall surface (inside sprayed houses) at a height of 1.5 m above the floor. Controls were similarly introduced into a mosquito netting cage and hung outdoors away from sprayed houses. At the end of the thirty minutes exposure, the test and control mosquitoes were transferred into clean paper cups that were kept for a 24-hour holding period for Actellic® 300CS and longer periods of 48 hours for SumiShield® 50 WG. Dead and live mosquitoes were counted after 24 hours or 48 hours holding period and the percentage mortality was calculated in the replicates for each house and recorded according to WHO protocol.

The baseline airborne effect of Actellic® 300CS was found to be low in Maganja da Costa exhibiting only 6 percent mortality 24 hours post exposure, while a much higher mortality (66 percent) was recorded in Milange. SumiShield® 50 WG demonstrated a much higher effect, 96 percent mortality, at 24 hours post exposure and 100 percent at 48 hours post exposure. One month post spray, at T₁, the observed 24-hour mortalities were 8 percent and 62 percent in Maganja da Costa and Milange, respectively. High mortality continued to be observed with SumiShield in Mopeia, with 100 percent mortality scored 48 hours post exposure.

8 MONITORING AND EVALUATION

8.1 KEY OBJECTIVES AND APPROACH

For the 2018 spray campaign's M&E, PMI VectorLink Mozambique closely followed the processes in the approved 2018 work plan. The main objectives of the M&E activities were to:

- Emphasize accuracy of both the data collection and data entry processes through comprehensive training and supervision at all levels
- Streamline and standardize data flow, minimize errors, and facilitate timely reporting
- Ensure IRS data security and storage for future reference through the establishment and enforcement of proper protocols
- Document lessons learned and good practices observed in the implementation of the project activities and apply them to future project years

8.2 DATA COLLECTION AND MANAGEMENT

PMI VectorLink Mozambique 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 pre-spray IEC campaign, community mobilizers used the mobilizer data collection form to collect household-level data. IEC assistants also used a supervision form to guide and support mobilizers to ensure good data quality. During the spray campaign, SOPs collected all household data. The data were verified through data quality assessment processes. To ensure data integrity, improve supervision, and, ultimately, enhance quality of data collection and data entry, VectorLink Mozambique used quality assurance and control tools (i.e., Error Eliminator [EE] and the Data Collection Verification [DCV] form). Annex A describes all of the 2018 data-collection and quality-assurance tools, their purposes, and intended users.

The project continued using the converted DCV tool from a paper form into a digital form platform within the mobile supervisory form suite. Tables 18 and 19 show the number of households that were interviewed using the DCV form, and the issues observed and resolved, respectively.

Table 18: Number of Structures Visited Using the DCV Form

District	No. of Structures Visited
Derre	382
Milange	484
Molumbo	215
Mopeia	1,086
Morrumbala	330
Maganja da Costa	410
Grand Total	2,907

Table 19: Use of DCV: Common Issues Found and Corrective Actions Taken

Errors/Issues Observed	Corrective Actions Taken
Names of head of households are not completed for unsprayed houses	Issues were addressed with BSs, TLs, and SOPs daily at morning assemblies. Though it was observed to produce minimal results, SOPs were encouraged to ask close neighbors for assistance.
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.	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 SOPs did not write in the 2018 column on the IRS household card that were given to the households	Issue was discussed with spray teams and SOPs during the morning assemblies, and SOPs were reminded to fill in the households cards completely and correctly before handing over to the homeowner or his representative.
All eligible structures encountered by SOPs were not appropriately registered, particularly eligible structures that were not sprayed.	Issue was 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 register eligible structures that were not previously registered.
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 would forget 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.

Table 20 compares spray coverage based on structures reported by SOPs and structures reviewed using the DCV. Overall, in terms of spray coverage, there was no significant difference between the SOP and DCV data.

Table 20: Data Collection Verification Based on DCV By District

Districts	Structures Visited	Structures Sprayed	Structures Not Sprayed	Coverage Based on DCV	2018 Spray Coverage	Difference in Coverage between SOP and DCV Data (% points*)
Derre	382	338	44	88.5%	87.5%	-1.0
Milange	484	465	19	96.1%	93.6%	-2.5
Molumbo	215	204	11	94.9%	92.7%	-2.2
Mopeia	1,086	1,058	28	97.4%	97.0%	-0.4
Morrumbala	330	313	17	94.8%	96.8%	1.9
Maganja da Costa	410	380	30	92.7%	96.1%	3.4
Total	2,907	2,758	149	94.9%	94.5%	-0.4

* Negative percentage points are where DCV data found a higher spray coverage compared to SOP data. Positive percentage points are where SOP data had a higher spray coverage than DCV data.

8.3 DATA ENTRY

The VectorLink Mozambique M&E team worked with the VectorLink home office M&E specialist and Client Technology Center to strengthen the Microsoft Access-based PMI VectorLink database. The project bought additional laptops to replace older, unusable computers, adding to the stock of DEC laptops available from previous years. It contracted 33 DECs to staff six data centers. Due to the improvement in the infrastructure, internet connectivity, and stable electricity in Molumbo and Derre districts, two new data centers were set up in these districts. The database set-up entailed using a shared server and individual workstations in each data center. The project team installed the 2018 PMI VectorLink database on 39 computers to be used for data entry. Also, the web-based DOS database was installed on six servers, one for each district.

DECs entered spray data simultaneously at each of the six data centers. The design of the PMI VectorLink M&E database allows two levels of data entry: *totals* and *details*. Totals data facilitate quick reporting for program decisions, while details data are for the final End of Spray Report. The project used this strategy for the mobilization data entry too.

DECs, database coordinators, and M&E assistants cleaned data at the data center each day, during data entry. It involved the following:

- Ensuring correct entry of all data collection forms (by the double-entry method)
- Making necessary corrections to ensure that the totals and details data agreed
- Checking and removing duplicate records
- Identifying and entering missing records

As in previous years, the project used the Microsoft Access-based IRS Cleaning/Reporting tool for data cleaning. The DECs, database coordinators, and M&E assistants completed final data cleaning six days after the close of the spray campaign.

8.4 DATA STORAGE

VectorLink Mozambique stored paper data forms in two-ring binders. It filed spray data by district, spray date, and operations site during the spray campaign. At the end of each day, it backed up all data electronically. Electronic back-up saved data in two ways: first, into a back-up folder on the district data entry server and, second, into the Dropbox-based back-up system. All the physical data collection forms have been brought to Quelimane for safe keeping.

8.5 REPORTING

Reporting on the progress of the spray campaign happened at two levels. At the operation site and district levels, the major reporting tool was the performance monitoring tracking (PMT) data. This is the daily summary of output for all spray teams at the operation site. The OSS summarized these data in a performance tracking sheet that was posted at each operation site. The OSS then sent the data sets via SMS to a central server. The central server aggregated all the SMSs from all operations site into one report that was automatically sent to all project managers each day. The same data were also shared with the various SDSMAS and the PDH.

Officially, VectorLink Mozambique project reported on the progress of the spray campaign once a week to the home office, PMI Washington, PMI Mozambique, and the PDH. The data source for the report was data from the VectorLink spray database.

In addition, the Monitoring and Evaluation Indicator Matrix (Annex F) provides reports data against the approved Monitoring and Evaluation Plan.

8.6 MOBILIZATION DATA

PMI VectorLink Mozambique conducted D2D mobilization in the six target districts on an average of six days. During this process, mobilizers collected information about the number of households that they had visited and sensitized. They also collected information on the number of males and females that they had sensitized and whether or not those households were ready to accept IRS. The mobilization data entry was done alongside spray data and the entry was finalized after the spray campaign. Mobilizers registered an estimated 208,938 structures and reached a total of 577,319 people with IRS messages. Table 21 provides a summary of mobilization data.

Table 21: Total Mobilization Data by District

District	Structures Found by Mobilizers	Structures Sensitized	Structures Not Sensitized	% Structures Sensitized	Population Reached			IRS acceptance			Mobilizers Worked	Structures per Mobilizers
					Total Population	Males	Females	Accepted	Not Accepted	% of Structures Accepting IRS		
Derre	10,484	10,353	131	99%	27,879	13,292	14,587	10,263	221	97.9%	608	17.2
Maganja da Costa	38,291	37,679	612	98%	82,581	35,542	47,039	37,642	649	98.3%	1,478	25.9
Milange	54,765	54,394	371	99%	158,735	75,406	83,329	54,161	614	98.9%	2,168	25.3
Molumbo	31,713	31,319	394	98%	135,993	67,775	68,218	31,295	418	98.7%	1,293	24.5
Mopeia	22,197	21,890	307	100%	56,832	26,846	29,986	21,838	204	98.4%	1,119	19.8
Morrumbala	51,488	51,172	316	99%	115,299	56,281	59,018	51,058	329	99.2%	1,374	37.5
Total	208,938	206,807	2,131	99%	577,319	275,142	302,177	206,257	2,435	98.7%	8,040	26.0

8.7 SPRAY OPERATIONS DATA

During the 2018 spray campaign, SOPs found 409,908 eligible structures and sprayed 387,413, representing 94.5% spray coverage. The total population protected by IRS (all ages) was 1,663,078. This included 237,944 children under five years of age and 90,089 pregnant women. Tables 22 and 23 provide a summary of spray results.

Table 22: 2018 Spray Results Summary 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
Derre	24,606	21,523	87.5%	100,929	88,798	44,175	44,623	5,542	13,973	88.0%
Maganja da Costa	53,012	49,629	93.6%	221,925	207,882	101,894	105,988	8,383	25,320	93.7%
Milange	114,059	105,720	92.7%	539,859	500,807	246,283	254,524	28,659	73,389	92.8%
Molumbo	62,175	60,322	97.0%	258,830	250,874	128,405	122,469	11,883	38,572	96.9%
Mopeia	39,208	37,951	96.8%	168,589	163,236	82,029	81,207	6,289	26,035	96.8%
Morrumbala	116,848	112,268	96.1%	470,755	451,481	216,433	235,048	29,333	60,655	95.9%
Total	409,908	387,413	94.5%	1,760,887	1,663,078	819,219	843,859	90,089	237,944	94.4%

Table 23: Insecticide Use By District

District	Structures Found	Structures Sprayed	Insecticide Bottles				Spray Operators			
			Issued	Returned Full	Used	Not Returned	SOPs Worked	Structures/SOP Day	Bottles/SOP Day	Structures/Bottle
Derre	24,606	21,523	10,783	2,387	8,396	0	2,314	9.3	3.6	2.6
Maganja da Costa	53,012	49,629	28,192	5,882	22,310	0	4,908	10.1	4.5	2.2
Milange	114,059	105,720	64,155	6,377	57,750	0	10,439	10.1	5.5	1.8
Molumbo	62,175	60,322	31,475	5,473	26,175	0	5,671	10.6	4.6	2.3
Mopeia	39,208	37,951	20,049	4,701	15,348	0	3,758	10.1	4.1	2.5
Morrumbala	116,848	112,268	59,769	4,934	54,835	0	10,635	10.6	5.2	2.0
Grand Total	409,908	387,413	214,423	29,754	184,814*	0	37,725	10.3	4.9	2.1

*This figure is 13 less than total insecticide the logistics inventory recorded as used (Table 11). This difference of 13 is the number of bottles/sachets involved in incidents (see Table 15 Incident Reports) and thus not used for spraying. The 13 were recorded in the warehouse but not in the database.

At the end of the spray campaign, 22,495 structures found by SOPs were not sprayed. Several factors led to non-sprayed structures as indicated in Table 24. Annex F provides detailed results on other project indicators.

Table 24: Reasons for Non-Spraying

Districts	Reason of not Sprayed					Grand Total
	Closed	Refusal	Sick	Funeral	Other	
Derre	785	1,880	248	19	151	3,083
Maganja da Costa	966	1,521	450	29	417	3,383
Milange	2,254	3,718	1,649	116	602	8,339
Molumbo	189	1,155	299	22	188	1,853
Mopeia	329	555	119	11	243	1,257
Morrumbala	1,253	2,223	407	32	665	4,580
Grand Total	5,776	11,052	3,172	229	2,266	22,495

8.8 MOBILE DATA COLLECTION, MESSAGING, AND REPORTING (MHEALTH)

In 2018, PMI VectorLink Mozambique continued to use mobile phone data collection, messaging, reporting, and supervision tools using the ODK and CommCare platforms. It implemented these tools in conjunction with the PMI VectorLink subcontractor, Dimagi LLC. The mHealth tools were:

- bulk SMS job aids;
- PMT; and
- mobile-based supervisory forms.

The first two tools rely on SMS messaging, while the third is a smartphone application built on two mobile data collection platforms.

8.8.1 BULK SMS JOB AIDS

Bulk SMS job aids remind spray teams and supervisors of standard operating protocols and key environmental compliance issues. They also reinforce the need to create a work environment without discrimination against individuals based on their gender, religion, or ethnicity. Through the bulk SMS job aids, PMI VectorLink Mozambique issued notices and information to all categories of spray campaign actors on a daily basis throughout the spray campaign.

Some of the challenges were delays in arrival of messages due to slow network connectivity in some operations sites, compounded by the sending of many messages simultaneously from one central phone. To mitigate this, VectorLink Mozambique constantly reviewed the messages to be sent, their importance, and the category of seasonal staff that would receive the message. The length and/or frequency of some messages was reduced to avoid overloading the system with pending messages. Also, the WhatsApp application was used to communicate directly with district coordinators when immediate action was required.

8.8.2 PERFORMANCE MONITORING TRACKER

Every day, via SMS, OSSs reported raw performance data to a central server using the PMT. Supervisors reported on four key indicators for their operations sites:

- Number of structures found
- Number of structures sprayed
- Number of insecticide bottles used
- Number of SOPs who worked that day

At the end of each day, each OSS sent an aggregate report on the four indicators, including calculations based on these indicators, to key supervisors as a snapshot of campaign progress. The purpose was to provide the district coordinators and senior management team real-time information to facilitate quick corrective decisions to improve ongoing spray operations.

During the first week of the spray campaign, progress reports from the PMT system were not accessible to senior project managers: the gateway phone for managing PMT data and job aids had become so overloaded with receiving and sending messages that it stopped working properly. To resolve this at the time, all the messages were cleared and rescheduled. To resolve it for the long term, the recommendation is to have different phones: one to manage PMT reporting and another to manage job aids.

8.8.3 MOBILE-BASED SUPERVISORY FORMS

PMI VectorLink Mozambique continued to implement the mobile-based supervisory applications that was rolled out in 2016 under the PMI AIRS project. The supervisory tools were on two different platforms: ODK and CommCare. Both platforms were equipped with the following supervisory tools: End of Day Clean-up Inspection, Home Owner Preparation and Spray Operator Performance, Spray Operator Morning Mobilization Inspection, Storekeeper Performance Inspection, and Spray Operator Transportation Vehicle Inspection. In addition, the ODK platform housed other environmental compliance supervisory forms (Pre-season Store and Soak Pit Assessment, Pre-contract Transport Inspection, and Post-IRS Environmental Compliance Inspection) that were used by the VectorLink ECO. The CommCare platform also had the DCV tool, which was not on the ODK platform. The supervisory forms on the ODK platform were used by VectorLink staff, while the supervisory tools on the CommCare platform were used by seasonal staff and staff from the PDH and SDSMAS.

Each day, after supervisors submitted data to a cloud server, an email was sent to specific recipients including the COP, operations manager, ECO, M&E manager, database manager, and communications coordinator. All persons or staff who used the mobile supervision and reporting systems received training during the ToT. The Dimagi representative responsible for the VectorLink Mozambique team followed up with the project frequently before and during the campaign to set up the systems and troubleshoot when obstacles arose.

9 TECHNICAL ASSISTANCE TO THE NATIONAL GOVERNMENT

9.1 TECHNICAL ASSISTANCE TO NAMPULA PROVINCE

PMI support to Nampula Province started in 2017, under the PMI AIRS project, as part of the effort to build capacity and improve the planning and implementation of IRS in Mozambique. VectorLink Mozambique's 2018 work plan indicated that PMI would continue supporting Nampula in the following technical areas: TOT, IEC/ BCC, environmental compliance, and entomology.⁹

To be able to offer well defined support and assist in better management of available resources, VectorLink Mozambique, PMI, the NMCP, and the Nampula PDH met to discuss the PMI VectorLink project support in Nampula in 2018 and the expected collaboration. The meeting was held in the office of the Nampula PDH on June 18, 2018.

9.1.1 PRE-SPRAY ENVIRONMENTAL COMPLIANCE ASSESSMENT

As part of VectorLink Mozambique's technical support to Nampula Province, the project conducted a PSECA in eight districts proposed for IRS in 2018: Angoche, Meconta, Monapo, Nacala Porto, Nampula Cidade, Murrupula, Rapali, and Ribaue. The PSECA was led by the VectorLink ECO and Nampula provincial malaria focal person in coordination with district malaria focal points. Five of the eight districts had never done IRS before and had no wash area, soak pit, or other basic infrastructure needed to comply with IRS requirements. Two of the proposed sites (Nampula Cidade and Nacala Porto) were recommended for relocation since they were too close (less than 7 meters) to houses, a school, and others sensitive areas. The PSECA findings were discussed with the Nampula PDH on June 10, 2018, before a written report was sent to Nampula on July 19, 2018. Based on the findings, the Nampula Cidade site was relocated, but financial constraints prevented the relocation of the Nacala Porto site.

Each district had only one operations site from which all SOPs operated. To reduce overcrowding at the wash areas and soil saturation around the fixed soak pits, in 2017, the PMI AIRS project had provided materials to build and use MSPs at the operations sites. Eleven mobile soak pits that were constructed in 2017 were used in 2018. VectorLink provided technical support on MSP used during the ToT and PSECA.

9.1.2 WASTE MANAGEMENT

As part of the environmental compliance technical support VectorLink Mozambique provided to Nampula Province, the project ECO helped design a management plan for waste from the 2017 spray campaign. The ECO and Nampula PDH identified a partner in Nampula (Topack), the same company the project works with to recycle insecticide bottles from Zambezia. VectorLink Mozambique brokered an agreement with Topack to receive and recycle bottles from the Nampula program. With the agreement in place, VectorLink trained 20 seasonal washers hired to wash all empty bottles before they were sent for recycling. VectorLink paid these seasonal washers and Nampula PDH provided the transportation for the bottles from the warehouse in Nampula Cidade to the washing site in Marere, and from the washing site to Topack. The VectorLink ECO was in Nampula to provide technical support and supervision throughout this process. All

⁹ This report does not include all details of entomology support to Nampula Province.

the bottles were washed and ground in Nampula and later transported to Maputo for the recycling. The bottles were recycled into pallets, chairs, and watering cans.

9.1.3 TRAINING OF TRAINERS

Based on the meeting held on June 18, VectorLink Mozambique and Nampula DPS planned a seven-day ToT (two days theory, four days spray technique practice, and one day for IEC).

The ToT was held on August 13–19, 2018, in Nampula and facilitated by VectorLink and Nampula PDH and NMCP representatives. Forty participants (25 males and 15 females) from the eight targeted districts attended the training. Each district's participants included the district medical chief, representatives of the departments of community health and health education, malaria focal points, and program assistants.

The Nampula PDH felt that some aspects of the training were not realistic to implement in Nampula, especially some requirements for environmental compliance, due to lack of resources. Unfortunately, the training was held after IRS planning had taken place; the training dates had been agreed upon with Nampula during the meeting with PMI in June. VectorLink Mozambique recommends that for future campaigns, Nampula in collaboration with the NMCP and the project harmonize the ToT content and timing way well in advance to allow time for adjustments in individual district plans.

9.1.4 INFORMATION, COMMUNICATION AND EDUCATION

Based on the June 18 meeting, VectorLink Mozambique was to support aspects of the communication strategy for the Nampula spray campaign. The project reviewed the IEC budget for Nampula and made plans to support some community and stakeholder meetings as well as support some radio communication activities. In the end, however, no IEC support was provided due to challenges in unclear expectations and poor communication between the project and Nampula DPS. For the future, VectorLink recommends that roles and responsibilities in the collaboration be defined and agreed upon between the two partners.

9.1.5 ENTOMOLOGY SUPPORT IN NAMPULA

VectorLink Mozambique supported Nampula in conducting cone wall bioassays to evaluate quality of spraying and monitor the decay rate of the insecticide after spraying in two districts. The mosquitoes for the assays were reared in the Nampula provisional insectary. All districts in Nampula were sprayed using Actellic® 300CS. The cone wall bioassays were conducted using the standard WHO cone bioassay test. Susceptible *An arabiensis* KGB strain mosquitoes reared in an insectary in Nampula were used for both cone wall bioassays and airborne effect assays. Both tests were conducted on September 22–23, 2018, during the first two weeks of the 2018 spray campaign. Spray quality results demonstrated 100 percent mortality after 24 hours holding period against mosquitoes exposed to sprayed wall surfaces indicating acceptable quality of spray.

The test for airborne effect of Actellic® 300CS conducted alongside the spray quality assessment was found to be at 6.0 percent mortality in Nampula district 24 hours post exposure, while a higher score, 32.4 percent, was recorded in Monapo

The results shown in Table 25 A, B and C summarizes cone wall bioassay mortalities recorded up to three months post spray in October (T₁), November (T₂) and December (T₃) 2018. The results shows acceptable levels of efficacy in the two districts, with mortality rates remaining above 80 percent after 30 minutes exposure and 24-hour holding period on two consecutive months, except for cement surface in Monapo with a score of 76 percent mortality one month and mud surface in Nampula at two months post exposure. However, the mortality scores were found to have improved to 96 and 100 percent on subsequent months.

Table 25A: Nampula One-Month Post-Spray (T₁) Cone Wall Bioassay Test Results

District	Surface Type	# of Houses	Total Mosquitoes Exposed	Total Killed after 24Hrs	Observed 24Hrs Mortality (%)	# of Control Mosquitoes Tested	Control Mortality (%)
Nampula Cidade	Mud	4	160	160	100	40	7.5
	Cement	1	40	40	100	10	10
Monapo	Mud	1	40	35	87	10	0
	Cement	2	80	61	76	20	20

Table 25B: Nampula Two-Months Post-Spray (T₂) Cone Wall Bioassay Test Results

District	Surface Type	# of Houses	# of Test Mosquitoes Exposed	Total Killed after 24Hrs	Observed 24Hrs Mortality (%)	# of Control Mosquitoes Tested	Control Mortality (%)
Nampula Cidade	Mud	3	120	92	76	30	0
	Cement	1	40	40	100	10	0
Monapo	Mud	2	80	76	95	20	0
	Cement	2	80	77	96	20	0

Table 25C: Nampula Three-Months Post-Spray (T₃) Cone Wall Bioassay Test Results

District	Surface Type	# of Houses	# of Test Mosquitoes Exposed	Total Killed after 24Hrs	Observed 24Hrs Mortality (%)	# of Control Mosquitoes Tested	Control Mortality (%)
Nampula Cidade	Mud	4	160	160	100	40	2.5
	Cement	1	40	40	100	10	0
Monapo	Mud	3	120	113	94.1	30	3.3
	Cement	2	80	76	95	20	10

10 CHALLENGES AND SOLUTIONS

10.1 LOW SPRAY COVERAGE IN DERRE DISTRICT

As of the third week of the 2018 spray campaign, several factors combined to slow progress in coverage in Derre District. First, some community leaders were dissatisfied with the community mobilizer recruitment process, and this led to poor mobilization of some communities. Second, some householders (Seventh Day Adventists) refused IRS based on religious restrictions that do not allow them to accept modern medical treatment, which includes IRS. Third, some households were not willing to prepare their homes for spraying due to fatigue when they returned from farms.

Solution:

- VectorLink together with community leaders restructured mobilization activities in Derre. This included terminating contracts of some community mobilizers and recruiting new ones.
- VectorLink and PDH representatives explained the implication of low spray coverage to community leaders and district-level leadership
- VectorLink and the SDSMAS representative intensified mobilization by using influential leaders for D2D mobilization using community-level reports to target community with spray coverage less than 85 percent.
- VectorLink considered Sunday spraying for communities where it was applicable after discussing with community leaders.
- By the end of the spray campaign, Derre's spray coverage was 87 percent.

10.2 NON-RECORDING OF UNSPRAYED STRUCTURES

Some SOPs did not record some structures they found but did not spray. This was common when the homeowner declined to provide information about the household to the SOPs, and the homeowner objected to SOP efforts to put any mark on the door or house. There were also cases where some SOPs did not record structures because they did not want to fill up their daily data collection form by recording unsprayed structures.

Solution: In the daily morning assemblies, the OSS reminded TLs and BSs to monitor recording done in the field and ensure that SOPs registered all eligible structures reached (sprayed or unsprayed). During mobilization, VectorLink can educate the community on why we collect this information in an effort to reduce homeowner refusals to provide household details

10.3 DATA FALSIFICATION

Field supervision revealed that some SOPs were falsifying data by entering made-up data and homeowner names on their SOP forms. VectorLink Mozambique reported these cases in incident reports, since they also involved misuse of insecticides. For all insecticide-related incidents, the project performed an intensive DCV to understand if the issue had been happening for a long time. For each SOP involved, the spray data for every Monday, Wednesday, and Saturday prior to the date of the incident were randomly selected for complete verification. The verification involved M&E assistants going back to the field to track all the structures on the selected forms. The selected SOP cards had a total of 1,665 sprayed structures. The DCV was able to track 1,306 of the 1,665 (78.4 percent). The remaining structures could not be traced.

Solution: The project terminated the SOPs involved on the spot, without pay. Data that were confirmed to be false were not entered into the database.

10.4 INSECTICIDE THEFT AND WASTE

The project caught some seasonal workers (especially SOPs) attempting to steal insecticide by emptying the insecticide into other containers or wasting insecticide by dumping it on or in the ground. PMI VectorLink reported all incidents.

Solution: The project terminated the contracts of the individuals involved on the spot, without pay. In some cases, the persons were reported to the police for further investigation and action. In each case, the project retrieved the insecticides in the other containers or the contaminated soil and sent them back to the operations site for proper disposal. Also, in some cases, if a data audit found the SOP involved had falsified data, those data were not entered into the VectorLink spray database.

10.5 RAINS

Heavy rains affected the daily output in some districts. Four districts (excluding Morrumbala and Molumbo) lost at least one operation day due to rains.

Solution: VectorLink modified spray calendars and moved the end date of the spray campaign back by one or two days, depending on the district, to make up for the rain days.

10.6 SUPPORT TO NAMPULA

VectorLink did not achieve all the planned activities in providing support to Nampula.

- i) **Training of Trainers:** The Nampula PDH felt that some aspects of the training were not realistic to implement in Nampula, especially some requirements for environmental compliance, due to lack of resources. Additionally, the training was held after IRS planning had taken place and some of the information would have come handy for planning purposes.

Solution: In collaboration with the NMCP and Nampula, VectorLink Mozambique shall aim to harmonize the ToT content and timing well in advance to allow time for adjustments in individual district plans.

- ii) **IEC/BCC:** IEC/BCC activities did not take off due to unclear expectations and poor communication between Nampula and VectorLink. The major setback was the lack of a dedicated person to track constantly engage with VectorLink, follow up on discussion and provide feedback. The assigned person in 2018 was also involved in many other activities with little time to effectively provide needed feedback and attention to IEC/ BCC support.

Solution: Nampula should identify a dedicated person responsible for IEC/BCC activities. This person will work closely with VectorLink IEC Coordinator to set clear and reasonable expectations, communicate on regular basis and shall be responsible for follow up on action items.

II RECOMMENDATIONS

The following are recommendations for the next spray campaign:

II.1 PROCUREMENT: SPRAY TEAM TRANSPORTATION

VectorLink Mozambique experienced some challenges regarding transportation services, particularly in Molumbo, Milange, and Derre districts. Transportation services vendors and district administrators complained that some of the vendors whose vehicles VectorLink hired were not residents of the districts where the vehicles would be used.

For the next spray campaign, VectorLink will modify the procurement process. Transportation services bids will be opened at the district level and SDSMAS, district administrators, and PDH representatives will be invited to observe. Vendors also will be encouraged to attend the bids opening process. The selection criteria will be clearly communicated to all parties. This recommendation is intended to ensure transparency and reduce misinformation, suspicion, and miscommunication.

II.2 SEASONAL WORKER RECRUITMENT

VectorLink Mozambique should continue to lead recruitment and contracting of OSSs, BSs, M&E support functions, storekeepers, logistics assistants, and IEC assistants. In addition, the project should discuss the recruitment of SOPs and community mobilizers with SDSMAS and community leaders with a focus on the transgressions of some SOPs, especially stealing and misuse of insecticides, and improper mobilization activities by some community-based mobilizers. The list of all those involved in improper behavior should be shared with the SDSMASs to prevent reconsidering them for employment in future spray campaigns. Additionally, the disciplinary actions taken against any misbehavior by all cadre of seasonal staff should be clearly stipulated.

II.3 TRAININGS: TOT AND TLS

VectorLink will continue to have two sessions of the ToT to adequately serve the numbers of the participants involved.

In addition, since MSPs are becoming an important part of the Mozambique spray campaign, VectorLink will review training content and allocate more time to their use. This may include increasing the number of days for ToT from five to six days. This is particularly important, considering the volume of information that is shared at the ToT, currently five days. Extending the number of days will be used to emphasize supervision in the field, camping (when, how, and where), use of PMT data to make decisions, and understanding and effectively managing spray calendars.

Also, VectorLink will review the content of TL training and allocate more time to the practice of the DOS form and SOP distribution and management in the field.

II.4 OPERATIONS SITE REHABILITATION AND RELOCATION

Under section 6.7, VectorLink has identified operation sites that require relocation and soak pits that require rehabilitation. Recently, Molumbo SDSMAS has identified Molumbo Sede operations site for possible relocation.

It is recommended that the project uses the post-spray period to begin the process of relocating identified sites in time to ensure that these site will be ready for future spray campaigns.

11.5 IEC ACTIVITIES

In 2019, proposed changes in IEC activities include:

- i) In recruitment of community mobilizers, the initial identification is normally done by SDSMAS. In future, VectorLink plans to work with all district SDSMAS, particularly with the Derre SDSMAS, from the outset to ensure that recruitment is fair and transparent. This should include considering the opinion of community leaders. In some communities, community leaders were not involved in the selection and assigning of community mobilizers. This led to misunderstanding between some community leaders, the district administrator, and the SDSMAS, and it affected spray coverage in some communities.
- ii) VectorLink will replace some IEC assistants. In 2018, during the recruitment of IEC assistants, priority was given to IEC assistants who worked in 2017 due to their experience. But the performance of some of them, especially their lack of ability to coordinate activities of mobilizers and movement of spray teams, requires they be replaced in future spray campaigns. The VectorLink IEC coordinator and district coordinators and SDSMAS IEC supervisor will do a performance review of all IEC assistants and identify those who will not be rehired.
- iii) VectorLink will improve mobilizer training by adding a practical session, similar to the “live-fire” session for SOP training.
- iv) After a community is sprayed, community mobilizers must make a list of the structures that are not sprayed and give it to the IEC assistants. This list will guide spray teams to do targeted re-visits where re-visits or mop-ups are needed.
- v) The six days of D2D mobilization are not enough for the number of mobilizers in some communities. The suggestion is for the SDSMAS IEC supervisor, and the VectorLink IEC coordinator and district coordinators to review the number of structures in each community and increase the number of mobilizers for communities that have relatively high number of structures to be mobilized.
- vi) VectorLink should continue improving the involvement of community leaders before and during the spray campaigns.
- vii) VectorLink should engage the district-level governmental institutions to improve communication with government employees, mobilizing them to accept the spray and be an example to community members, especially in Derre district.
- viii) VectorLink will review the budget in consultation with PMI and allocate more resources for IEC activities according to experiences and lessons learned from the 2018 spray campaign.
- ix) In 2018, the PDH introduced new engagement meetings at the district level. The goal of these meetings was to improve community leadership in mobilizing communities for IRS acceptance. However, these meetings were not initially planned and budgeted in VectorLink Mozambique approved work plan. VectorLink will discuss with PDH about these engagement meetings for inclusion next work plan and budget or for the subject matter to be discussed in already established meetings.

ANNEX A: DATA COLLECTION AND QUALITY ASSURANCE TOOLS

Tool	Purpose	Users	Frequency Used
Mobilizer Form	Capture structures found and mobilized for spraying; population reached, acceptance of IRS	Primary: Mobilizer Secondary: IEC assistant	Daily, during door-to-door mobilization, prior to spraying.
Mobilization Supervision Form	Summarize daily performance of mobilizers, including structures found and mobilized for spraying; population reached, acceptance of IRS	Primary: IEC assistants Secondary: SDSMAS IEC supervisor, VectorLink district coordinators	Daily, during door-to-door mobilization.
Daily SOP Form	Capture structures found, structures sprayed, structures not sprayed, population protected, population not protected	Primary: SOPs Secondary: TLs	Daily
Daily Team Leader Form	Summarize daily performance of spray team, including structures found, structures sprayed, structures not sprayed, population protected, population not protected, and bottles of insecticide received, used and returned, empty and/or full	Primary: TLs Secondary: BSs	Daily
Error Eliminator	Verify completeness and accuracy of data collected by SOPs; highlight common data collection errors so they can be quickly identified and corrected; elucidate issues requiring retraining	Primary: TLs, BSs Secondary: Site supervisors, district coordinators, operations manager, database manager, M&E manager	Daily
DCV	Check data accuracy during randomized household visits; ensure data collected by SOPs matches information reported by households	Primary: M&E assistants, database coordinator, database manager, M&E manager	Every 2 to 3 days during the spray campaign

ANNEX B: SPRAY CAMPAIGN SUPERVISORY TOOLS

Tool	Purpose and Person Responsible
Spray Operator Morning Mobilization and Vehicle Inspections	<p><i>Purpose:</i> To ensure spray teams leave for the day with the correctly accounted for PPE, equipment, insecticide, and supplies, and are safely transported to the spray site.</p> <p><i>Persons responsible for completing this checklist:</i> OSS, field supervisor, ECO, and district coordinator</p>
End-of-Day Clean-up	<p><i>Purpose:</i> To ensure spray teams correctly follow environmental compliance procedures for cleaning pumps and PPE, account for insecticide stocks, and store equipment for the next day.</p> <p><i>Persons responsible for completing this checklist:</i> OSS, ECO, visiting HQ staff, and district coordinator (when visiting an operations site)</p>
Home Owner Preparations and Spray Operator Performance	<p><i>Purpose:</i> To ensure that SOPs spray houses (structures) that have been correctly prepared for spraying (inside and out) and use correct spray and insecticide handling techniques. In addition, to ensure that IEC messaging has been performed and understood by the homeowner.</p> <p><i>Persons responsible for completing this checklist:</i> Field supervisors, IEC/ coordinator, ECO, operations manager, and district coordinator (when visiting the field for supervision)</p>
Storekeeper Performance	<p><i>Purpose:</i> To ensure that site storekeepers are following best warehousing practices and accounting for stocks and equipment.</p> <p><i>Persons responsible for completing this checklist:</i> OSS, district coordinator, logistics assistant, logistics manager, operations manager, COP, and visiting HQ staff</p>
Directly Observed Spraying	<p><i>Purpose:</i> To ensure proper application of insecticides by correctly applying the spray techniques.</p> <p>Person responsible for completing this checklist: TLs.</p>

ANNEX C: POST-SPRAY CAMPAIGN INVENTORY

Inventory item	Initial Stock	Procured in 2018	Total Stock	Used	Damaged/Unusable	Stock Balance (Usable)
Insecticide (Actellic® 300CS) bottles	59,948	53,196	113,144	112,411	0	0
Insecticide (SumiShield 50WG) Sachets	0	75,250	75,250	72,469	0	0
Permanent Markers	3,180	2,000	5,180	2,144	0	3,036
Adhesive tape	21	132	153	143	0	10
Calculators	45	11	56	0	51	5
Clipboards	273	1,632	1,905	737	0	1,168
First aid kit boxes	157	0	157	157	18	139
Pregnancy tests (Kits)	519	1,023	1,542	1,386	0	156
Blood sugar measuring machine (glycaemia machine)	5	17	22	22	0	22
Blood sugar measuring strips	750	1,000	1,750	1,750	0	0
Blood pricking lancets for blood sugar test	1,024	800	1,824	1,824	0	0
Powder detergent soap (150g, 250g)	2,880	5,370	8,250	7,564	0	686
Liquid Soap (0.5L bottle)	0	79	79	39	0	40
Bar soap	20,607	3,175	23,782	6,781	0	17,001
Megaphones (using battery size D)	86	0	86	86	0	86
Megaphones (using battery size C)	6	0	6	6	0	6
Batteries for megaphones (size C)	2,006	0	2,006	0	0	2,006
Batteries for megaphones and flashlights (size D)	2,046	40,244	42,290	25,586	0	16,704
Wall thermometer	20	6	26	26	1	25
Flashlights	258	2,567	2,825	2,543	2,553	272
Metal strainers (Large)	332	1,000	1,332	1,332	604	728
Small towels for pump cleaning	1,830	0	1,830	1,630	0	200

Inventory item	Initial Stock	Procured in 2018	Total Stock	Used	Damaged/ Unusable	Stock Balance (Usable)
Gum boots (pairs)	1,759	15	1,774	1,774	572	1,202
SOP uniform 2-piece (brown and blue)	1,820	0	1,820	1,820	1,820	0
SOP uniform 2-piece (shirts only, brown color)	70	0	70	0	70	0
SOP uniform 1 piece	878	2,626	3,504	3,504	24	3,480
Head/Shoulder protector- Blue	894	0	894	894	56	838
Head/Shoulder protector- Brown	438	1,331	1,769	1,429	582	1,187
Socks for spray operators	2,013	1,162	3,175	3,175	3,175	0
Team leader lime green vests	394	108	502	500	193	309
Base supervisor red/deep orange vests	121	0	121	98	25	96
Nose and mouth masks	21,600	47,400	69,000	55,560	55,560	13,440
Rubber gloves (SOP Nitrile)	883	3,528	4,411	2,919	2,919	1,492
Rubber gloves (long) for washers	343	0	343	135	135	208
SOP bags simple (beige color)	486	0	486	0	1	485
SOP carrier bag (school backpack)	100	1,517	1,617	1,550	1,356	261
Helmet bracket (Metal)	1,005	0	1,005	0	0	1,005
Helmet bracket (Plastic)	997	700	1,697	1,680	38	1,659
Face shields	525	2,750	3,275	1,965	1,965	1,310
Helmets (Hard hat)	1,736	1,152	2,888	1,905	1,909	979
Washer aprons	260	0	260	160	160	100
T-shirts - Mobilizer	682	2,261	2,943	2,490	0	453
Mobilizer hat	691	2,261	2,952	2,464	0	488
Grass/ Weed cutter (handheld)	34	0	34	13	0	21
Machetes	40	34	74	31	31	43
Rakes	30	34	64	29	29	35
Hoes	32	0	32	29	29	3
Shovel	64	0	64	24	24	40
Rope (100m)	0	23	23	23	23	0

Inventory item	Initial Stock	Procured in 2018	Total Stock	Used	Damaged/ Unusable	Stock Balance (Usable)
Pipe wrenches/ plastic gardening hose	1	0	1	0	0	1
Screwdriver (Flat)	33	48	81	16	16	65
Screwdriver (star)	47	54	101	12	12	89
Hammers	19	0	19	13	13	6
Pliers	20	0	20	3	3	17
Pincers (size 10/11)	25	0	25	0	0	25
10L Hudson spray pumps (in good condition)	1,293	0	1,293	271	271	1,022
iK Super spray pumps (Plastics)-Goizper pump	10	448	458	458	0	458
8L Hudson spray pumps - tank only no parts	627	0	627	627	0	627
Repair kits (Hudson pump)	28	0	28	10	10	18
Tool boxes (simple for sprayers)	10	0	10	1	1	9
Lubricating oil (1L bottles)	0	60	60	42	42	18
Hudson spray pump pressure gauge	100	0	100	0	0	100
Spray pump strainer (Hudson)	1,200	0	1,200	932	0	1,200
Plastic nozzle washers	456	0	456	0	0	456
Clamp	3	0	3	0	0	3
8002E SPRAY PUMP NOZZLE tip (metallic)	2,412	0	2,412	2,052	0	2,412
8001 spray pump nozzle (metallic)	500	0	500	0	0	500
8002E spray pump plastic nozzle (enamel)	1,445	0	1,445	0	0	1,445
Control flow valve (Hudson pump)	2,883	0	2,883	2,106	2,106	777
Trigger for IK pumps	0	38	38	0	0	38
Lance for IK pumps	0	40	40	0	0	40
Hoses for IK pumps	0	20	20	0	0	20
Repair kit (Goizper pump)	0	70	70	0	0	70
Complete plunger for IK pumps (Goizper)	0	20	20	0	0	20
Nozzle tip for IK pumps	0	860	860	0	0	860
Toothbrushes	661	1,904	2,565	2,354	2,354	211

Inventory item	Initial Stock	Procured in 2018	Total Stock	Used	Damaged/ Unusable	Stock Balance (Usable)
Metal buckets 15 L	102	0	102	38	10	92
Plastic buckets 80 L	362	54	416	388	98	318
Plastic buckets 50 L	97	25	122	75	0	122
Plastic basins 20L	37	88	125	49	0	125
Plastic basins 50L	193	0	193	0	10	183
Plastic basins 80 L / 100 L	131	0	131	113	0	113
Plastic buckets 20 L	95	0	95	54	0	95
Gallon 20L	0	276	276	253	0	276
Staplers	27	28	55	18	18	37
Pencil sharpener	392	0	392	0	0	392
Paper puncher	0	38	38	0	0	38
School chalk (pieces)	10,000	32,800	42,800	38,700	0	4,100
Biro pens	2,250	8,160	10,410	9,210	0	1,200
Sleeping bags	96	0	96	4	0	92
Cushions	21	0	21	0	0	21
Wheel barrow	35	7	42	34	0	42
Box files	110	659	769	505	0	264
Waste bins	60	76	136	57	0	136
Waste bin bags	4	1,000	1,004	545	545	459
Tarpaulin	0	76	76	76	76	0
Plastic rolls	0	204	204	154	154	50
Stock control forms (A4)	2,264	4,226	6,490	3,674	3,674	2,816
Notebooks	0	4,020	4,020	4,020	0	0
Plastic paper files/folders	450	6,167	6,617	5,487	0	1,130
Flipcharts	30	36	66	20	0	46
Generator	7	0	7	4	0	3
Fire extinguishers (1kg)	2	0	2	0	0	2

Inventory item	Initial Stock	Procured in 2018	Total Stock	Used	Damaged/ Unusable	Stock Balance (Usable)
Fire extinguishers (2kg)	20	0	20	5	0	20
Fire extinguishers (2.5kg)	13	0	13	0	0	13
Fire extinguishers (4kg)	1	0	1	0	0	1
Fire extinguishers (4.5kg)	10	0	10	0	0	10
Fire extinguishers (6kg)	11	0	11	0	0	11
Fire extinguishers (10kg)	10	0	10	0	0	10
Ironing blankets	7	0	7	0	0	7
Large towels	9	0	9	0	0	9
Activated charcoal (bags)	132	0	132	25	0	107
Guides for storekeepers	196	0	196	46	0	150
Guides for team leader	37	0	37	0	0	37
Spray operator pocket manual	1,100	0	1,100	738	0	362
Request book	45	44	89	41	41	48
Delivery note	78	100	178	86	0	92
Goods received note (GRN)	0	75	75	15	0	60
Log book	0	87	87	82	0	5
Ledger book (A3)	0	110	110	40	0	70
Danger warning signs	51	89	140	49	0	91
No eating warning signs	64	96	160	54	0	106
No smoking warning signs	69	88	157	36	0	121
Other danger warning signs	65	0	65	14	0	51
Spill response procedures	180	260	440	326	0	114
Wooden chairs	2	0	2	2	0	0
Wooden tables	1	0	1	1	1	0
Plastic tanks (1500 L)	13	13	26	21	0	26
Plastic tanks (50L)	2	0	2	2	0	2
Plastic tank (200L)	2	0	2	2	0	2

ANNEX D: 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 pesticide or spray team transport.	VectorLink ECO and logistics coordinator inspected 65 trucks for SOP transportation and 6 trucks for insecticide transport.	<p>Based on the 2017 recommendation to improve seasonal workers safety during transportation, VectorLink scheduled two inspections for seasonal workers trucks.</p> <p>The first inspection was to evaluate the physical state of trucks, such as mechanic conditions and documentations. It also recommended improvements the trucks needed for the second inspection, including the installation of seat belts. The second and final inspection was to ensure that all recommendations had been followed and that trucks were ready for spray. All trucks that complied with all recommendations were certified before the start of the spray campaign.</p>	
1b. Driver training	87 drivers trained; 2 female and 85 males were trained on safety issues while transporting seasonal personnel, and insecticide.		
1c. Cell phone, personal PPE, and spill kits on board during pesticide transportation.	All drivers were given PPE (boots, gloves, coveralls, and mask) to manage insecticide in case of an emergency or spill. During supervision, 168 cases of compliance and 5 of non-compliant were observed.		

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
1d. Initial and 30-day pregnancy testing for female candidates for jobs with potential pesticide contact.	<p>The first round of pregnancy test was prior to training in all six districts in the last week of September. The second round was on November 10.</p> <p>All female seasonal staff found to be pregnant were assigned to roles that did not include working with insecticides (e.g., fetching water for the operations site).</p>	No issues were identified during the inspections.	
1e. Health fitness testing for all operators	Seasonal staff in all six districts went through medical checks for fitness. Those who passed went through training before final recruitment.	No issues were identified during the inspections.	
1f. Procurement of, distribution to, and training on the use of PPE for all workers with potential pesticide contact.	<p>All districts received enough PPE to ensure that all workers had at least two pairs of PPEs each. Dress rehearsal was conducted during training for seasonal workers to try their PPE to ensure proper fitting.</p> <p>68 cases of non-compliance were found in 2,757 inspections</p>	Non-compliance was related to non-working flashlights.	
1g. Training on mixing pesticides and the proper use and maintenance of spray pumps.	<p>SOPs were trained on mixing insecticides before spraying. Proper handling of spray equipment was part of both the ToT and the SOP and TL training to ensure that all seasonal staff were familiar with the spray equipment and how to maintain it.</p> <p>During the spray campaign, 2,483 inspections resulted in 13 red flags in relation to insecticide mixing.</p>	There were several red flags relating to leaking pumps. Investigation found the problem was that some SOPs did not always close the spray pump correctly prior to pressurization. This issue was addressed during morning assemblies. It will also be a point to emphasize during future trainings.	
1h. Provision of adequate facilities and supplies for end-of-day clean-up.	All operations sites, including sites using MSPs, had adequate facilities and supplies for for end-of-day clean-up. Water, wash soap, and other supplies were provided to facilitate end-of-day clean-up for both men and women. There were 26 inspections; all were in compliance.	No outstanding issue.	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
1i. Enforce spray and clean-up procedures.	<p>All operation sites had all the needed conditions (water, 7 barrels, etc.) for successful triple rinsing. The end-of-day clean-up was supervised by a combination of OSS, BS, and TL. Also, in sites with MSPs, the needed processes were in place to ensure safe clean-up.</p> <p>End-of-day clean-up inspections found 1 case of non-compliance and 339 of compliance.</p>	No outstanding issue.	
2a. IEC campaigns to inform homeowners of responsibilities and precautions.	<p>IEC assistants and community mobilizers informed homeowners about their roles, responsibilities, and precautions through house-to-house mobilization. Community meetings, radio discussions, and jingles highlighted these roles, responsibilities, and precautions before, during, and after their homes were sprayed. SOPs were trained to inform households about what they should do before, during, and after their homes are sprayed.</p> <p>There were 30 red flags out of 6,903 inspections. Red flags reflect homeowner not having been informed by SOP about their roles and responsibility after spraying is done.</p>	No outstanding issue.	ECO issued daily reminders to the VectorLink team to investigate all red flags found during supervision and/or inspection; issues were addressed during morning mobilizations and re-emphasized as part of supervision.
2b. Prohibition of spraying houses that are not properly prepared.	Households were prepared before spray activities. There were some notifications from CommCare that some SOPs sprayed houses without removing /covering food and water. 11 red flags were identified out of 2,812 inspections.	No outstanding issue.	<p>Some supervisors made mistakes in using the smartphones checklists. Some were not reading the questions well before answering. This meant that some red flags were incorrect.</p> <p>Morning mobilization meetings were used to address these issues.</p>

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
2c. Two-hour exclusion from house after spraying	All householders were instructed to stay out of the house for two hours after the house was sprayed. All householders were instructed to open and air their houses for 30 minutes before entering. Inspections resulted in 2,308 cases of compliance and 3 of non-compliance, all 3 from homeowners claiming that SOPs had not informed them on what to do. In these cases, supervisors explained to the homeowners what they should do after spraying, and the supervisors reminded SOPs to always inform households about their responsibilities after spraying. SOPs were encouraged to use the local language as much as possible to ensure that households understood the post-spray instructions.	No outstanding issue.	The 3 red flags were immediately corrected in the field and information given to the homeowner
2d. Instruct homeowners to wash itchy skin and go to health clinic if symptoms do not subside.	All homeowners were instructed to wash itchy skin with soap and water, and go the nearest health facility in case of contact with insecticide. 36 red flags were found out of 2,275 inspections. These happened when homeowners had not been instructed to wash itchy skin with soap and water, and/or go to the nearest health facility in case of contact with insecticide.	No outstanding issue.	Some SOPs were not providing accurate information to homeowners regarding itchy skin after coming in contact with insecticides. Supervisors conducting supervision visits assisted to provide accurate information to homeowners. Morning mobilization was used to emphasize and remind spray teams about the importance of providing safety information to homeowners. Also, TLs and BSs were instructed to support SOPs in the field.
3a. Indoor spraying only	Spraying was conducted on the inside surfaces of sleeping structures and under eaves where applicable. 14 red flags were recorded out of the 22,821 inspections, where SOPs were observed spraying on inappropriate surfaces.	No outstanding issues.	The 14 cases where SOPs were observed spraying inappropriate surfaces were corrected in the field. Morning mobilization was used to address the issue of appropriate surfaces to spray.

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
3b. Training on proper spray technique	Spray techniques were included in SOP and all supervisors training; however, some SOPs were not following accurate spray techniques, resulting in 50 red flags from 2,775 inspections regarding spraying speed and wall coverage.	No outstanding issues.	Some SOPs were either too fast or slow compared to the standard speed of 5 seconds for a 2-meter wall. These SOPs received on-the-spot feedback and refresher on the spray techniques.
3c. Maintenance of pumps	Pump repairs and calibration was done before spray campaign, and during the operations. Spray pump technicians handled all issues at the field level. Out of 2,481 inspections, 15 red flags regarding pumps leaking were identified.	During repair of spray pumps for the next spray campaign, special attention should be given to nozzle tips. The project should buy new nozzle tips to replace old ones.	
4a. Choose sites for disposal of liquid wastes, including MSP sites, according to PMI BMPs.	All contaminated liquid wastes were disposed of in the fixed and mobile soak pits. 28 inspections found no cases of non-compliance regarding the disposal of liquid waste.	No outstanding issues.	
4b. Construct fixed and mobile soak pits with charcoal to adsorb pesticide from rinse water	VectorLink ECO constructed 65 MPS and supervised building of 1 fixed soak pit and rehabilitation of 8 fixed soak pits in coordination with district environmental officials.	No outstanding issues.	
4c. Maintain soak pits as necessary during season	Soak pits were rehabilitated before the spray campaign started. They were covered with metal plates to prevent debris from entering them. Two soak pits (Mopeia sede and Derre sede) were re-itemized during the spray campaign when it was observed that they were not draining properly.	No outstanding issues.	
4d. Inspection and certification of solid waste disposal sites before spray campaign	Inspection and certification conducted by VectorLink ECO and MITADER.	No issues identified.	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
4e. Monitoring waste storage and management during campaign	<p>All wastes from the operations site stores were properly stored in district stores prior to transporting them to the provincial level and then central warehouse for final disposal after the spray campaign.</p> <p>98 inspections reported 1 red flag where contaminated and uncontaminated wastes were stored in the same place.</p>	No outstanding issues.	
4f. Monitoring disposal procedures post campaign	The VectorLink ECO in conjunction with government staff will supervise all IRS waste to disposal by January 2019.	This activity is ongoing. Incineration of some items has started.	
5a. Maintain records of all pesticide receipts, issuance, and return of empty bottles	<p>Proper stock records were maintained and checked.</p> <p>There were 99 inspections and 0 red flags.</p>	No outstanding issues.	
5b. Reconciliation of number of houses sprayed vs. number of bottles used	387,413 structures were sprayed; 184,827 bottles and sachets were used.	No outstanding issues.	
5c. Visual examination of houses sprayed to confirm pesticide application	Supervisors examined houses sprayed to ensure SOPs sprayed according to the established spray techniques.	No outstanding issues.	TLs were re-trained to identify different types of issues that would affect pesticide application and to report them correctly.

ANNEX E: SOLID WASTE MANAGEMENT PLAN

Category	Quantity	Procedure	Completion Date
Actellic CS bottles	112,367 ¹⁰ Actellic empty bottles	Empty bottles were triple rinsed at the time of insecticide mixing. Empty bottles were kept at the operations site stores in their original boxes. They were picked up weekly and transported to the district-level stores for consolidation. Records were done at both the site and district stores. The bottles were transported to the central warehouse for final counting and prepared for recycling. To ensure that the bottles contain no insecticide residue, they will go through a final wash with liquid soap, and their labels will be removed. The bottles will then be transported to Incala (in Quelimane) or Topack (in Maputo) where they will be shredded in readiness for recycling. Bottles are recycled into items such as chairs, cloth hangers, plastics pallets, car number plates, and IRS usable products based on requests from the project.	April 2019
Cardboard boxes Atellic	3,627 empty boxes	Empty contaminated insecticide cardboard boxes of Actellic will be incinerated at Ceramica Okanga located in Nicoadala District.	December 17, 2018
Empty SumiShield sachets	72,463 empty sachets	All empty SumiShield sachets were initially stored at the operations site, then transported to the district store and finally to the central warehouse. They will be incinerated at Ceramica Okanga in Nicoadala.	December 17, 2018
Cardboard boxes SumiShield	1,207 empty boxes	All empty cardboard boxes will be incinerated in Ceramica Okanga, Nicoadala.	December 17, 2018
SumiShield spill	2 sachets	Insecticide theft by an SOP was recovered and disposed off in the soak pit at the central warehouse in Quelimane District.	December 14, 2018 Completed
Rubber gloves	2,919 pieces	All damaged gloves were thoroughly washed with water and soap, and sent to a local landfill at Ceramic Okanga, in Quelimane.	December 17, 2018

¹⁰ This includes the 112,364 bottles used by the 6 districts and 3 bottles from the 45 bottles that were used by PDH. Of the 45 bottles used by PDH, 42 were added to the empty bottles from 2017 and recycled. The 42 bottles were used by the PDS at the same time the 2017 bottles were being prepared for recycling.

Category	Quantity	Procedure	Completion Date
Gum boots	572 pieces	Damaged but usable boots are thoroughly washed with water and soap and will be donated to SOPs with the appropriate warning that the boots cannot be used in chemical environments. VectorLink Mozambique is still exploring recycling options for all unusable boots. Should recycling not be an option, these boots will be sent to the landfill at Ceramic Okanga.	February 20, 2019
Dust masks	55,560 pieces	Dust masks are used once only in accordance with established standards for IRS. Used masks are kept in containers in the insecticide storage room at the operations sites, transported to the district level where they are consolidated and transported to the central warehouse for final counting, and subsequently incinerated.	December 17, 2018
2-piece uniform, neck protector, SOP bags	1,890 coveralls 582 neck protector 1,356 SOP bags	Damaged and unusable overalls, neck protectors, and SOP bags were washed and will be incinerated.	January 2019
Charcoal and sawdust	300kg	Based on pre-spray assessment of all operations sites in the 6 districts, degraded charcoal and sawdust was replaced with new charcoal and sawdust in soak pits in Derre, Dulanha, Mopeia sede, Chimuara, Maganja sede, and Milange sede. The degraded charcoal and sawdust was stored in large, heavy-duty plastic bags in the operations sites and designated as solid waste. Later, the waste was transported to the central warehouse, and sent for incineration.	December 17, 2018
Insecticide (Actellic) Contaminated soil	50kg	SOPs dumped Actellic insecticide on the ground in Derre and Maganja districts. The contaminated soil was collected and transported to the central warehouse for incineration.	December 17, 2018
Insecticide (Actellic) poured into domestic bottles	20.5 bottles	Per incident reports, Actellic (equivalent to 20.5 bottles) was poured into domestic containers. The containers were recovered by field supervision teams and transported to the central warehouse. These insecticides will be disposed of at the soak pit in Quelimane.	January 2019
Damaged and unusable visors and toothbrushes	1,965 pieces	These will be washed, cut into pieces, and then disposed of in the landfill at Ceramic Okang, Quelimane.	January 2019
Activated charcoal	25kg	25 kg of activated charcoal removed from MPSs used in 2017 will be incinerated at Ceramca Okanga, Quelimane.	December 17, 2018

ANNEX F: MONITORING AND EVALUATION INDICATOR MATRIX

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹¹		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	<i>Successfully execute IRS and other malaria vector control programs</i>												
1.1.1	Annual country work plan developed and submitted on-time	Project records Annually	By Spray Campaign	Completed	Completed								
1.1.2	Number of eligible structures targeted for spraying	Project records Annually	By Spray Campaign	388,623	409,908								
1.1.3	Number of eligible structures sprayed with IRS	Project records Annually	By Spray Campaign	330,330	387,413								
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%								
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)								
1.1.6	EOSR submitted within 45 days after the end of spray (including completing MEP and EMMR)	Project Annually	By Spray Campaign	Completed	Completed								

¹¹The only VC intervention in Year 1 is IRS.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹¹		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
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								
1.1.8	Number of Insecticide Treated Nets (ITNs) distributed, by channel	Project Records Annually	Channel	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								
1.1.10	Operational routine monitoring systems for continuous ITN distribution established and disaggregated by channel	Project Records Annually	Channel	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								
1.2	<i>Provide technical assistance and planning support for IRS and other integrated malaria vector control activities</i>												
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								
1.2.2	Number of NMCP and other vector control host country staff accessing DHIS2	DHIS2 Logs Annually	Job Function	0	0								

¹² This refers to TOT in Zambezia and Nampula.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹¹		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.3	<i>Ensure safe and judicious use of insecticides and other malaria vector control products</i>												
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 & TLs: 1,478; BS: 79; OSS: 20)								
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%])								
1.3.3	Number of adverse reactions to pesticide exposure documented	Incident Report Forms Annually	Type of Exposure	0	0								
1.4	<i>Strengthen capacity of NMCPs, vector control personnel, and other institutions to implement and manage IRS and other vector control activities</i>												
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								

¹³ SOP training and ToT

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹¹		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
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%])								
1.4.3	Total number of people hired to support VC in target districts	Project Records Annually	Sex (# and %) Job Function VC Intervention Type	3744	3,888 ¹⁴ (Males: 3,076 [79.1%]; Females: 812 [20.9%]) VC Intervention Type: IRS *See foot note job function								
1.4.4	Number of government/district officials who acted as supervisors during VC campaigns	Project Records Annually	VC Intervention Type	50 ¹⁵	34 VC Intervention Type: IRS								
1.5	<i>Promote gender equality in all facets of planning and implementation</i>												
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								

¹⁴ Job Function for indicator 1.4.3 - SOPs:1120; TLs: 224; BS:78; OSS: 20; community mobilizers: 2208; pump technician: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: 1.

¹⁵ Medical chiefs, malaria focal points, IRS supervisors, IEC supervisors, MASA representative, MITADER representatives

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹¹		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
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 ¹⁶	93 VC Intervention Type: IRS Job Function: refer to foot note ¹⁷								
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 ¹⁸ (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								
1.5.4	Number and percentage of women in senior leadership roles in VectorLink country offices	Project Records Annually	Sex (# and %)	N/A	N/A								
1.6	<i>Implement and support social behavioral change communication and mobilization activities</i>												
1.6.1	Number of radio spots and talk shows hired	Project Records Annually	VC Intervention Type	4,500	908 VC Intervention Type: IRS								

¹⁶ Supervisory roles include: database coordinators, M&E assistants, logistics assistants, IEC assistants, site supervisors, brigade supervisors, team leaders.

¹⁷ 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, team leaders: 64.

¹⁸ 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 ¹¹		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.6.2	Number of print materials disseminated	Project Records Annually	VC Intervention Type	5,500	10,731 ¹⁹ VC Intervention Type: IRS								
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								
1.6.4	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								
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								
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								
1.7	<i>Environmental compliance</i>												
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								

¹⁹ T-shirts: 4,270, caps: 4,188, job aid for mobilizers: 2,208, poster for vehicles: 65

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹¹		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
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%)								
1.7.3	Number and percentage of storehouses inspected and approved prior to IRS campaigns	Project Records Annually	Storehouse Type	27 ²⁰ ; 100%	28; 100% Insecticides Store ²¹ : 8 (28.6%) Material store ²² : 20 (71.4%)								
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%								
2. Entomological and Epidemiological Data to Drive Decision-Making													
2.1	<i>Vector control activities monitored via entomological and epidemiological data</i>												
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 ²³ ; 100%	7; (100%) VC Intervention Type: IRS								

²⁰ 1 central; 21 district

²¹ These are stores that are exclusively used for insecticides.

²² There are stores that are used for both insecticides and materials.

²³ The number of sentinel sites planned for this year to monitor the mentioned indicators are 6 in Zambezia and 3 in Nampula, decreased from 12 and 9, and this number probably will be reduced further if we eliminate Morrumbala and Mocuba from the entomology activity.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹¹		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
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	7 ²⁴ ; 78%	7 (100%) VC Intervention Type: IRS								
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%	TBD VC Intervention Type: IRS								
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	7 ²⁵ ; 100%	TBD								
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								
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%)								

²⁴ We reduced the number because we don't conduct quality assurance and decay rate.

²⁵ 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.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹¹		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 ²⁶	50 (ongoing)								
2.1.8	Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites	Entomological Reports Annually	Insecticide Type	70	TBD								
2.1.9	Integrated vector control analytics dashboard available for decision making	Project Records Annually	By Spray Campaign	N/A	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								
2.2	<i>NMCPs develop country-level IRS and other malaria vector control strategies</i>												
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								
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								
2.2.3	Implemented sub-national insecticide rotation as part of an IRM strategy	Project Records Annually	By Spray Campaign	Completed	Completed								
2.3	<i>Build capacity of NMCPs and local institutions to collect, analyze, and use data for strategic malaria control decision-making</i>												
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								

²⁶ Entomology section will reduce the number of districts to conduct quality assurance and decay rate. Molumbo and Derre do not have appropriate conditions to take mosquitoes to those districts; consequently, the quality assurance tests will be conducted in 3 districts in Zambezia and 2 districts in Nampula, one site per district. We estimate 25 tests in Zambezia (15 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 35 houses for 8 months.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹¹		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
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								
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 ²⁷ ; 100%	2; 100% Actellic® 300CS : 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 ²⁸ ; 100%	2; 100% Actellic® 300CS : 1 shipment SumiShield 50WG: 1 shipment								
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 ²⁹ ; 100% VC Intervention Type: IRS								
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%	3 ³⁰ ; 100%								
3.1.5	PPE procured according to workforce composition	Procurement Records Annually		N/A	N/A								

²⁷ 1 Actellic; 1 SumiShield

²⁸ 1 Actellic; 1 SumiShield

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

³⁰ 1 for coveralls, 1 for boots, 1 for neck covers

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1 ¹¹		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
3.2	<i>Robust inventory management and logistics systems established</i>												
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%])								
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	21 ³¹ ; 100%	21; 100%								
3.2.3	Successfully completed spray operations without an insecticide stock-out	Inventory and Stock Records Annually	Insecticide Type	Completed	Completed								
4. Innovation													
4.1	<i>Conduct operational research or monitoring to scale up new tools, methods, and approaches</i>												
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								
4.2	<i>Create and share knowledge through dissemination of best practices and lessons learned</i>												
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								
4.2.2	Number of individual members who use the Vector Learning Exchange	Project Records Annually		8 ³²	0								
4.2.3	Number of symposia and/or presentations submitted to and accepted at global conferences	Project Records Annually	Technical Area	0	0								

³¹ 1 central warehouse (SumiShield and Actellic); 20 district warehouses: 9 for SumiShield, 11 for Actellic

³² COP, operations manager, M&E, 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 ¹¹		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
4.2.4	Number of success stories written or videos produced and shared on the VectorLink project website	Project Records Annually		1	0								
4.2.5	Number of peer-reviewed journal articles submitted and accepted	Project Records Annually	Technical Area	0	0								
4.2.6	Number of critical guidance, standards, or plans that incorporate disseminated findings/best practices	Project Records Annually	Technical Area	0	0								
4.3	<i>Develop and deploy cost-savings approaches</i>												
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									
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	1 ³³									
4.4	<i>Cultivate public-private partnerships</i>												
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								

³³ Project-wide cost assessment

ANNEX G: QUESTIONNAIRE FOR BARRIER ANALYSIS

Group: Doer Non-Doer

Barrier Analysis Questionnaire : IRS acceptance for use with heads of households

Behavior Statement

Heads of households in Derre, Mozambique accept IRS spray teams and allow their houses to be sprayed per spray protocol

Demographic Data

Interviewer's Name: _____ Questionnaire No.: _____ Date: ___/___/___

Community: _____

Scripted Introduction:

Hi, my name is _____; and I am part of a study team looking into malaria prevention. The study includes a discussion of this issue and will take about 20 minutes. I would like to hear your views on this topic. You are not obliged to participate in the study and no services will be withheld if you decide not to. Likewise, if you chose to be interviewed you will not receive any gifts, special services or remuneration. Everything we discuss will be held in strict confidence and will not be shared with anyone else. Would you like to participate in the study? [If not, thank them for their time.]

Section A - Doer/Non-doeer Screening Questions

1. Have you lived in this community for at least 1 year?
 1. Yes
 2. No
 3. Don't Know / Won't say → *End interview and look for another respondent*
2. Are you the head of your household (do you make decisions about what happens in your house?)
 1. Yes
 2. No
 3. Do not know / no response → *End interview and look for another respondent*
3. Was your household approached by an IRS team last year to participate in the spray campaign?
 1. Yes
 2. No
 3. Do not know / no response → *End interview and look for another respondent*
4. Did you accept IRS spraying in your house during last year's campaign?
 1. Yes
 2. No
 3. Do not know / no response → *End interview and look for another respondent*

In the table below identify the screening questions and how they need to be answered to be considered either a Doer, Non-doeer, or a person not to be interviewed

DOER /NON-DOER CLASSIFICATION TABLE

DOER (all of the following)	Non-Doer (any ONE of the following)	Do Not Interview (any ONE of the following)
Question 1 = yes	Question 1 = yes	Question 1 = no/don't know
Question 2 = yes	Question 2 = yes	Question 2 = no/don't know
Question 3 = yes	Question 3 = yes	Question 3 = no/don't know
Question 4 = yes	Question 4 = no	Question 4 = don't know

Group: Doer Non-doeer

Section B – Research Questions

Behavior Explanation (as needed)

In the following questions I am going to be talking about IRS acceptance. By this I mean that you allow the spray teams to spray your house and you comply with their instructions and protocol.

(Perceived Self-efficacy)

1. Doers and Non-doers: With your present knowledge, money, and skills do you think that you could accept IRS spraying of your house?

- a. Yes
- b. Possibly
- c. No
- d. Don't Know

(Perceived Self-efficacy)

2a. Doers: What makes it *easier* for you to accept IRS spraying of your house?

2b. Non-doers: What would make it *easier* for you to accept IRS spraying of your house?

(Write all responses below. Probe with "What else?")

(Perceived Self-efficacy)

3a. Doers: What makes it *difficult* for you to accept IRS spraying of your house?

3b. Non-doers: What would make it *difficult* for you to accept IRS spraying of your house?

(Write all responses below. Probe with "What else?")

(Perceived Positive Consequences)

4a. Doers: What are the *advantages* of accepting IRS spraying of your house?

4b. Non-doers: What would be the *advantages* of accepting IRS spraying of your house?

(Write all responses below. Probe with "What else?")

(Perceived Negative Consequences)

5a. Doers: What are the *disadvantages* of accepting IRS spraying of your house?

5b. Non-doers: What would be the *disadvantages* of accepting IRS spraying of your house?

(Write all responses below. Probe with "What else?")

(Perceived Social Norms)

- 6a. Doers:** Do most of the people that you know approve of you accepting IRS spraying of your house?
- 6b. Non-doers:** Would most of the people that you know approve of you accepting IRS spraying of your house?
- a. Yes
 - b. Possibly
 - c. No
 - d. Don't know / Won't say

(Perceived Social Norms)

- 7a. Doers:** Who are the people that **approve** of you accepting IRS spraying of your house?
- 7b. Non-doers:** Who are the people that **would approve** of you accepting IRS spraying of your house?
(Write all responses below. Probe with "Who else?")

(Perceived Social Norms)

- 8a. Doers:** Who are the people that **disapprove** of you accepting IRS spraying of your house?
- 8b. Non-doers:** Who are the people that **would disapprove** of you accepting IRS spraying of your house?
(Write all responses below. Probe with "Who else?")

(Perceived Access)

- 9a. Doers:** How difficult is it to get the materials and services needed to accept IRS spraying of your house? Would you say it's very difficult, somewhat difficult or not difficult at all?
- 9b. Non-doers:** How difficult would it be to get the materials and services needed to accept IRS spraying of your house? Would you say it's very difficult, somewhat difficult or not difficult at all?
- a. Very difficult
 - b. Somewhat difficult
 - c. Not difficult at all.

(Perceived Cues for Action / Reminders)

- 10a. Doers:** How difficult is it to remember to (or how to) accept IRS spraying of your house every time you need to do it? Very difficult, somewhat difficult, or not difficult at all?
- 10b. Non-doers:** How difficult do you think it would be to remember to (or how to) accept IRS spraying of your house every time you need to do it? Very difficult, somewhat difficult, or not difficult at all?
- a. Very difficult
 - b. Somewhat difficult
 - c. Not difficult at all.
 - d. Don't know / Won't say

(Perceived Susceptibility / Perceived Risk)

- 11. Doers and Non-doers:** How likely is it that you or someone in your family will get malaria in the next year? Would you say it's very likely, somewhat likely or not likely at all?
- a. Very likely
 - b. Somewhat likely
 - c. Not likely at all

(Perceived Severity)

- 12. Doers and Non-doers:** How serious would it be if you or someone in your family got malaria? Would you say it's very serious, somewhat serious, or not serious at all?
- a. Very serious
 - b. Somewhat serious
 - c. Not serious at all
 - d. Don't know / Won't say

(Action Efficacy)

- 13. Doers and Non-doers** How likely is it that you or someone in your family will get malaria if you did not accept IRS spraying of your house? Would you say it's very likely, somewhat likely or not likely at all?
- a. Very likely
 - b. Somewhat likely
 - c. Not likely at all

(Perception of Divine Will)³⁴

- 14a. Doers:** Do you think that **God (or the gods) approves** of your accepting IRS spraying of your house?
- 14b. Non-doers:** Do you think that **God (or the gods) would approve** of your accepting IRS spraying of your house?
- a. Yes
 - b. Maybe
 - c. No

(Policy)

- 15. Doers and Non-doers:** Are there any community laws or rules in place that make it less (**or more**) likely that you accept IRS spraying in your house?
- a. Yes
 - b. Maybe
 - c. No

(Culture)

- 16. Doers and Non-doers:** Are there any cultural rules or taboos against accepting IRS spraying in your house?
- a. Yes
 - b. Maybe
 - c. No

Now I am going to ask you a question totally unrelated to the topic we've been discussing.

(Question on Universal Motivators)

- 17. Doers and Non-doers:** What is the one thing you desire most in life?

THANK THE RESPONDENT FOR HIS OR HER TIME!

³⁴ and/or – Do you think it's God's Will that you (or your child or whoever the problem effects) gets [put the problem/illness here]?