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Indoor Residual Spraying (IRS 2) Task Order Six

MOZAMBIQUE
2015 END OF SPRAY REPORT

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AIRS MOZAMBIQUE 2015 END OF SPRAY REPORT

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ACRONYMS

ACTs	Artemisinin-based Combination Therapies
AIRS	Africa Indoor Residual Spraying
BMP	Best Management Practices
CTC	Client Technology Center
DCV	Data Collection Verification
DEC	Data Entry Clerk
ECO	Environmental Compliance Officer
HF_s	Health Facilities
HLC	Human Landing Catch
IEC	Information, Education and Communication
IRS	Indoor Residual Spraying
M&E	Monitoring and Evaluation
MINAGRI	Ministry of Agriculture and Risk
MITADER	Ministry of Land, Environment & Rural Development
MOH	Ministry of Health
NMCP	National Malaria Control Program
PDH	Provincial Directorate of Health
PMI	President's Malaria Initiative
PPE	Personal Protective Equipment
PSC	Pyrethrum Spray Collection
PSECA	Pre-Spray Environmental Compliance Assessment
RDT_s	Rapid Diagnostic Tests
SDSMAS	District Services for Health, Women and Social Welfare
SEA	Supplemental Environmental Assessment
SOP	Spray Operator
TL	Team Leader
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

Overall, the key objectives of the President's Malaria Initiative (PMI) Africa Indoor Residual Spraying (AIRS) Project in Mozambique are to reduce malaria-associated morbidity and mortality in select districts in Zambezia Province and to establish a model indoor residual spraying (IRS) program that will set national performance standards.

In Mozambique, Abt Associates implements the PMI AIRS Project in close collaboration with Mozambique's National Malaria Control Program (NMCP), the Provincial Directorate of Health (PDH) in Zambezia Province, the District Services for Health, Women and Social Welfare (SDSMAS) in the select districts, the Ministry of Agriculture and Risk (MINAGRI) and the Ministry of Land, Environment & Rural Development (MITADER).

On April 1, 2015, PMI AIRS Mozambique transitioned to Task Order 6, having concluded Task Order 4 program activities and contractual close-out requirements. AIRS Mozambique went through a Chief of Party (COP) transition whereby Lourdes Loch assumed leadership of the program on April 20, 2015. In May 2015, the Ministry of Health (MOH) and PMI selected organophosphates (OPs) for three PMI IRS districts (Mocuba, Morrumbala, and Derre) where resistance to pyrethroids was present. The remaining districts for the 2015 spray campaign (Milange, Molumbo, and Quelimane) continued to be sprayed with pyrethroids. Note that Milange and Morrumbala were each split into two districts in late 2014 by the Government of Mozambique. Derre was part of Morrumbala District and Molumbo was part of Milange District.

Enhanced epidemiological surveillance activities were conducted in seven selected health facilities (HF), chosen based on the history of IRS use in their districts and their pairing with entomological monitoring sentinel sites.

In addition to entomological monitoring activities in Zambezia Province, AIRS Mozambique continued to work with the NMCP at the national and provincial levels to carry out entomological activities and to enhance capacity for entomological monitoring in Mozambique.

After the spray campaign in all six districts began on October 19, 2015, there was a 12-operational-day interruption to respond to issues surrounding spray quality, data integrity, and insecticide theft. Spray operations were discontinued on November 7th and important stakeholders were informed. A supply chain assessment was immediately conducted to understand the extent of the irregularities observed. The assessment was led by the AIRS Mozambique Chief of Party, who worked with AIRS Mozambique staff not previously involved in logistics and supply chain-related activities during the planning and implementation of the spray campaign. The activity involved physical counts of insecticide stock and used (empty) packaging. Officials from the PDH witnessed the stock counts. The assessment also included a review of the use, quality, and completeness of all the mandatory warehousing documentation. Results of the physical counts were compared with the records at each of the warehouses, and with the records at the Central Warehouse. The PMI AIRS Home Office Director of Operations developed tools (spreadsheets) that were used for data collection.

The assessment concluded on November 18th. There were a few repeat visits to some warehouses to fill information gaps, with all visits concluding November 22nd. The results of the assessment indicated significant failures in leadership, oversight, management, and supervision of the supply chain for insecticide during the planning and implementation of the spray campaign. There were systemic failures, and failures at the individual level. However, the results of this assessment cannot be used to establish how much to attribute the failures to competence of individuals involved, negligence, or dishonesty.

To address these issues, AIRS Mozambique immediately suspended two staff implicated in the systemic failures and deployed two senior level operations managers from AIRS Ghana and Rwanda to provide south-to-south technical assistance. They provided refresher trainings for all spray personnel, storekeepers, and operational site supervisors and served as interim operations manager and logistics manager for the remainder of the 2015 IRS campaign. Also, AIRS Mozambique deployed its entire senior technical team members for field supervision. The 2015 AIRS Mozambique approved work plan included a target of 468,439 structures for spraying. At the end of the 2015 spray campaign, spray operators (SOPs) had found a reported 338,139 structures, and sprayed 337,433 structures, resulting in 88.1% spray coverage. There were issues of under-reporting of the houses that were found but not sprayed. SOPs were not reporting structures that were closed, for instance, thereby affecting the ultimate denominator. The total population protected during the campaign was 1,631,058. Of these, 287,813 children under the age of five years and 105,400 pregnant women were protected. Community mobilization efforts were led by the PDH, however, they were done too close to the onset of the spray campaign to have an impact on the level of acceptance by communities. A Spray Evaluation meeting was held in January 2016 with PMI, NMCP, PDH, and SDSMAS participating in order to debrief on the challenges faced during the campaign and identify solutions to implement next year.

The 2015 spray campaign results are summarized in Table 1.

TABLE 1: 2015 SPRAY CAMPAIGN RESULTS AT A GLANCE

Number of provinces/districts covered by PMI-supported IRS in 2015	6 districts in Zambézia Province (Quelimane, Mocuba, Morrumbala, Derre, Milange and Molumbo)
Insecticide Class	Pyrethroids (K-Othrine & Pali) and Organophosphates (Actellic CS)
Number of structures targeted for PMI-supported IRS in 2015 (based on structures found by SOPs in 2014)	468,439
Number of structures found by SOPs in 2015	383,139 ¹
Number of structures sprayed by PMI-supported IRS in 2015	337,433
2015 spray coverage	88.1%
Population protected by PMI-supported IRS in 2015	1,631,058 (including 105,400 pregnant women and 287,813 children under 5)
Dates of PMI-supported IRS campaign	October 19 – December 18, 2015 ² <small>Error! Bookmark not defined.</small>
Length of 2015 spray campaign ²	36 days
Number of people trained with US government funds to deliver IRS ³	1,746

¹ Overall progress of the 2015 spray campaign was difficult to ascertain due to the miscalculation of targeted structures in all districts. These figures were taken from the number of structures found during the 2014 campaign, but as spray teams and supervisors were out in the fields, they found different numbers of structures than initially anticipated.

² Spraying was completed in 36 operational days; however, the spray campaign was interrupted on November 7th in all six districts. It restarted in Quelimane and Mocuba on November 23rd; Morrumbala, Derre, Milange, and Molumbo Districts restarted on November 25, 2015.

³ Based on the PMI indicator definition; it includes only spray personnel such as SOPs, TLs, supervisors, and clinicians. It excludes DEC's, drivers, washers, porters, pump technicians, and security guards.

I. INTRODUCTION

I.1 PROJECT OBJECTIVES IN 2015

In August 2011, Abt Associates, Inc. (Abt) was awarded the three-year Africa Indoor Residual Spraying (AIRS) project, IRS2 Task Order 4, which was funded by the United States Agency for International Development (USAID) under PMI. The objective of the Project was to contribute to PMI's Global Health Initiative's goal to halve the burden of malaria in 70 percent of at-risk populations in sub-Saharan Africa. In September 2014, Abt was awarded the follow-on three-year Task Order 6 PMI AIRS Project to support the implementation of indoor residual spraying in up to 17 countries in sub-Saharan Africa, including the continuation of support to Mozambique. Abt works closely with MOHs, NMCPs, the PDHs, national and international non-governmental organizations (NGOs), and the private sector in the implementation of IRS to enable them to sustain and lead future IRS and malaria control programs.

AIRS Mozambique continued to work with the MOH through the NMCP, the PDH of Zambezia, the SDSMAS, and other stakeholders to achieve at least 85 percent spray coverage of the targeted structures located in the six target districts, namely Quelimane, Mocuba, Morrumbala, Derre, Milange and Molumbo. Organophosphate insecticide (Actellic® 300CS) was used for the first time in Mozambique in 2015 in three of the six target districts, including Mocuba, Morrumbala, and Derre; pyrethroid insecticide, (deltamethrin K-Othrine & Pali) were used in the remaining three districts, Quelimane, Milange and Molumbo.

Specific objectives of the AIRS Mozambique program for 2015 included the following:

- Cover at least 85 percent of the 468,439 targeted and eligible structures found in six selected districts of Zambezia (Molumbo, Milange, Morrumbala, Derre, Quelimane and Mocuba), and protect as many as 2,496,939 lives from malaria transmission in the target areas.
- Identify cost and operation-efficiency to streamline the IRS campaign, lower cost of implementation, and limit stock and supply chain error.
- Support training, capacity building, and advocacy at the national, regional, and district level as a means to achieving IRS sustainability. This will include building the capacity of government, counterparts, and partners to undertake high-quality IRS. The AIRS Mozambique team will work towards increasing districts' and PDH's role in supervising IRS in 2015.
- Provide regular monitoring and evaluation (M&E) for the PMI AIRS Project.
- Carry out a logistics assessment in all districts and arrange all procurement, shipping, delivery, and storage of spray pumps, spare parts, insecticides, and personal protective equipment (PPE).
- Prepare and submit the 2015 Supplemental Environmental Assessment (SEA).
- Ensure safe and correct insecticide application, thus minimizing human and environmental exposure to IRS insecticides, in compliance with the Safer Use Action Plan in the 2015 SEA.
- Conduct routine entomological monitoring in all spray sites, including assessing malaria vector density and species composition in intervention areas; establishing vector feeding time and location; monitoring the quality of insecticide application and insecticide decay rates; and assessing vector susceptibility and mechanisms of resistance.
- Conduct enhanced epidemiological surveillance activities in selected health facilities in order to

evaluate the impact of IRS. Promote cost efficiency through due diligence and efficiency of operations.

1.2 SPRAY SITES

Spray site selection for 2015 was made in collaboration with the MOH/NMCP and PMI, which agreed to continue to support IRS in the Zambezia Province. IRS in Zambezia has been supported by PMI since 2007. Zambezia Province (Figure 1), located in central Mozambique, has a total population of 4,563,018⁴ and is divided into 22 districts. Table 2 provides an overview of the number of sprayed structures and population protected since 2007, and insecticide used. In 2014, the Government of Mozambique realigned the province, creating an additional five districts, whereby Milange and Morrumbala districts were each split into two districts; Molumbo was part of Milange, and Derre was part of Morrumbala District. In 2015, AIRS Mozambique sprayed six of the 22 districts, namely Milange, Molumbo, Morrumbala, Derre, Mocuba, and Quelimane highlighted in Figure 1. In these six districts, the PMI AIRS Project established 23 operational sites with complete wash bays, soak pits, refurbished stores, and men's and women's segregated showers and latrines. The program central warehouse is located in Quelimane, in close proximity to the project office.

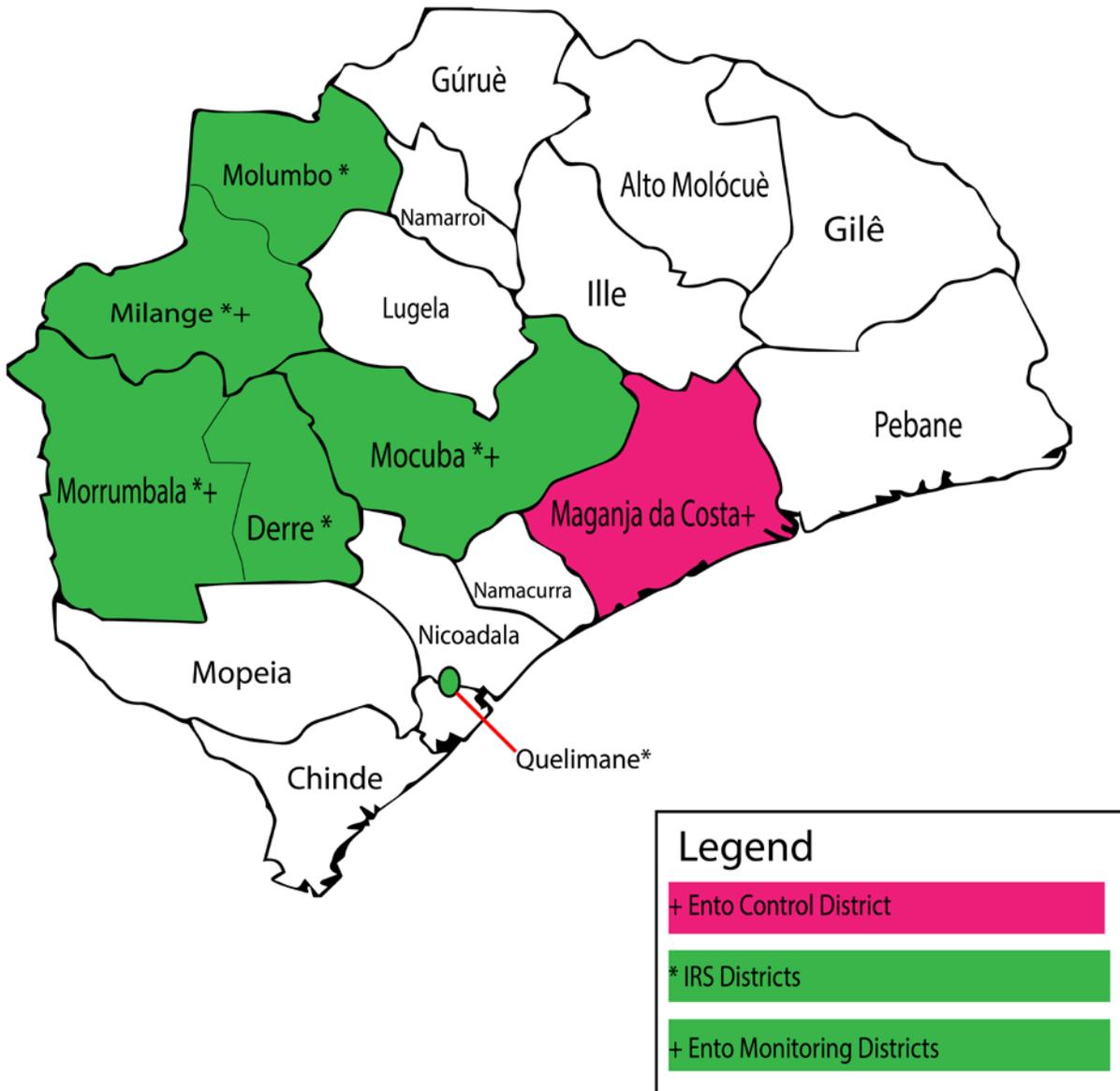
TABLE 2: PMI-Funded IRS Coverage in Zambezia Province, 2007–2015

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

* 2007 – 2011 data source is the NMCP

⁴2007 population census data

FIGURE 1: MAP OF ZAMBEZIA PROVINCE



1.3 INSECTICIDE SELECTION

Insecticide selection for IRS is a critical issue with the emergence of insecticide resistance throughout Africa. In accordance with PMI technical guidance for entomological monitoring, insecticide resistance tests must be conducted annually to inform insecticide selection for IRS and to assess the resistance/susceptibility status of the malaria vector against the insecticides available for public health use. This vector susceptibility study was conducted in January and February 2015 to help guide appropriate insecticide selection for the forthcoming IRS spray campaign.

The population of *An. gambiae* s.l. mosquitoes from Mocuba and Morrumbala tested against deltamethrin and lambda-cyhalothrin were found resistant and possibly resistant. Mortality rates against deltamethrin were 90.7% in Morrumbala and 74.3% in Mocuba, while mortality rates against lambda-cyhalothrin were 68.75% in Morrumbala and 92.33% in Mocuba. The vector was susceptible to DDT, bendiocarb and fenitrothion in both areas. Taking into consideration the effect of cross-resistance mechanisms, cost, residual life in relationship to the malaria transmission period, operational feasibility, and safety, AIRS Mozambique recommended the use of organophosphate insecticide where resistance to pyrethroids was identified.

Therefore, with PMI approval, AIRS Mozambique procured a long-lasting organophosphate, specifically Actellic® CS, for the districts of Mocuba, Morrumbala and Derre; a total of 186,192 bottles of Actellic® CS were procured in 2015. For the remaining three districts, Quelimane, Milange, and Molumbo, where pyrethroid susceptibility was still observed, 4,047 deltamethrin (K-Othrine) sachets of remaining stock from the 2014 spray campaign, and 345,500 deltamethrin (Pali) sachets were donated by the MOH, procured by the Global Fund as part of a larger inventory for Mozambique.

2. PRE-SPRAY ACTIVITIES

2.1 MICRO-PLANNING

A two-day micro-planning meeting was held in Quelimane from June 18-19, 2015. As in previous years, AIRS Mozambique staff facilitated the meeting and worked closely with the MOH, NMCP officials, the PDH and SDSMAS, MITADER, MINAGRI, and PMI. Micro-planning concluded with presentations by each of the districts, detailing quantification plans, which included human resource requirements, logistics and transportation requirements, and other needs. District plans were then rolled-up into a detailed provincial plan. In mid-May 2015, the NMCP, PDH, PMI and AIRS Mozambique discussed and proposed to conduct the 2015 campaign in 35 operational days; the 2014 spray campaign lasted 46 days. The reduction in operational days was justified with the increase of spray teams per district and operational sites; it was also agreed to add one extra person per spray team in support of home preparation and community mobilization efforts. The target number of structures per SOP remained at 12 per day, as in previous years.

Spray team structure included six SOPs, one mobilizer/porter and one team leader (TL). TLs reported to the operational site supervisor. Subsequently, AIRS Mozambique, through its district coordinators and operations management team, worked with PDH and SDSMAS in developing training and community mobilization plans, spray calendars, and a detailed timeline, outlining responsibilities for AIRS Mozambique and the MOH. Delay in the recruitment and contracting of the District Coordinators in Quelimane, Molumbo, and Milange resulted in insufficient support and supervision at the district level during the planning months, including training and supervision.

2.2 LOGISTICS NEEDS AND PROCUREMENT

The logistics needs assessment was conducted during the development of the annual work plan in early 2015 to inform the procurement plan for both local and international procurements. For a list of the local and international procurements, please refer to Annex A.

2.3 HUMAN RESOURCES REQUIREMENTS

AIRS Mozambique contracted 1,772 seasonal workers, 35% of whom were female for the 2015 spray campaign in the six districts as shown in Table 3. This represents a 6% increase in females from the previous year. Responding to PMI's priority to making its country programs more gender inclusive, AIRS Mozambique worked closely with the MOH from the national to the district levels to create more awareness and made provisions to increase female participation. Recruitment advertisements through radio and SDSMAS offices included a specific tagline encouraging women to apply. The number of female applicants was at an all-time high in 2015. Unfortunately, about 15% of the female applicants were not hired because they did not meet the literacy requirements.

TABLE 3: SEASONAL PERSONNEL BY NUMBERS AND GENDER

Type of Personnel	No. of Males	No. of Females	Total
Spray operators	756	366	1,122
Mobilizers	72	115	187
Team leaders	147	40	187

Type of Personnel	No. of Males	No. of Females	Total
Base supervisors	23	0	23
Pump Technicians	25	0	25
Storekeepers	26	3	29
Washers	4	90	94
Security Guards	49	0	49
Database Coordinators	5	0	5
M&E Assistants	10	2	12
Data Entry Clerk	28	11	39
Total	1,145	627	1,772
Percentage	65%	35%	100%

Seasonal personnel were recruited at the community level, led by the SDSMAS in collaboration with community leaders. AIRS Mozambique rolled out an application process that consisted of a one-page registration form accompanied by a copy of their personal identification card, Social Security card, and literacy certificate. The pre-selected candidates were subject to a written and logic test, and a pregnancy test for female candidates (see Table 11 in Section 6.2 for test results pre-spray), and those that passed were invited to participate in the training. The Project added a 10 percent buffer to the number of SOPs invited for training to account for expected workforce attrition and to allow the best candidates to be offered positions. A second round of pregnancy tests was conducted in November, 30 days after the start of spraying (see Table 11 for test results mid-spray).

2.4 TRAINING

AIRS Mozambique, in close collaboration with the PDH and SDSMAS, supported a series of trainings between July and October 2015 in preparation for the spray campaign. The training involved classroom and practical spray techniques.

TABLE 4: TRAINING DATES AND DESCRIPTION

Training Dates	Location	Participants	Type of Training	Brief Description
August 25, 2015	Mocuba District	HF Nurses and/or Technicians from the 23 operational site HFs	Insecticide Exposure and treatment	Training covered insecticide toxicity, routes of exposure to insecticides, measures to prevent insecticide contamination and exposure, and treatment for exposure.
August 26, 2015	Mocuba District	PDH and SDSMAS Health Officers (Malaria Supervisor, IRS Coordinator/Supervisors and Information, Education and Communication (IEC) Coordinator), Districts and Provincial Environmental Officers (MITADER & MINAGRI)	Environmental Compliance	Training covered EC standards and requirements for IRS in accordance to best practices management for IRS.

Training Dates	Location	Participants	Type of Training	Brief Description
August 27 – September 1, 2015	Mocuba District	PDH and SDSMAS Health Officers (Malaria Supervisor, IRS Coordinator/Supervisors and IEC Coordinator); Environmental Officers, District Health Directors MITADER & MINAGRI's Environmental Officers	Training of Trainers	Training topics included: 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.
August 28 – 29, 2015	Mocuba District	Washers from each of the 23 operational sites	Washer Training	Environmental compliance for IRS, procedures and standards to handling and washing PPE, and personal safety measures.
August 28 – 29, 2015	Mocuba District	Storekeepers from each of the 23 operational sites stores	Warehouse and Stock Management for Storekeepers	Training included supply chain system, stock card use and recording, delivery note, inventory management, storage and handling of insecticide, PPE and other materials, loss of inventory, as well as health and environmental risks.
August 28 – 29, 2015	Mocuba District	Security Guards from each of the 23 operational sites	Operational Sites Security	Training in security standards and requirements during the spray campaign.
September 14 – 24, 2015	Mocuba, Milange, Morrumbala, and Quelimane Districts	SOPs, TLs, and operational site Supervisors	SOP Training	Training curriculum covered both lectures and practical exercises. The lecture component included: IRS concept; spraying techniques; insecticide mixing and handling (K-Othrine, Pali and Actellic CS); health and environmental protection; environmental compliance for IRS; care for IRS equipment; spray pump parts; stock control of insecticides and other materials and equipment, spray pump maintenance; proper use of PPE; gender equity; data collection and reporting; and general personal and community safety during the spray campaign. The practical exercises consisted mainly of spray techniques, preparation, dilution and mixing of insecticide, and progressive rinsing.
October 7 – 11, 2015	Mocuba, Milange,	Database Coordinators, M&E Assistants & data entry clerks	M&E Training and Database	Two training sessions were carried out for database

Training Dates	Location	Participants	Type of Training	Brief Description
	Morrumbala, and Quelimane Districts		Training	coordinators, M&E Assistants and data entry clerks. Training covered the PMI AIRS Access database as a tool, roles and responsibilities, data collection tools, data entry, cleaning, report generation, data collection forms filing, storage and security, supervision tools, data handling protocols, data security, Sugarsync, computer use and care, and communication flow for IRS.
October 7 – 11, 2015	Mocuba, Milange, Morrumbala, and Quelimane Districts	Pump technicians from each of the 6 districts and 23 operational sites	Pump Technicians training for repair and maintenance	Training included spray pump parts and functions, pump repair kits, pump repair and maintenance
October 16, 2015	Quelimane District	Drivers from each of the contracted transportation service providers (trucks and/SUVs)	Driver training in seasonal personnel and insecticide transportation requirements	Training in transportation of spray personnel, safety and security of people, insecticide and PPE, road safety, including spillage handling.

In 2015, AIRS Mozambique trained 2,119 people, as shown in Table 5.

TABLE 5: 2015 TRAINING MATRIX

Categories of Persons Trained	Training on IRS Delivery														Other Trainings				TOTAL			
	Training of Trainers		Spray Operations		Data Capture		Logistics Training		ECO		Poison Management		Technical Maintenance		Base 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
MOH – Central, Provincial and District	32	9							32	7	22	3									86	19
Data Entry Clerks					37	13															37	13
M&E Assistants					11	2															11	2
Database Coordinators					6	0															6	0
SOPs, Base Supervisors, Team Leaders			1,184	494																	1,184	494
Storekeepers							30	3													30	3
Security Guards															41	0					41	0
Pump Technicians													26	0							26	0
Washers																	3	92			3	92
Drivers																			71	1	71	1
TOTAL Male/Female	32	9	1,184	494	54	15	30	3	32	7	22	3	26	0	41	0	3	92	71	1	1,495	624
TOTAL	41		1,678		69		33		39		25		26		41		95		72		2,119	

Table 6 shows training based on the PMI indicator definition; it includes only spray personnel such as SOPs, TLs, supervisors, and clinicians. It excludes data entry clerks (DECs), drivers, washers, porters, pump technicians, and security guards.

TABLE 6: PEOPLE TRAINED TO DELIVER IRS WITH USG FUNDS

Type of Training	Males	Female	Total
IRS Delivery TOT	32	9	41
Spray Operations	1,184	494	1,678
Poison Management for Health Clinicians	22	3	25
Total	1,238	506	1,744

3. COMMUNICATIONS ACTIVITIES

Community mobilization and awareness are key to a successful spray campaign. AIRS Mozambique collaborated with the PDH, SDSMAS, and community leaders in the target districts for community mobilization activities. PDH carried out community meetings with community leaders to impart IRS messages in the six districts. Additionally, community leaders supported spray teams throughout the spray campaign in their local communities to ensure that households had received key IRS messages and were aware of the timing of the spray. Community leaders were paid 100 MZN per day for their contributions. However, the presence and participation by the community leaders was sporadic throughout the spray campaign; coordination and communication by the MOH at the district level, including the AIRS District Coordinator to the communities was very weak. In addition, the spray calendar was not distributed in a timely manner and communication flow was generally very poor.

As mentioned previously, an additional person was added to the spray teams to serve as a mobilizer/porter to strengthen the community mobilization and support to the spray teams. Essentially, spray teams consisted of eight people (i.e., six SOPs, one mobilizer and one team leader). However, this revised team structure alone did not have the desired outcomes because team leaders did not do their jobs well to ensure SOP spray quality and strong community mobilization by mobilizers/porters. Mobilization activities began two weeks prior to the campaign and included radio spots in four languages and meetings with the communities and their leaders. These meetings took place a day or two before spraying began in the targeted areas. The purpose of these meetings was to inform communities of the immediate visit by SOPs and educate the beneficiaries on the importance of IRS and how it reduces malaria transmission, proper preparation of their homes, and environmental protection. The higher than anticipated refusal rates throughout the districts reflect that community mobilization through high level meetings did not reach the village level leaders or beneficiaries.

In addition to verbal messages, the MOH IRS brochure was disseminated by community leaders during the spray campaign. Table 7 shows the types and numbers of communication activities.

TABLE 7: IRS CAMPAIGN COMMUNICATION ACTIVITIES

Activity	Frequency
PMI AIRS sponsored community meetings held by the PDH	12
Radio spots; MOH IRS message in 6 districts (before and during spray)	750 4 languages (Portuguese, Chuabo, Sena and Lomue) on 4 radio stations in Morrumbala, Milanage, Mocuba and Quelimane)
Spray Campaign official launch	6; 1 official launch per district; Quelimane District hosted provincial launch

On October 22, 2015, AIRS Mozambique assisted the PDH with the provincial IRS spray campaign launch ceremony, which was held in Maquival, Quelimane District. The launch was presided over by Felipe Vicente, PDH from the provincial MOH. The event was attended by Quelimane city government, district and provincial government representatives, civil society members, local partners, the community, and Quelimane District’s 30 spray teams. There was no spraying in Quelimane District on the 22nd, as spray teams were deployed to mobilize the Maquival area for the remainder of the day.

4. SPRAY ACTIVITIES

4.1 SPRAY OPERATIONS

An estimated 468,439 structures were targeted to be sprayed in 2015; estimates were based on the total number of structures reported by SOPs during the 2014 spray campaign. The six districts, Quelimane, Mocuba, Morrumbala, Derre, Milange, and Molumbo, have a targeted total population of 2,288,553. The spray campaign was initially scheduled to start on October 12th, but it began a week later, on October 19th due to the delayed arrival of both insecticide shipments. The Actellic CS was originally scheduled to arrive in country on September 1st but arrived at the Nacala Port, Nampula on September 24, 2015, and arrived in Quelimane on October 10th. The deltamethrin shipment became available for AIRS Mozambique to pick-up at the Beira Port, Sofala, on October 8th. It was delivered to the central warehouse in Quelimane on October 17, 2015.

The 2015 spray campaign began in all six districts on October 19th. However, there was a twelve-operational-day interruption starting on November 7th (third week of spraying) to respond to issues surrounding spray quality, data integrity, logistics management, and insecticide theft. The campaign resumed on November 23rd and finished on December 18, 2015. See subsection below for details on the spray campaign interruption. Spray teams were allocated to each of the 23 operational sites according to the number of eligible structures targeted in each district. Each team consisted of one TL and six SOPs, as well as one mobilizer/helper. The distribution of spray teams by operational sites is shown in Table 8.

TABLE 8: DISTRIBUTION OF SPRAY TEAMS BY OPERATIONAL SITES

District	Operational Sites	No. of SOPs	No. of Spray Teams
Quelimane	Namuinho	114	19
	Madal	24	4
	Maquival	42	7
Mocuba	Mocuba Sede	126	21
	Mugeba	78	13
	Muaquiua	30	5
	Namanjavira	36	6
	Alto Benfica	24	4
	Munhiba	42	7
Milange	Milange Sede	126	21
	Liciro	30	5
	Dulanha	24	4
	Dachudua	42	7
Molumbo	Molumbo Sede	60	10
	Coromana	48	8

District	Operational Sites	No. of SOPs	No. of Spray Teams
Morrumbala	Morrumbala Sede	84	14
	Muandiuua	42	7
	Sabe	18	3
	Megaza	18	3
	Pinda	24	4
	Chire	48	8
Derre	Derre Sede	36	6
	Guerissa	6	1
Total		1122	187

As per the previous spray campaigns, daily spray activities started around 6:00 a.m. and ended around 2:30 p.m. In many sites the spray schedule was adjusted to better fit with the communities' daily routines and activities already in progress. For example, the spray teams had to occasionally stay beyond 4:00 p.m. to spray structures owned by farmers who left home for field work early in the morning and did not come back until after 2:00 p.m.

SOPs collected household data using the Daily SOP Form, and their TLs collected and verified the data before handing the forms to their site supervisor. SOP and TL forms were delivered to district level data centers by hired motorbikes. Operational sites completed the Performance Tracking Sheet, designed to provide an operational-level evaluation for the sites' progress. This information was reported directly to each District Coordinator through a cell phone call on a daily basis. District Coordinators reported the information to the country Operations Manager, who compiled and reported to the Operations Director and COP on a weekly basis. This system allowed immediate measures to be taken as necessary.

4.1.1 SPRAY CAMPAIGN INTERRUPTION

A series of challenges including: 1) multiple incidents of insecticide theft 2) falsification of data by SOPs (discovered through the use of Data Collection Verification) 3) poor supervision and 4) a weak supply chain system led PMI AIRS Home Office Management to call for a pause to the spray campaign. During the 12 operational day interruption period, the AIRS Mozambique team conducted a supply chain assessment to gain a better understanding of the extent of irregularities observed. The assessment was carried out from November 7-15, 2015. It involved physical counts of insecticide stock and used (empty) bottles and sachets. It also involved review of the use, quality, and completeness of all the mandatory warehousing documentation. The results of the physical counts were compared with the records at each of the warehouses, and with the records at the Central Warehouse. The assessment was led by the COP, who was supported by select AIRS Mozambique staff not previously involved with the supply chain activities during spray planning. PDH officials formed part of the inspection team who witnessed the stock counts. The results of the assessment indicated that there were significant failures in leadership, oversight, management, and supervision of the supply chain for insecticide during the planning and implementation of the spray campaign. There were systemic failures, and failures at the individual level. However, the results of this assessment cannot be used to establish how much to attribute the failures to competence of individuals involved, negligence, or dishonesty.

Overall, there was widespread disregard for the PMI IRS Best Management Practices (BMP) guidelines, the AIRS warehousing management guidelines, and the basic principles/standards of warehousing management. AIRS has previously developed tools to be used at all points and levels of the IRS supply

chain. In some cases, the tools were not provided to the seasonal workers to carry out their work. In other cases, the tools were provided, but completely disregarded. In other cases, the tools were used only partially, and/or in irregular ways.

To address the spray quality issues that had been observed in the first half of the campaign, refresher trainings were conducted November 9–23. Trainings included TOT for the three-person key staff from each of the SDSMASs, operational site supervisors, and AIRS Mozambique district coordinators. All storekeepers went through one-day training; and all spray personnel attended a three-day training that concentrated on spray techniques and insecticide mixing. These trainings were led by the AIRS Operations Managers from Ghana and Rwanda who were deployed to Mozambique as interim Operations Manager and Logistics Manager, respectively, while the AIRS Mozambique Operations and Logistics Managers were suspended.

To improve mobilization and address acceptance of IRS by the communities, the Provincial Directorate of Health conducted meetings with community leaders in the target districts during the interruption period (funded through PMI AIRS). In addition to acceptance of IRS, community leaders and residents were reminded to keep vigilant of SOPs and other seasonal workers and report any irregularities observed. Communities were encouraged to contact local authorities and their leaders in the event they observed such behavior. Spray calendars were distributed to community leaders a week prior to the restart of the spray campaign. A radio spot aired emphasizing insecticide use for public health, for IRS only, as well as potential hazards to humans and the environment when mishandled.

To verify data integrity and accuracy of data collected during the first three weeks of the spray campaign (i.e., up until the interruption), data collection verification (DCV) was intensified by the AIRS M&E team. Trained Data Entry Clerks (DECs), and Database Coordinators (DBC), and M&E Assistants (M&EAs) conducted DCV in all six districts to verify structures reported as sprayed by SOPs. 9,990 structures were visited by the M&E team from November 14 to December 18, 2015.

To strengthen field supervision, AIRS deployed senior staff members to each of the six districts to support the local teams in preparation for the restart and for the remainder of the spray campaign. All three members of the PMI Mozambique team, the head of the NMCP, PDH and others also deployed to the districts to strengthen supervision and support of the remainder of the spray campaign.

See Sections 10-12 for more details on challenges and lessons learned from the 2015 spray campaign and recommendations for 2016.

4.2 LOGISTICS AND STOCK MANAGEMENT

Prior to the dispatch of commodities from the central warehouse to the district stores, a distribution spreadsheet was designed, tracking the flow of the commodities from the central warehouse to the district level and from this point to peripheral storerooms. This spreadsheet also showed the number of teams at each spray site. A dispatch book was designed to control all IRS commodities going in and out at the central and district warehouses. All insecticide boxes were numbered according to their final destination, so each district received boxes of insecticides with different marked numbers. A dispatch note was used to track distribution from the warehouse to the operational store, which returned a signed copy as proof of delivery. The supply chain review conducted during the I2 operational day interruption revealed that these best practices were not done accurately and timely before the campaign interruption. Retraining and supervision emphasized supply chain management after the campaign was restarted and will be even further emphasized in future IRS planning and operations.

4.3 SUPERVISION VIA MOBILE DEVICES

During the 2015 campaign, AIRS Mozambique piloted the use of mobile tools to facilitate supervision. Thirty-one phones and tablets were donated from the AIRS Angola program for use in Mozambique. After testing and configuration, 30 were determined to be functional and a portion of those were distributed to AIRS Mozambique staff, regional supervisors, PMI, and government partners for use during the campaign. Four supervision forms, which have been used in previous campaigns, were digitized onto the CommCare platform by Abt's in-house Client Technology Center (CTC); the same division responsible for the AIRS database). Reporting templates were developed at the start of the campaign and were intended to be used for operations decision-making throughout the campaign. Due to delays in form programming, limited uptake in the field, and issues with data submission to the CommCare server, reporting could not take place during the campaign. Table 9 shows a breakdown of the data surrounding form submission during the 2015 campaign.

TABLE 9: SUMMARY OF SUPERVISION FORMS SUBMISSION VIA MOBILE TOOLS

Form Name (Portuguese Translation)	Districts Supervised	Number of Forms Submitted	Number of Unique Users Who Submitted Forms ^{5,6}
SOP Morning Mobilization & Transportation Vehicle Inspection (Inspeção de Mobilização Matinal dos Rociadores e de Viaturas de Transporte)	4 (Milange, Mocuba, Molumbo, Quelimane)	8	5
SOP Performance and Homeowner Preparation (Desempenho do Rociador e Preparação do Agregado Familiar)	4 (Milange, Mocuba, Morrumbala, Quelimane)	26	6
End-of-Day Clean-up (Limpeza do Final do Dia)	3 (Mocuba, Morrumbala, Quelimane)	13	6
Storekeeper Performance (Desempenho do Fiel de Armazém)	4 (Milange, Mocuba, Morrumbala, Quelimane)	22	9

⁵ Gender training was an integrated component of TOT.

⁶ Note that generic usernames were established for government partners, so the number of unique users is likely greater than those reported here.

5. POST-SPRAY ACTIVITIES

5.1 CLOSING OF IRS OPERATIONS

5.1.1 POST-SPRAY INSPECTION

The 2015 spray campaign officially ended on December 18, 2015. The post-spray inspection is currently underway in the six districts led by the AIRS Mozambique Environmental Compliance Officer (ECO) in coordination with the Ministries of Agriculture and Environment from provincial and district level. The inspection consists of verifying the complete closure of latrines, soak pits and wash bay areas, including the gates of the site in general, and ensuring all environmental standards were followed during the movement of remaining insecticide, empty bottles and sachets, and all other materials. Inspections are being done using the Open Data Kit smartphone.

5.1.2 POST-SPRAY EVALUATION MEETING AND POST-SPRAY DATA QUALITY AUDIT

The post-spray evaluation meeting was held on January 28, 2016, in Quelimane. Each of the spray districts participated and presented results, challenges and lessons learned for discussions with the broader group, which included PMI, NMCP, PDH, and the Abt AIRS team. Neither the PDH nor SDSMAS raised any issues about the spray campaign's interruption, mishandling of insecticide by SOPs, nor poor spray quality, but they focused on the low coverage as a direct result of weak community mobilization. They also raised the need for the PDH and SDSMAS to be involved in the procurement of transportation services. There is a need for a solid understanding at least two months in advance of the campaign by the PDH and SDSMAS regarding AIRS Mozambique finance and administration policy and procedures to avoid delays during the campaign. This need will be addressed during micro-planning, specifically regarding procurement policies and procedures. A Post-Spray Data Quality Audit was conducted for the first time in Mozambique this year; field surveys and data entry have been completed; and data analysis and reporting is currently underway.

5.2 LOGISTICS

Following completion of the spray campaign, insecticide stocks were moved from the 23 operational site stores to their respective district store, and finally to the central warehouse. AIRS Mozambique transported empty bottles and sachets, masks, unused sachets, spray pumps and all other program commodities to the central warehouse. Progressive rinsing barrels and wash buckets were also collected and stored in the central warehouse. A physical count of all inventory returned from the districts was conducted. Stock records were updated to reflect the remaining stock under the leadership of the AIRS Mozambique ECO, with the assistance of Provincial Environmental officers from MICOA and MITADER, as well as two AIRS district coordinators. Annex B shows the remaining inventory currently maintained in the central warehouse.

6. ENVIRONMENTAL COMPLIANCE

6.1 PRE-SEASON ENVIRONMENTAL ASSESSMENT

A new SEA was developed in early 2015, and was approved by USAID in late September 2015, prior to the onset of the 2015 spray campaign. The new SEA addressed changes in the PMI AIRS Project and updated information provided in previous SEAs. The SEA authorizes the use of organophosphates, carbamates, pyrethroids and DDT for IRS in all of Mozambique, and also authorizes the provision of technical assistance to the Government of Mozambique, including for the use of DDT.

The SEA also authorizes the use of chlorfenapyr for IRS, when recommended by WHOPEs. Chlorfenapyr is currently under WHOPEs review for IRS and is registered for agricultural, but not public health use by the U.S. Environmental Protection Agency. Previous SEAs authorized PMI IRS activities in Zambezia Province, whereas the new SEA is applicable for IRS activities nationwide and will allow the potential expansion of PMI IRS activities throughout the country.

In early July 2015, AIRS Mozambique conducted Pre-spray Environmental Compliance Assessments (PSECAs) in the six target districts at the 23 operational sites. The PSECAs were conducted using smartphones which were pre-programmed with environmental assessment checklists. For the first time, in 2015, government technicians from Ministries of Environment and Agriculture used the smartphone technology; training was provided prior to the onset of PSECAs. Data were entered in the e-forms on smartphones at operational sites and submitted to a central database on an automated server at Abt's office in Bethesda. A work list was generated which was then instantly shared with the COP, Operations Manager, and the ECO to guide actions to be taken in preparing the operational sites for the 2015 spray campaign. The assessment involved identifying storage facilities and determining the suitability of soak pits that were used the previous year. The 23 operational sites within the six districts are located on various premises of the SDSMAS. A detailed description of the rehabilitation and/or construction of the operational sites is shown in Table 10.

TABLE 10: CONSTRUCTION AND REHABILITATION OF OPERATIONAL SITES

District	Operational Sites rehabilitation
Molumbo	1 new soak pit and wash area built (Corromana). 1 soak pit and wash area rehabilitated. 4 bathrooms built segregating female and male personnel; 2 changing rooms built. 1 operational site fence reinforced and 1 built. 1 storage facility built (Corromana) and 1 provided by the SDSMAS.
Quelimane	1 soak pit and wash area built (Madal), and 2 soak pits and wash areas rehabilitated. 1 storage facility and 1 changing room built (Madal). 1 storage facilities rehabilitated (Maquival).
Mocuba	2 soak pits rehabilitated. Fencing at all 6 operational sites were rehabilitated. 6 changing rooms reinforced and 5 female and male bathrooms rehabilitated. 6 storage facilities provided by the SDSMAS.
Morrumbala	1 soak pit rehabilitated, fencing at all 5 operational sites rehabilitated. 2 bathrooms rehabilitated. 6 storage facilities provided by the SDSMAS, 2 of these storage facilities were rehabilitated.
Milange	2 soak pits and wash areas rehabilitated.

	4 storage facilities provided by the SDSMAS.
Derre	2 storage facilities provided by SDS both rehabilitated.

6.2 SAFETY AND ENVIRONMENTAL COMPLIANCE DURING AND AFTER THE SPRAY CAMPAIGN

Prior to the start of the spray campaign, all eligible females were tested for pregnancy. A second round of pregnancy tests was conducted on November 30th, the week the spray campaign restarted after the 12-day interruption. With good effort and coordination, all women found pregnant were reassigned as mobilizers or porters. As shown in Table II, total number of women tested reflects the number of women involved in the spray campaign at the time pregnancy tests were administered, a lesser number of women tested in round two indicates the number of women who were either dismissed, or left the program.

TABLE II: PRE-SPRAY & MID-SPRAY PREGNANCY TEST RESULTS

District	Pre spray Pregnancy Test Results	Mid spray Pregnancy Test Results
Morrumbala: Total number of Women	51	47
Total number of women tested	51 (100%)	47 (100%)
Total positive	1	0
Mocuba: Total number of Women	202	178
Total number of women tested	202 (100%)	178 (100%)
Total positive	9	2
Milange: Total number of Women	80	85
Total number of women tested	80 (100%)	85 (100%)
Total positive	4	4
Molumbo: Total number of Women	38	42
Total number of women tested	38 (100%)	42 (100%)
Total positive	7	1
Quelimane: Total number of Women	86	87
Total number of women tested	86 (100%)	87 (100%)
Total positive	1	0
Derre: Total number of Women	13	3
Total number of women tested	13 (100%)	3 (100%)
Total positive	3	0
Total number of Women	470	442
Total number of women tested	470 (100%)	442 (100%)
Total positive	25	7

Any and all personnel involved in the spray campaign were required to adhere to the requirements for environmental and human safety. Mitigation measures included the provision and use of complete PPE,

including coveralls, a two-piece uniform designed to fit women more comfortably, head and neck protector, gloves, boots, socks, helmets, face shields, and dust masks for use throughout the campaign.

Insecticide transportation from the central warehouse to the district stores was done using enclosed trucks. Distribution from the district warehouse to the operational sites was done using trucks covered with tarpaulin. Each vehicle was equipped with spill kits, a first aid kit, Material Safety Data Sheets, and accident/emergency procedures sheets. Spray operators were transported from the operational sites to the field using trucks that were retrofitted with railings and seating benches. Prior to their contracting, vehicles were inspected in line with PMI BMPs for IRS to ensure compliance with safety and environmental requirements. Vehicles were inspected throughout the spray campaign.

Soak pits were monitored throughout the campaign; plastic sheeting was used at the wash areas to ensure insecticide contaminated effluent did not pollute the environment and was replaced where and when it was deemed necessary. The soak pits and wash areas are fenced and gated around the perimeter of the operational site to preclude unauthorized access to the premises. The progressive (triple) rinsing system was used at each soak pit for rinsing spray pumps. Trained washers washed the PPE over the soak pits at the end of each spray day. There are wash facilities at each of the operational sites, segregated by gender to allow SOPs and other personnel who handle insecticide to wash up at the end of the spray day.

Mid-spray environmental compliance inspections were conducted in all 23 operational sites to ensure that mitigation measures were adhered to. Inspections were done by the ECO with the Provincial Environmental and Agricultural officers utilizing the newly acquired smartphones; it was the first year that government partners utilized the technology for this activity.

The inspection teams assessed the use of PPE during spraying and washing activities, stores' records and arrangement, transportation of SOPs, and use of warning signs and first aid kits. In addition, preparation of households for spraying and the instructions given to residents on what to do during and after spraying operations were monitored. The inspection teams ensured that wastes were correctly handled and packed during operations in preparation for disposal at the end of operations. Inspections also involved observing SOPs in the field. Additionally, fire extinguishers in storerooms were inspected.

The post-season spray inspection of the 23 operational sites was delayed until the week of January 18th, due to schedule conflicts for the ECO, who oversaw demobilization and physical inventory activities over the end of year holidays. The ECO with the environmental officers of MITADER and MINAGRI went to the field in the first two weeks of 2016. The inspection ensured that all materials, insecticides, and other equipment were collected from the operational sites and returned to the central warehouse. All warehouses were decontaminated to avoid possible contamination in case they are used for other purposes during the non-spray period. All bathrooms and latrines were closed to avoid unauthorized use. Six of the 23 soak pits were found with grown weeds, which the team ensured they cleaned out prior to their departure. During this process, the team had discussions with the health technicians to determine whether the reporting of any negative human health or environmental impacts were missed during the spray campaign to ensure that any such cases were included in the environmental monitoring and mitigations plan. Health technicians confirmed that all cases had been recorded. AIRS Mozambique District Coordinators ensured that fences at all operational sites were properly closed to avoid unauthorized access by people, animals, etc. Additionally, metal covers are being made for all soak pits, and are scheduled for installation in early April.

Tables 12-16 reflect the results of the mid-spray and post-spray inspections. Note NC = non-compliant; C = compliant. Annex C includes the Environmental Monitoring and Mitigation Report.

TABLE 12: MID-SPRAY INSPECTION RESULTS: MORNING MOBILIZATION

Morning Mobilization	Number of Inspections	PPE Use		Drivers with Cellphone and PPE		Physical Inspection of SOPs		Vehicle Inspection		Vehicle with Spill Kit and Fire Extinguisher		Drivers Training	
		C	NC	C	NC	C	NC	C	NC	C	NC	C	NC
	9	6	3	7	2	7	2	7	2	8	1	8	1

TABLE 13: MID-SPRAY INSPECTION RESULTS: HO PREPARATION AND SOP PERFORMANCE

Spray Operator Performance	Number of Inspections	Homeowner Removes Belongings		Spray Operator Records Data		Residents Informed in Advance about the IRS		Households Accepting IRS	
		C	NC	C	NC	C	NC	Yes	No
	19	19	0	19	0	14	5	15	4

TABLE 14: MID-SPRAY INSPECTION RESULTS: END OF DAY CLEAN-UP

End of day Cleanup	Number of Inspections	SOPs Eating or Drinking with PPE Prior to Removing PPE and Washing		SOPs Complaints of Irritation		Covers Placed on the 7 Triple rinse Drums after All Pumps are Cleaned		Team Leaders Supervising the Cleaning and Wash up			
		C	NC	Yes	No	C	NC	C	NC		
	16	16	0	0	16	16	0	13	3		

TABLE 15: MID-SPRAY INSPECTION RESULTS: STOREKEEPER PERFORMANCE

Storekeeper Performance	Number of Inspections	Records of Pregnancy Test		Spill Kit, First Aid Kit and Fire Extinguisher		Provision of Antidotes for Pesticides at the Nearest Health Facility		Thermometer for Monitoring the Daily Temperatures		Recording of Waste Stock	
		C	NC	C	NC	C	NC	C	NC	C	NC
	19	14	5	19	0	19	0	17	2	17	2

TABLE 16: POST SPRAY INSPECTION RESULTS

Post Spray Environmental Compliance Inspection	Have All the IRS Items, Signs, Insecticides and Wastes Been Removed from this Store?	Has the Pesticide Storage Area Been Washed with Soap and Water?	Is the Soak Pit Covered and the Gates Locked?	Are The Soak Pit and Its Surroundings Left Clean?	Was the Working Relationship between the IRS Team and Owners of the Store Good?	Would You Recommend Re using this Store Next Year?
Number of noncompliant responses (Total = 7)	0	1	0	6	0	0
Number of compliant responses	27	26	27 ⁷	21	27	27

⁷ There are 23 soak pits, there were four additional inspections as conducted by the MITADER's Environmental Officer.

6.3 MANAGEMENT OF INSECTICIDE ADVERSE EFFECTS

Each of the six spray districts had a resource team responsible for handling adverse effects. The team was comprised of a coordinator, a doctor who was based at the district hospital and nurses based at each health center affiliated with each operational site. These teams were responsible for addressing any adverse effects experienced by community members and/or the spray operations support staff during the spray operations. Before the start of the spray campaign, teams received refresher training at each district on management of IRS adverse effects. During this year's campaign, there was one exposure involving an SOP using Actellic® 300CS, who splashed himself while pressuring the spray pump. The SOP in question was treated at the local health facility and was able to return to work quickly.

6.4 SOLID WASTE MANAGEMENT

IRS solid waste generated by the 2015 spray campaign was placed in the insecticide storage facility in each operational site at the district level, segregated from PPE and other supplies and equipment. It was separated, repackaged in each of the operational sites, consolidated at the district level, and transported for further consolidation at the central warehouse in Quelimane. At the completion of the spray campaign and arrival of all solid waste at the central warehouse, the waste was separated, counted, and repackaged. The waste was incinerated in January 2016 at Ceramica Okanga incinerator in Nicoadala District, Zambezia Province. Ceramica Okanga is certified by MITADER, the government organization responsible for ensuring that Ceramica Okanga operates in accordance with established environment standards. The Zambezia Provincial Environmental Officer, featured by the PMI AIRS Project as a 'Malaria Fighter' in September 2015, oversaw the 2015 incineration effort with the ECO. In coordination with the NMCP, AIRS Mozambique will follow-up with the Ceramica Okanga incinerator staff to seek Ministry of Health Certification for said incinerator.

AIRS Mozambique's solid waste plan for 2015 is currently being implemented. Annex D outlines the solid waste plan by category, quantity, procedures, and timeline for completion; a copy of the certificate of incineration can be found in Annex F. AIRS Mozambique has been exploring all possibilities for recycling the empty bottles of Actellic CS insecticide, which was used for the first time this year in three of the six PMI districts. To date, only INCALA, a Quelimane-based company specializing in footwear, domestic plastic articles, nursery planting goods, and recycling, shows real potential for recycling the Actellic bottles. INCALA offered to do a sample whereby they recycled 100 bottles and produced a 30 liter bucket with a lid (See Annex E). AIRS Mozambique is exploring the possibility of recycling bottles into basins for washing PPE and 200 liter buckets for triple rinsing. This process will be managed very closely by the ECO. It will include a memorandum of understanding between Abt and the vendor to work together to recycle Actellic 300 CS empty plastic bottles, promoting public health, safety and environmental protection, and ensuring final products are not used for the storage of drinking water.

6.5 INCIDENT REPORTS

As highlighted in the executive summary, data integrity, insecticide theft, and a high number of incidents led to the decision to pause the spray campaign. Table 17 provides the details of the entire 2015 incident reports. Similar to previous years, Mocuba was the district with the highest number of incidents.

TABLE 17: INCIDENT AND EXPOSURE REPORTS

District	Operational Site	Date	Description of Incident	Insecticide Loss	Corrective Action Taken
Mocuba (organophosphate district)	Namanjavira	October 20, 2015	SOP used river water to rinse insecticide bottle and poured content on the river bank; SOP gave 2 insecticide bottles to a homeowner.	No, both bottles of insecticide were recovered.	Reviewed rinsing procedures during the morning field deployment with teams; TL oversight emphasized; both SOPs implicated were dismissed without pay.
	Namanjavira	October 20, 2015	SOP splashed himself with insecticide while pressurizing the spray pump.	No	Review of insecticide mixing and pump pressurization procedures during the morning field deployment with the teams; SOP was treated at the local health facility, returned to work in 48 hours.
	Muhiba	October 20, 2015	2 trucks collided while parking at the operational site at the end of the spray day.	No	Reviewed parking regulations with transportation service providers.
	Muaquia	October 21, 2015	Attempt to steal insecticide; falsified data. 2 SOPs found to have poured 12 bottles of insecticide into domestic containers, left at family member's home.	Insecticide was recovered in its entirety.	2 SOPs dismissed without pay.
	Namanjavira	October 24, 2015	Overcrowded truck; not properly retrofitted; SOP was not sitting on a bench, suffered a toe injury once the truck drove over a speed bump.	No	Site Supervisors and TLs reminded of transportation requirements; truck substitution.
	Munhiba	December 3, 2015	Dumping insecticide on the ground; and pouring contents into domestic plastic containers.	Only 5 bottles out of 12 were recovered	3 SOPs dismissed without pay; contaminated ground removed to be incinerated.
	Muaquiua	December 2, 2015	15 bottles given to homeowners; 8 bottles poured onto the ground.	The 15 bottles were recovered.	5 SOPs dismissed without pay; contaminated ground removed for incineration.
	Namanjavira	December 1, 2015	10 bottles given to homeowners; 5 bottles poured onto the ground.	The 10 bottles were recovered.	7 SOPs dismissed without pay, contaminated ground removed to be incinerated.
	Muaquia	December 1, 2015	SOPs dumped 8 bottles of insecticide onto the ground; 15 bottles given to homeowners.	Insecticide given to homeowners recovered.	5 SOPs dismissed without pay, contaminated removed to be incinerated.
Queimane (pyrethroid district)	Namuinho	December 8, 2015	Attempt to steal insecticide; falsified SOP data forms; insecticide hidden in plastic pouch	Insecticide recovered	2 SOPs involved dismissed without pay.

District	Operational Site	Date	Description of Incident	Insecticide Loss	Corrective Action Taken
Milange (pyrethroid district)	Milange Sede	October 24, 2016	SOP attempted to steal insecticide; emptied 5 sachets of deltamethrin into empty water bottle; falsified SOP data forms; insecticide hidden in plastic pouch.	Insecticide recovered.	SOP dismissed without pay.
	Dachudua	November 11, 2015	Attempt to steal insecticide, falsified SOP and TL data collection forms.	Insecticide Recovered.	TL and 3 SOPs dismissed without pay.
	Milange Sede	December 18, 2015	Stolen 10L Spray Pump	No	Spray pump technician stole and sold the spray pump; taken to the police; was jailed for a week and required to pay costs of spray pump.
Molumbo (organophospho hate district)	Corromana	December 8, 2015	Attempt to steal insecticide; falsified SOP data forms; insecticide hidden in flashlights.	Insecticide recovered.	3 SOPs involved dismissed without pay.

6.6 MITIGATION OF INCIDENTS

It is difficult to attribute a singular cause that could account for the number of incidents that were experienced during the 2015 spray campaign, as they were most likely caused by the combination of many factors. Some of such factors include the following:

- **High spray targets:** the target number of structures for SOPs to spray per day was 12 structures. Some SOPs may falsify data to achieve their daily target. They then may manipulate insecticide data in order to remain consistent. This may lead to some SOPs disposing of insecticides in a wrongful way. To address this underlying issue, spray teams must be educated that targets are average values that may be met, exceeded, or even not met depending on such factors as mobilization, etc. While mobilization needs to be improved, spray teams must also be encouraged to continue to pursue their targets without compromising data quality. It may also be good to discuss with PDH/ NMCP the targets that are set for spray operators in order to come to more realistic and achievable targets for spray teams.
- **Poor supervision:** as stated earlier, poor supervision may have contributed to frequent incidents. Though most of these incidents were captured during supervisory visits, lack of strict supervision especially from team leaders and base supervisors as well as the absence of spray team supervisors had a role to play. The leadership role of team leaders needs to be highlighted, in addition to restructuring of spray teams to ensure maximum field supervision.
- **Patronage from household members:** sometimes pilfering is encouraged among spray teams when some community members are interested in offering money in exchange for insecticides to be used for purposes other than IRS. Such actions must be enforced with police actions against the spray operators and/or households involved. This must be communicated to households during mobilization and through community leaders. The potentially deadly consequences of the wrong use of insecticides should be highlighted during mobilization.
- **Quality human resources:** while it is difficult to judge character in interviews, spray team members involved in such actions must be “blacklisted” and never hired again. AIRS Mozambique and the DPS/ NMCP must agree on selection criteria for spray team members that will focus on

quality human resources. Also at trainings, such incidents should be discussed. The direct and indirect deadly consequences should be explained to spray team members.

To mitigate incidents for the next spray campaign AIRS Mozambique will work with the MOH to strengthen recruitment, training, and field supervision to address these issues discussed above and to ensure adherence to best management practices for IRS. SOPs daily targets will be revisited; NMCP would like the target to be lowered to eight structures per spray operator per day.

7. ENTOMOLOGY

AIRS Mozambique worked closely with the NMCP and the PDH to conduct entomological monitoring. The NMCP and PDH technicians, as well as the AIRS Mozambique entomology coordinator and insectary and entomology technicians, engaged in monthly mosquito collections. For monitoring vector behavior, density, species composition, and seasonality, five sentinel sites were selected (Milange, Morrumbala, Mocuba, Quelimane and Maganja da Costa). Four sites in intervention areas were selected, and one site in a comparable non-intervention district (Maganja da Costa) was selected.

Pyrethrum spray collection (PSC), human landing catches (HLC), and CDC light trap collections were carried out in these areas. PSC, CDC light trap and HLC were conducted in all the districts with the exception of Quelimane where only cone wall bioassays were conducted.

7.1 MONITORING VECTOR DENSITY, DISTRIBUTION, AND SEASONALITY AND BEHAVIOR

Entomological data collection on vector density, distribution, seasonality and behavior began three months before the start of spray operations. Collections were done monthly, including October when the spray began. In spray districts, October collections were done pre-spray.

7.1.1 PSC COLLECTIONS

A total of 308 female adult malaria vector mosquitoes (*An. gambiae* s.l. and *An. funestus* group) were collected in all areas by PSC from July to December 2015. Of the 308 mosquitoes collected in the four sites, 259 were *Anopheles funestus* s.l. (84.09%) and 49 (15.91%) were *An. gambiae* s.l. In each site, collection was done in a total of 10 houses every month. Table 18 presents the densities and number of mosquitoes collected per species in the intervention and control sites.

TABLE 18. INDOOR RESTING DENSITY IN FOUR SENTINEL SITES, JULY TO DECEMBER 2015
(*NUMBERS IN PARENTHESIS ARE DENSITY PER ROOM)

Month	Intervention (3 sites)		Control (1 site)		Total	
	<i>An. gambiae</i> s.l.	<i>An. funestus</i> s.l.	<i>An. gambiae</i> s.l.	<i>An. funestus</i> s.l.	<i>An. gambiae</i> s.l.	<i>An. funestus</i> s.l.
July	8(0.27)*	10(0.33)	5(0.50)	110(11)	13	120
August	0(0.00)	24(0.8)	8(0.80)	27(2.7)	8	51
September	0(0.00)	8(0.27)	5(0.50)	49(4.9)	5	57
October	1(0.03)	1(0.03)	1(0.10)	18(1.8)	2	19
November	2 (0.07)	0(0.00)	16(1.60)	0(0.00)	18	0
December	1(0.03)	0(0.00)	2(0.20)	12(1.2)	3	12

7.1.2 HUMAN LANDING CATCHES

HLCs were carried out in two structures (homes) per village in four villages (Samora Machel in Mocuba, Coqueiro in Morrumbala, 12 de Outubro in Milange, and Motinho in Maganja da Costa). Night-long (6 p.m. – 6 a.m.) mosquito collections were carried out to monitor vector feeding times and location. Two collectors were assigned to sit indoors and another two outdoors for nightly collections on three consecutive nights per month (July to December). However, the two people indoors and the two people outdoors were working in four shifts per night. At a given collection time, only one person was indoors in each of two houses and another person outdoors in each house respectively. Therefore, the person-night used for the calculation of biting rate for each collection site indoors or outdoors was $2 \times 3 = 6$ (2 houses \times 3 nights = 6 person nights/month).

A total of 734 adult malaria vector mosquitoes were collected using HLCs. Out of the total 734 malaria vector mosquitoes collected by the HLCs, 18.94% were *Anopheles gambiae* s.l. and 81.06% were *Anopheles funestus* s.l. HLCs showed that in general *Anopheles funestus* s.l. tend to feed indoors in the control (Maganja) area and in one of the intervention areas (Milange), and *Anopheles gambiae* s.l. tend to feed outdoors in the control area where there is no IRS, and in the Mocuba intervention area. In Milange where a relatively higher biting rate is reported, *An. funestus* s.l. tended to feed mainly indoors before and after the IRS intervention (see Tables 19 and 20).

TABLE 19: NUMBER OF ANOPHELES GAMBIAE S.L. AND ANOPHELES FUNESTUS COLLECTED BY THE HUMAN LANDING CATCHES, JULY– DECEMBER 2015

Collection Months	ENTOMOLOGICAL MONITORING DISTRICTS															
	Mocuba				Morrumbala				Milange				Maganja			
	An. funestus		An. gambiae		An. funestus		An. gambiae		An. funestus		An. gambiae		An. funestus		An. gambiae	
	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor
July	0	0	0	0	1	0	0	0	39	25	0	0	138	45	11	25
August	0	0	0	2	0	1	0	1	16	6	0	2	87	5	2	5
September	1	0	1	0	0	0	0	0	10	7	0	0	36	9	11	17
October	0	0	2	5	0	0	0	0	16	2	1	0	46	8	0	0
November	0	0	0	14	0	0	0	0	1	0	0	2	9	4	9	16
December	0	0	0	1	0	0	0	0	16	6	2	5	39	22	4	1

TABLE 20: THE BITING RATE OF ANOPHELES GAMBIAE S.L. AND ANOPHELES FUNESTUS IN INTERVENTION AND CONTROL AREAS, JULY–DECEMBER 2015

Collection Months	ENTOMOLOGICAL MONITORING DISTRICTS															
	Mocuba				Morrumbala				Milange				Maganja			
	An. funestus		An. gambiae		An. funestus		An. gambiae		An. funestus		An. gambiae		An. funestus		An. gambiae	
	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor
July	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	6.50	4.17	0.00	0.00	23.00	7.50	1.83	4.17
August	0.00	0.00	0.00	0.33	0.00	0.17	0.00	0.17	2.67	1.00	0.00	0.33	14.5	0.83	0.33	0.83
September	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	1.67	1.17	0.00	0.00	6.00	1.50	1.83	2.83
October	0.00	0.00	0.33	0.83	0.00	0.00	0.00	0.00	2.67	0.33	0.17	0.00	7.667	1.33	0.00	0.00
November	0.00	0.00	0.00	2.33	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.33	1.5	0.67	1.5	2.67
December	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	2.67	1.00	0.33	0.83	6.50	3.67	0.67	0.17

Monthly monitoring of the biting rate and vector density will continue in both the intervention and control villages to assess the seasonality of the malaria vector population and the potential impact of IRS.

7.1.3 CDC LIGHT TRAP COLLECTION METHOD

CDC light traps were used in four houses for three nights per month per district. Data was collected from July–December 2015, and collections will continue in subsequent months. See densities in Table 21. Consistent with results from HLCs, more mosquitoes were collected in Milange and Maganja da Costa compared to the other districts.

TABLE 21: NUMBER OF MOSQUITOES COLLECTED PER DISTRICT, (COLLECTION PER TRAP PER NIGHT)

Collection Months	Entomological Monitoring Districts							
	Intervention Site (Three Districts)						Control Site	
	Mocuba		Milange		Morrumbala		Maganja	
	An. funestus	An. gambiae	An. funestus	An. gambiae	An. funestus	An. gambiae	An. funestus	An. gambiae
July	0(0.00)	0(0.00)	87(7.25)	0(0.00)	10(0.83)	0(0.00)	51(4.25)	2(0.17)
August	2(0.17)	1(0.08)	61(5.08)	0(0.00)	15(1.25)	0(0.00)	10(0.83)	1(0.08)
September	0(0.00)	0(0.00)	48(4.00)	0(0.00)	15(1.25)	0(0.00)	22(1.83)	3(0.025)
October	0(0.00)	0(0.00)	31(2.58)	0(0.00)	1(0.08)	0(0.00)	7(0.58)	0(0.00)
November	0(0.00)	0(0.00)	11(0.92)	4(0.33)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
December	0(0.00)	1(0.08)	1(0.08)	2(0.17)	0(0.00)	0(0.00)	11(0.92)	0(0.00)

7.2 CONE/WALL BIOASSAY TESTS

7.2.1 QUALITY OF SPRAYING AND DECAY RATE OF INSECTICIDE SPRAYED

Standard WHO cone bioassay testing was used to evaluate the quality of spray by SOPs. The bioassay tests were conducted 24 hours after spraying in Samora Machel; 12 de Outubro; Coqueiro; and Madal and Maquival sites in the districts of Mocuba, Milange, Morrumbala and Quelimane, respectively. The decay rate testing was conducted for two months after spraying in Samora Machel, 12 de Outubro, and Coqueiro villages. In Madal and Maquival villages in Quelimane District the decay rate testing was conducted only one month after spraying due to the necessity to respray the area. Subsequent cone wall assays for the decay rate in Quelimane will continue. The wall bioassay tests showed a 100% mortality rate of susceptible mosquitoes (*Anopheles arabiensis*) exposed to Actellic® 300 CS and deltamethrin (Pali™ 250 WG) on sprayed walls in Mocuba, Morrumbala and Milange. In Quelimane, tests showed mortality less than 80%, pointing to substandard spray quality. Therefore, a re-spray of the houses in question was conducted. Two months after spray testing showed mortality remained high in Samora Machel, Mocuba District and Coqueiro, Morrumbala District. In Milange, two months after spray, a reduction in mortality to 87% was observed.

Figures 2A and 2B show the residual efficacy from the monthly cone bioassay tests on the wall surfaces of 25 structures in four districts. In each district five structures were used for the cone bioassay tests. In each house a total of four tests were conducted at the bottom, middle, and top of the wall and on the door.

FIGURE 2A: WHO CONE TEST RESULTS, AN. ARABIENSIS DURBAN STRAIN MORTALITY AFTER 24HRS, ONE AND TWO MONTHS DECAY RATE IN DISTRICTS SPRAYED WITH ACTELLIC

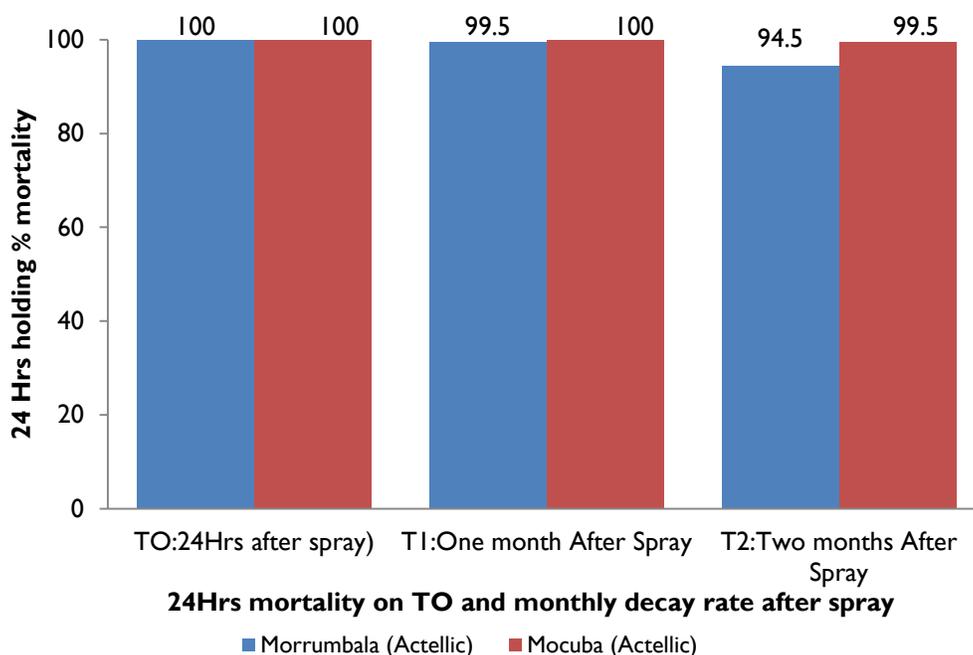
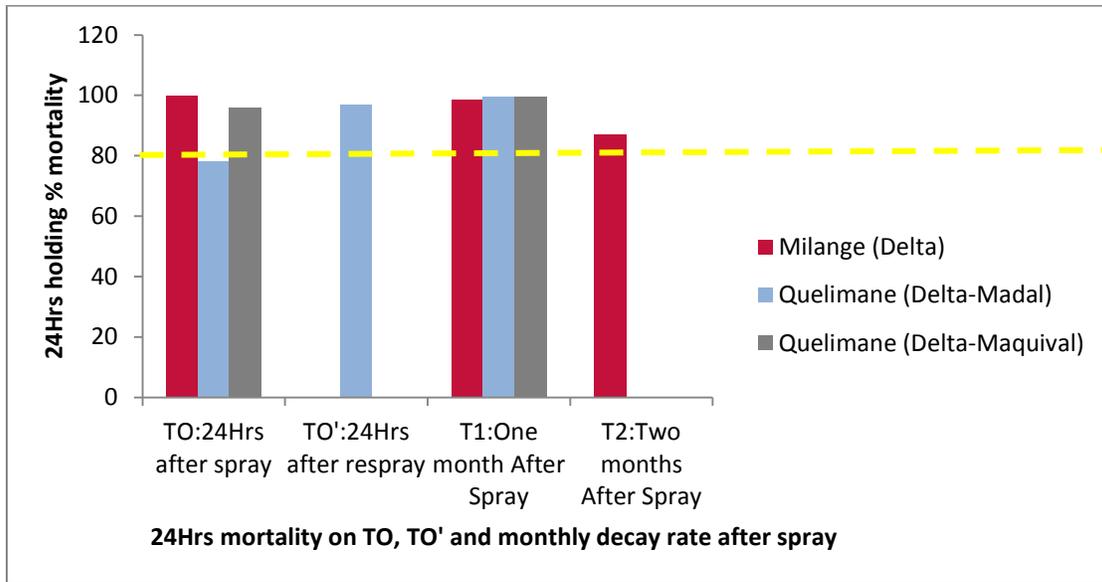


FIGURE 2B: WHO CONE TEST RESULTS, AN. ARABIENSIS DURBAN STRAIN MORTALITY AFTER 24HRS, ONE AND TWO MONTHS DECAY RATE IN DISTRICTS SPRAYED WITH DELTAMETHRIN



8. MONITORING AND EVALUATION

8.1 KEY OBJECTIVES AND APPROACH

For the 2015 spray campaign's M&E, AIRS Mozambique closely followed the processes outlined in the annual AIRS Mozambique Work Plan and the AIRS M&E Concept Paper developed by the PMI AIRS Project. AIRS Mozambique recruited a seasoned M&E Manager, and an IT/Database Manager on a full-time capacity. Both of these staff members had worked for Abt a number of years on the CHASS-SMT project; both joined AIRS by mid-August 2015. 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; and
- Document lessons learned and good practices observed in the implementation of the project activities and apply to future project years.

8.2 DATA COLLECTION AND MANAGEMENT

Data was collected using standardized data collections forms designed to capture all core PMI indicators. All data collection was preceded by training on data capture. During the spray campaign, all household data was collected by SOPs and subsequently verified by team leaders and supervisors.

In 2015, the PMI AIRS Project continued the use of standardized data quality assurance tools - the Error Eliminator (EE) and the Data Collection Verification (DCV) form - to improve supervision, and ultimately quality, of data collection and data entry. Because of the implementation of the DCV tool, specifically, during the initial phase of the campaign, the M&E team was able to identify that the coverage rate reported by SOPs was not verifiable. Although the SOPs reported several structures as being found and sprayed, the DCV data collection revealed that those structures had not, in fact, been visited or sprayed by spray teams.

After the campaign interruption, the M&E team intensified the DCV work to verify the quality and integrity of data collected during the initial phase of the campaign. Because of this work, areas of low coverage were identified and targeted for revisits and additional spraying during the second half of the campaign.

DCV was conducted in all six districts to validate and verify structures reported as sprayed by SOPs. 9,990 structures were visited by the M&E team from November 14 to December 18, 2015.

Supervision of the data collection process was carried out at various levels through field visits.

TABLE 22: NUMBER OF STRUCTURS VISITED USING THE DCV FORM

District	# Structures visited using the DCV form
Quelimane	1,250
Mocuba	2,511
Morrumbala	1,313
Derre	680
Milange	3,317
Molumbo	919
Grand Total	9,990

TABLE 23: USE OF DCV FORM: COMMON ISSUES FOUND AND CORRECTIVE ACTIONS TAKEN

Errors/Issues Observed	Corrective Actions Taken
<ul style="list-style-type: none"> Names of head of households are not filled for the non-sprayed houses. IRS Household Cards are not given to the non-sprayed houses. 	<p>These issues were addressed at morning assembly to TLs and SOPs.</p> <p>It was emphasized to the SOPs to give IRS cards to both sprayed and non-sprayed households.</p>
<ul style="list-style-type: none"> Difference between the number of population (number of men and women) reported in the SOP form and DCV. The head of household did not include the children in the total number of men and women. 	<p>The issue was discussed with spray teams and SOPs were encouraged to probe further when collecting population figures to ensure that it included all those living in the structure (adults and children).</p> <p>Example: instead of asking how many men live at home, should ask how many males live at home including children and adults.</p>
<ul style="list-style-type: none"> Structures consistently not marked on the doors by SOPs. SOPs did not record closed structures. 	<p>The issue was discussed with spray teams and SOPs during the refresher trainings and morning assemblies and SOPs were reminded to mark and record all eligible structures found in a village.</p>
<ul style="list-style-type: none"> Many houses reported as sprayed by SOP were not found. Example: SOP reported spraying 400 structures, but in the same village, there were fewer than 400 structures found or if there were 400 structures, the difference in coverage between what was found through the DCV exercise and what was reported on the SOP forms was too large. 	<p>During the refresher trainings and morning assemblies, the importance of reporting the data correctly was emphasized with spray teams and SOPs. They were also reminded how accurate data collection and reporting help in planning and evidence-based decision making.</p>
<ul style="list-style-type: none"> Loss of IRS Household Cards by households 	<p>Explained during the refresher training and morning assemblies that the card has duration of three years, so it should be kept well and in safe place. SOPs were also instructed to reiterate these points with homeowners during the campaign.</p>

8.2.1 DATA ENTRY

As in previous years, the AIRS Mozambique M&E team worked with Abt's internal CTC to strengthen the Access-based database established in 2012. The Project procured seven additional laptops, adding to the stock of data entry clerk (DEC) laptops that were available from previous campaigns. Thirty-seven DECs were employed at an original five data entry centers, a data center in each district. However, due to poor connectivity and unstable electricity in Molumbo, its data center was co-located with the Milange data center in Milange Sede. Also, given the poor infrastructure of Derre, the district was handled by the Morrumbala data center. Four to 11 DECs were assigned per data center, depending on the amount of data a district collected per day.

Data were entered simultaneously at each of the four data centers. The database was designed to allow two levels of data entry; *totals* and *details* data. *Totals* data was meant to facilitate quick reporting for program decisions, while *details* data was used for the final End of Spray Report.

Data cleaning was done at the data center-level during and after spray on a daily basis. It involved the following:

- Ensuring that all data collection forms were entered correctly (by the double entry method - both by *totals* and by *details*);
- Making necessary corrections to ensure that the *totals* and *details* data were in agreement;
- Checking and removing duplicate records; and
- Identifying and entering missing records.

Data cleaning was done using a Microsoft Access-based IRS Cleaning/Reporting tool developed by the CTC. The DECs, Database Coordinators and M&E Assistants cleaned spray data daily throughout the spray campaign with final data cleaning completed four to five days after the spray campaign was completed in each district.

This database system used an SQL server system for a single data storage site at each of the four data centers and a cloud-based file transfer system to compile data from all four data centers to develop weekly spray progress reports at the provincial level. Second round spraying (post campaign interruption) was prioritized in places where there was found to be a large discrepancy between the SOP data and the DCV findings. It was recommended that districts reconcile the data of the first and second spray rounds, comparing the findings in order to validate first round data. This reconciliation allowed for the identification of structures actually found and sprayed in the first spray round.

8.2.2 DATA STORAGE

Paper data forms are stored in three-ring binders. Spray data were filed by district, date and operational site name.

At the end of every day, all data was backed up electronically. Backup was performed in two different ways: into a backup folder on the district data entry server and the cloud backup system (Sugar Sync).

8.2.3 REPORTING

Regular district-level reporting was carried out on a daily basis for both internal planning purposes and external reporting using the automated reports in the AIRS Access Cleaning/Reporting Tool. The report provides feedback to spray teams to facilitate program management and decision-making.

On a national level, data from all six districts were aggregated to produce Weekly Spray Progress Reports for PMI, the NMCP, PDH, and SDSMAS.

8.3 RESULTS

The complete list of all indicators for the 2015 spray campaign is presented in the Monitoring and Evaluation Plan Matrix in Annex E. The following sections provide summaries on the core PMI indicators and other spray indicators.

8.4 SPRAY OPERATION DATA

During the spray campaign 383,139 eligible structures were found by SOPs, of which 337,433 were sprayed, representing 88.1% spray coverage. The total population protected by IRS (all ages) was 1,631,058. A total of 287,813 children under the age of five years and 105,400 pregnant women were protected. Table 24 provides a summary of spray results.

TABLE 24: 2015 SPRAY RESULTS SUMMARY BY DISTRICT, FOLLOWING DATA CLEANING & VERIFICATION

District	Structures Found by SOPs	Structures Sprayed	Spray Coverage	Total Population Found	Population Protected					
					Total Population	Males	Females	Pregnant Women	Children <5 Years	% Population
Derre	16,478	15,158	92%	71,351	67,625	33,301	34,324	4,735	11,726	95%
Milange	71,621	65,957	92%	337,231	319,221	157,837	161,384	19,082	52,908	95%
Mocuba	90,330	77,240	86%	476,389	408,050	201,061	206,989	29,200	74,561	86%
Molumbo	44,064	37,790	86%	199,770	178,646	91,539	87,107	10,431	33,904	89%
Morrumbala	92,685	89,021	96%	398,201	383,994	195,146	188,848	25,580	72,605	96%
Quelimane	67,961	52,267	77%	349,129	273,522	131,775	141,747	16,372	42,109	78%
Total	383,139	337,433	88%	1,832,071	1,631,058	810,659	820,399	105,400	287,813	90%

8.4.1 OTHER SPRAY INDICATORS

TABLE 25. INSECTICIDE USE PER DISTRICT

District	Structures Found	Structures Sprayed	Sachets/Bottles				SOPs			
			Issued	Returned Full	Used	Not Returned	SOP Days Worked	Structures/ SOP day	Sachets or Bottles/ SOP day	Structures/ Sachet or Bottle
Derre	16,478	15,158	15,890	5,989	9,901	0	1,580	9.6	6.3	1.5
Milange	71,621	65,957	74,110	16,722	57,388	0	7,371	8.9	7.8	1.1
Mocuba	90,330	77,240	111,569	45,331	66,236	2	11,919	6.5	5.6	1.2
Molumbo	44,064	37,790	39,130	11,037	28,093	0	3,882	9.7	7.2	1.3
Morrumbala	92,685	89,021	78,398	24,747	53,651	0	8,065	11.0	6.7	1.7
Quelimane	67,961	52,267	60,263	15,271	44,989	3	5,997	8.7	7.5	1.2
Grand Total	383,139	337,433	379,360	119,097	260,258	5⁸	38,814	8.7	6.7	1.3

⁸ Additionally, the equivalent of 21 sachets of pyrethroids and 57 bottles of organophosphates were recovered by field supervision teams

8.5 ENHANCED MALARIA REPORTING SYSTEM

8.5.1 SCOPE OF WORK/METHODOLOGY

The AIRS Mozambique enhanced epidemiological surveillance (ES) scope of work consisted of training and supportive supervision within select HFs. A Training of Trainers (TOT) for Malaria Focal Points, Chief Medical Officers, and the District Statistics Focal Points/*Núcleo de Estatística Distrital* was held in January 2013 to train them on the use of then newly rolled-out malaria data collection forms. The intention was that these HF staff members would then cascade this training down to the lower-level HF personnel. Since the TOT held in 2013, the ES activity's predominant work has been to carry out visits to the identified health facilities. While no refresher training was held in 2014, the MOH and AIRS held a two-day training in June 2015 and rolled out revised malaria collection forms, implemented as of May 2015. From January 2013-June 2015, a team consisting of the AIRS Mozambique ES Coordinator and a PDH representative visited health facilities each month. From June 2015 onwards, seven facilities in IRS/former IRS districts were targeted. During these visits, the team provided supportive supervision to the HFs, specifically focusing on the following activities:

- Distribution and use of malaria reporting forms.
- Supporting PDH trainings of HF (outpatient, pharmacy, and laboratory) staff on data collection of malaria cases and related data, further ensuring that all the health technicians are using the new malaria tools correctly.
- Cross-checking the malaria indicators between various data collection and reporting tools (e.g., patient registries, pharmacy logs, monthly malaria reports, etc.).
- Working with PDH teams to verify rapid diagnostic tests (RDTs) and artemisinin-based combination therapies (ACT)⁹ stocks.
- Raising awareness among health facility staff to request replenishment of consumables (e.g., RDTs, ACTs, forms) before stock outs occur, as well as providing training and reminders regarding how to correctly complete stock control forms and organize procurement files.
- In coordination with the PDH, collecting copies of the weekly epidemiologic bulletin (BES) at the health facilities and using the data for further analysis and improvement of the ES system.
- Following up at the district level to ensure that the district health authorities collect/receive accurate monthly malaria report datasheets from the peripheral health facilities.
- Working with PDH to ensure that all malaria drug distribution is accurately captured in all data collection mechanisms and that duplication or omissions are absent.

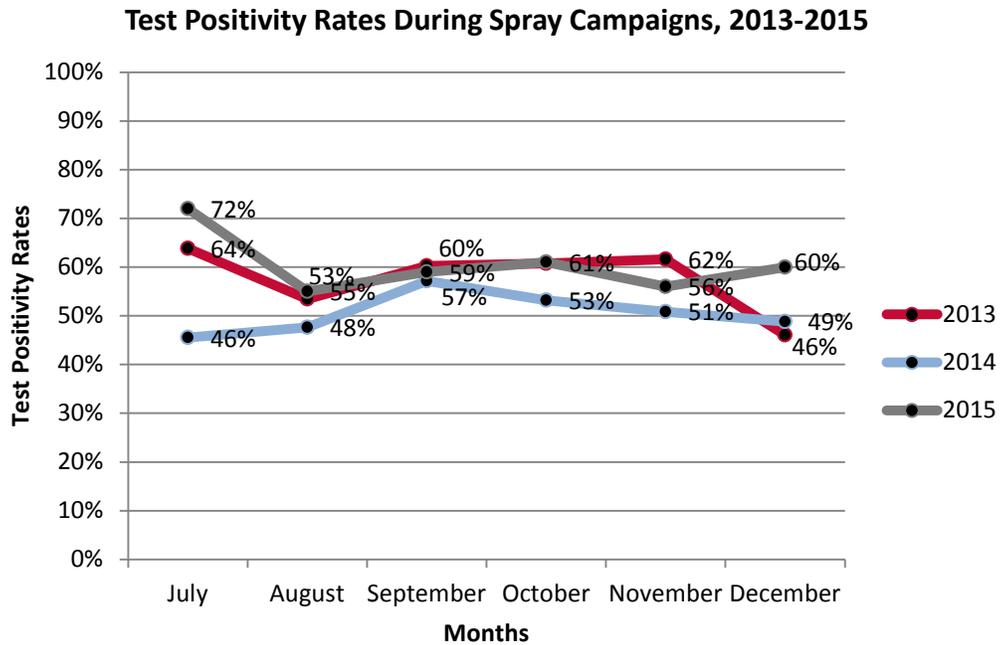
8.5.2 HEALTH FACILITIES AND SUPERVISION

During the period of July through December 2015, AIRS Mozambique's ES Coordinator's supervision visits and support to the seven health facilities was limited, as the Coordinator was pulled in to support the spray campaign serving as District Coordinator for Quelimane District. HF visits resumed in January 2016, when data for the missing months was collected. Data trends among the seven HFs indicate the average malaria test positivity rate by RDT or microscopy was 60% between July 2015 and December 2015. Test positivity rates ranged from 72% to 60% over the course of the six-month reporting period.

⁹ The ACT tracked is generically, Artemether Lumefantrine (AL).

In addition to the RDT-tested in the health facilities, a total of six patients were clinically confirmed cases during the period. Over time, the positivity rates varied, with July showing the highest positivity rate at 72% as shown in Figure 3 below.

FIGURE 3: TEST POSITIVITY RATES DURING SPRAY CAMPAIGNS



Cases and Testing, July - December 2015

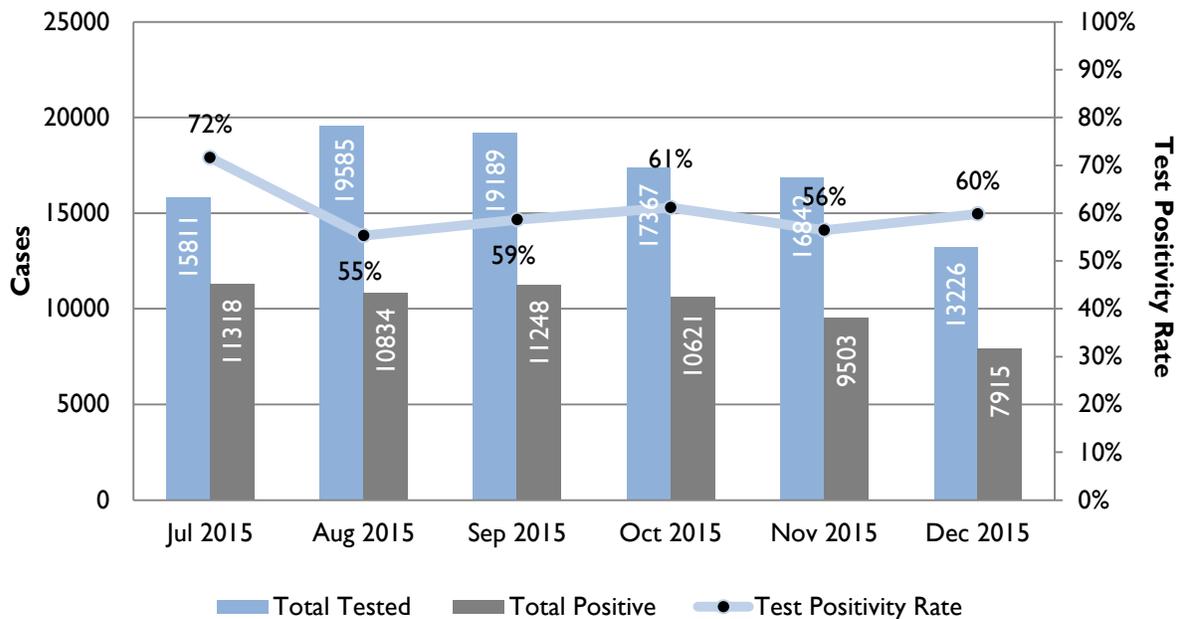


Table 26 presents data for all seven health facilities. The positivity rate is displayed in ascending order, from lowest to highest. The total number of suspected cases reported from the ES target HFs over the six-month period was 102,026. Maganja da Costa, Centro de Saúde Sede, reported the largest number of confirmed cases (20726), while Molumbo, Centro de Saúde Sede reported the fewest (2965).

The highest number of outpatient consults were reported from Maganja da Costa, Centro de Saúde Sede (32,765), followed by Quelimane, Centro de Saúde de Namuinho (17,872). The highest proportion of outpatient consults confirmed as malaria cases was found in Centro de Saúde Namuinho (64%) in Quelimane District, while Centro de Saúde Sede in Milange had the lowest number of positive cases (50%).

TABLE 26: CASES AND TESTING BY HEALTH FACILITY FROM JULY – DECEMBER 2015

Districts	Health Facility	Total Suspected	Total Tested	Total Positive	Test Positivity Rate
Milange	Centro de Saúde Sede	13,463	13,457	6,759	50%
Mocuba	Samora Machel	9,371	9,371	5,313	57%
Molumbo	Centro de Saúde Sede	5,090	5,090	2,965	58%
Mopeia	Centro de Saúde Sede	14,063	14,063	8,362	59%
Morrumbala	Centro de Saúde Sede	9,402	9,402	5,946	63%
Maganja Da Costa	Centro de Saúde Sede	32,765	32,765	20,726	63%
Quelimane	Centro de Saúde Namuinho	17,872	17,872	11,368	64%
Total		102,026	102,020	61,439	60%

9. FINANCE AND PAYMENT STRATEGIES

As established in 2013, AIRS Mozambique handles all seasonal spray personnel contracts. While contracts are between the SDSMAS and the individual, Abt facilitates the contracting process from development to signatures by both the District Directors and the individual; payments are also handled by the AIRS team. In accordance with Mozambican labor laws, in 2015, the M&E support functions, including the DECs, database coordinators and M&E Assistants were contracted directly and paid by AIRS Mozambique, without engaging a local employment agency, resulting in cost savings.

Delays in submission by the districts of the seasonal personnel lists resulted in delay of execution and signature of contracts until the second week of the spray campaign. Initially one payment was scheduled for 2015, based on the original spray calendar which projected a 35-day spray campaign. However, due to the interruption, two payment installments were agreed upon and executed.

There are no banks in four out of the six target districts. Quelimane and Mocuba are the only two districts with several operating banks at their respective city centers. Milange opened its first bank during the 2015 spray campaign. Nearly 100% of seasonal personnel do not have a bank account, and this is culturally very common in Mozambique. Historically, payment of seasonal personnel has been made in cash. With the increase of mobile payment strategies, including Mpesa (Vodacom) and MKesh (Mcell) in Mozambique, the team researched this as an option to making payments in 2015. However, neither of these two services have a network of payment agents throughout the target spray districts. As in previous years, all seasonal personnel were paid in cash, but efforts are underway to shift to alternative systems for the 2016 spray.

10. CHALLENGES

The following are a few of the key challenges faced during the 2015 campaign, including proposed solutions. It was because of these challenges that the decision was made to pause the spray campaign. It then re-started once several additional resources and controls were in place, and once refresher trainings had been conducted.

- Data Integrity:** As reported in previous sections of this report, SOPs were found forging spray data throughout the six spray districts identified through field supervision and DCV.

Solution: Spray campaign was temporarily suspended; refresher training conducted; and increased field supervision, and DCV implementation.
- Insecticide theft and waste:** SOPs were identified with stolen sachets, having dumped Actellic on the ground, and/or poured insecticide in domestic containers.

Solution: Spray campaign was temporarily suspended; refresher training conducted in insecticide handling and management, and work ethics. Team and government increased field supervision. Nearly 100 SOPs and TLs (80% SOPs and 20% TLs) were dismissed immediately without pay.
- Non-recording of unsprayed structures:** SOPs were not recording unsprayed structures. This was a recurring issue based on previous years.

Solution: Spray campaign was temporarily suspended. A separate training for TLs focused on this particular issue. AIRS Mozambique increased field supervision to ensure proper recording of structures.
- Incorrect House Marking:** SOPs failed to accurately mark structures once they were sprayed and/or mobilized for spraying; a recurring issue from previous years.

Solution: Spray campaign was temporarily suspended. Separate training for TLs focused on this particular issue, and it was stressed to SOPs during refresher training.
- Homeowners Refusals:** There were a high number of refusals in all six districts throughout the spray campaign. Refusals are a direct result of weak mobilization, lack of ownership by community leaders, and planting season.

Solution: Reinforced community mobilization. PDH conducted town hall meetings with community leaders; spray calendar was distributed to community leaders and work schedules were adjusted to better accommodate community members' planting activities.
- Weak supply chain system:** Widespread disregard for the PMI IRS BMP guidelines, the AIRS warehousing management guidelines, and the basic principles/standards of warehousing management. AIRS developed tools to be used at all points and levels of the IRS supply chain, but they were being used inconsistently.

Solution: Hired seasoned operations manager to provide senior level leadership in operations and logistics management for the remainder of the campaign. Conducted a supply chain assessment as mentioned earlier in this report.
- Weak field supervision:** The lack of both strong TL and district-level SOP supervision, along with poor use of supervisory tools resulted in substandard performance by many spray teams.

Solution: In 2015, AIRS restructured spray teams and enforced the use of supervision checklists

(i.e., AIRS tools) at all times by all supervisors, including the SDSMAS. Also, in 2015 AIRS deployed its senior staff members to each of the target districts to strengthen field supervision.

8. **Daily spray schedule:** Standard period for daily spraying in Zambezia is between 6:00 a.m. and 2:00 p.m.; however, the early morning field deployment often resulted in low spray coverage as homes were closed because homeowners are in the fields.

Solution: The 2015 experience showed that this cannot be generalized, as people in some localities are in fields; therefore adapting the daily schedule must be done at the operational site levels allowing for SOPs to move to those areas later than scheduled in order to find the population and get their structures sprayed.

9. **Poor spray technique:** Overall, the quality of spraying observed was below standard. Spray operators struggled to mix insecticide correctly and incorrect application skills and competency gaps were also observed.

Solution: At the refresher training during the pause, much attention was given to mastering the spray technique and correctly mixing insecticides for spray. Also when the spray resumed, and with the help of the entomology team, specific spray operators that still had issues with spray technique were followed and given further training in the field to improve their performance.

10. **Weak mobilization efforts:** Overall, mobilization efforts were weak. In most communities visited, household members were not aware of the coming of the spray operators.

Solution: As discussed in the previous sections, in 2015 an additional person was added to the spray teams to serve as a mobilizer/porter to strengthen the community mobilization and support spray teams. However, this revised team structure alone did not have the desired outcomes because team leaders did not do their jobs well to ensure SOP spray quality and strong community mobilization by mobilizers/porters.

II. LESSONS LEARNED

The following are a few of the key lessons learned during the 2015 campaign. Many others can be found in the recommendations section (Section 12).

1. **Seasonal Personnel Recruitment:** AIRS Mozambique should play a key role in collaboration with the SDSMAS and community leaders during recruitment of seasonal personnel at the community level. Contracts must be issued and signed prior to the start of the spray season.
2. **Substandard Training:** There were not enough trainers and there were too many trainees per trainer. The organization of the trainings was substandard. AIRS should conduct a capacity building boot camp that will include curricula for high-level and low-level trainings, including SOP training. It is also important to decentralize spray operator training to the site level. This will ensure that there are fewer numbers of trainees for each trainer. Also, spray operators that need spatial attention can be attended to and additional emphasis can be given.
3. **Importance of Team Leader Training:** AIRS should separate TLs from SOPs during training to emphasize their supervisory role.
4. **Ineffective Team Leaders:** Increase TL training for team leaders only; also TLs must participate in SOP training. For 2016 and beyond, spray teams will be restructured to reduce the number of SOPs from 6 to 4 or 5; there will also be one field supervisor for 3 spray teams.
5. **Weak Community Mobilization:** Led by the PDH historically, AIRS Mozambique must play a critical role, including:
 - Developing mobilization calendar;
 - Providing specific mobilization training;
 - Encouraging greater engagement from community leaders and community; and
 - Identifying a “chairman” for each village to increase accountability.
6. **Supervision:** Supervision structure was limited in terms of capacity and commitment by the district supervision teams. Having a cadre of supervisors similar to other AIRS countries would be very useful. In addition, supervision tools were not used consistently.

12. RECOMMENDATIONS

The following recommendations came out of an AIRS Mozambique campaign debrief meeting in December 2015. Participants included the AIRS Mozambique COP, the interim Operations Manager and Logistics Manager and AIRS Home Office:

A) Staffing Changes:

- Hire a new and seasoned operations manager; possible TCN recruitment to be based in Quelimane.
- Hire a Communications Coordinator; manager-level to be based in Quelimane.
- Hire a new Logistics/Procurement Manager to be based in Quelimane.
- Hire highly qualified district coordinators for each of the six districts.

B) Seasonal Worker Recruitment:

- Abt staff must be involved in recruitment.
- Criteria to be developed as early as possible and agreed upon with government stakeholders.
- Engage PDH to revise recruitment criteria, ensure candidates from the respective communities, (e.g., community health workers).
- Require collection of IDs as early as possible.
- Pre- and post-testing of workers should be conducted to ensure ability to properly complete M&E forms.

C) Improved Supervision:

- Need to rebuild the supervision structures/hierarchy of supervision.
 - Build a supervision cadre.
 - Engagement of PDH for increased participation in supervision.
 - For every 3 teams, there should be 1 supervisor.
 - 4-5 SOPs per TL; 1 brigade supervisor for 3 teams.
- Government supervisors to be trained along with other supervisors.
- There should be a dedicated one-day supervisor training. Supervisors should also be required to attend the TL training.
- Continue to use District Environmental and Agriculture Officers for supervision.
- Supervisors to complete all supervision forms using e-forms (Dimagi).
- Abt staff engagement in supervision should continue. This should be accompanied by a field supervision schedule with targets for all AIRS staff that will be involved in supervision.
- Increased technical and managerial capacity of AIRS Mozambique district coordinators.

D) Pre-Campaign Planning:

- Seasonal personnel contracts to be fully executed ahead of onset of spray campaign.
- Seasonal personnel must have bank accounts in districts where they are located as a criteria to contracting; AIRS Mozambique will facilitate process with local banks.
- Seasonal payments, including services providers (transportation, SOP breakfast), to be made through bank transfer or preferably through mobile payment system, such as MPesa or MKesh, if available in the districts.
- Meeting deadlines is critical to the success of a spray campaign. All deadlines must be agreed to and communicated across project implementation teams and there must be commitment and attention to these deadlines, especially those highlighted in the Race to the Starting Line. In particular, the operations manager must coordinate all deadlines and manage to them accordingly.
- Storekeeper training should include lessons and practice on how to complete all required logistics management documents.
- As part of the micro-planning, there should be a discussion and review of the the daily targets for spray operators. The 2015 spray data can be used as a basis for this discussion. There should be an understanding that these are average targets that can be met, exceeded, or not met in any particular day based on other factors (e.g., effectiveness of mobilization). Spray operators should be encouraged to put in more effort rather than being made to feel that they are doing a poor job.
- Bairro level data should be used in the designing of the spray calendar. The current localidade level spray calendar leads to poor management and dispatch of spray teams in the field.

E) IEC/Mobilization:

- AIRS Mozambique to play a key role working with the PDH and SDSMAS to implement an effective community mobilization campaign.
 - Develop mobilization calendar that is in line with the spray calendar.
 - Specific mobilization training is needed.
 - Encourage greater engagement from community and community leaders.
 - AIRS Mozambique to hire a Communications Manager. This person would liaise with government IEC point people.
- AIRS Mozambique to hire IEC assistants at each site who need to report regularly to a senior person on AIRS and check on village mobilization.
- IEC assistants would work with the six district-level government IEC point people.
 - IEC assistants would report to AIRS Communications Manager and 3 government focal points as well as District Coordinator.
- Individuals who serve as mobilizers must be individuals who come from the bairro level. Sending in mobilizers as part of spray teams may not yield bairro commitment. If bairro chairman can be involved as the mobilizers for their bairro, it will be a great way to gain bairro acceptance as in other AIRS country programs.

F) Monitoring and Evaluation:

- DEC's need to be hired earlier.
- M&E calendar to be developed earlier and to be in line with spray calendar.
- Improve reporting and tracking DEC performance.
- More oversight from M&E team on field activities.

G) Environmental Compliance:

- Consider having an EC support system at lower level.
- Make sure TLs/supervisors are empowered to be eyes/ears of EC during field operations.
- Continue enhanced IEC around insecticide safety.

H) Supply Chain Management:

- Ensure all of the AIRS warehousing best practices and tools are being used for management of IRS commodities, and that all procedures are done in accordance with the BMPs.
- AIRS to gain more control over recruitment of storekeepers.
- Replace central warehouse storekeeper.
- Recruit brand new storekeepers and have clear hiring criteria (to be shared with PDH).
- Ensure a three-day long training for storekeepers.
- New logistics manager will be responsible for training storekeepers along with the new Operations Manager.

I) Roles and Responsibilities:

- Establish clear roles and responsibilities between AIRS Mozambique and the MOH for provincial and district levels through a memorandum of understanding.

J) Improved Training:

- Future trainings should be designed to address the skill gaps observed in the seasonal workers (especially team leaders, supervisors, spray operators, and storekeepers).
- In particular, spray operator training should be decentralized to the site level to give more attention to improving spray quality of spray techniques. As a result, the TOT should also include building capacity of the base supervisors and field supervisors on how to train spray operators and team leaders.
- Refresher trainings are needed for DPS staff to update them on current trends in IRS implementation and management.

ANNEX A: INTERNATIONAL AND LOCAL PROCUREMENT

Items	Quantity Procured
International Procurement	
Hilux Toyota Vehicle (Restricted Commodity)	2
Insecticide (Actellic CS) Bottles	186,192
Masks (Boxes)	251
Face Shield	1500
Gloves (Short) 216(sz7) 72(sz10) 720(sz9) 792(sz8)	1800
Hudson Spray Pump (138) Pressure Gauge, (65) 3/4 Gal Kits	138 & 65
8002E Spray Pump CFVs (paid out of Core funds)	1600
Local Procurement	
IRS Household Cards	499,720
Helmets	600
Batteries	6584
Towels	2,600
Plastic 100 meter sheets	54
Tool kits	25
Clipboards	1300
Laundry Detergent (150 grms sachets)	5725
Pregnancy Tests	875
SOP Uniform 2-pc	3,113
Engine oil for pump lubricating (liters)	40
Gum Boots (pairs)	800
Flashlights	1270
Washer Aprons	30
Padlocks	58
Calculators	250
SOP Bag	1300
Megaphones	84
SOP socks (pairs)	2600
Tooth brushes	1300
First Aid Kits (Contents BMP required for PY & Ops)	79

ANNEX B: POST SPRAY CAMPAIGN PROGRAM INVENTORY

Description	Initial Stock	Procured in 2015	Total Stock	Used and/or Damaged/lost	Stock Balance
Insecticide (Actellic CS) Bottles	0	186,192	186,192	126,328	59,864
Insecticide (Deltamethrin) Pali Sachets (GF funding)	43,701	345,500	389,201	133,420	255,781
Insecticide (K-Othrine) Sachets	4,047	0	4,047	4,047	0
Megaphones	99	84	183	24	159
Markers	4,679	0	4,679	4,134	545
Adhesive tape	136	0	136	88	48
Calculators	110	250	360	244	116
Clipboards	21	1,300	1,321	1,321	0
First Aid Kits Contents	0	79	79	79	0
Pregnancy tests	0	875	875	815	60
Washer Aprons	61	30	91	15	76
TL/Base Supervisor Vests	275	0	275	33	242
Masks	28,896	34,632	63,528	58,346	5,182
Rubber Gloves (short)	167	1,800	2,067	704	1,363
Rubber Gloves (long)	358	0	358	91	267

Funnels with filter	362	0	362	63	299
Detergent (150g)	298	5,725	6,023	5,881	142
Batteries	304	6,584	6,888	6,317	571
Flashlights	67	1,270	1,337	951	386
Strainers (large)	50	0	50	0	50
Towels	354	2,600	2,954	1,417	1,537
Leather boots (pairs)	4	0	4	0	4
Gum Boots (pairs)	1,382	800	2,182	503	1,679
SOP Uniform 2-piece	1,109	3,113	4,222	948	3,274
SOP Bags	1,519	1,300	2,819	812	2,007
Head/Shoulder Protector	2,297	0	2,297	374	1,923
Bracket Metal	1,814	0	1,814	72	1,742
Face shields	1,541	1,550	3,091	0	3,091
Helmets	1,100	600	1,700		1700
Grass/Weed Cutter (handheld)	23	0	23	0	23
Machetes	13	14	27	10	17
Rakes	13	0	13	5	8
Hoes	13	0	13	2	11
Shovel	32	0	32	8	24
Rope 100m	5	54	59	41	18
Pipe Wrenches	10	0	10	0	10
Screwdriver	9	0	9	0	9
Hammers	24	0	24	0	24
Pliers	8	0	8	0	8
Wrench (size 10/11)	7	0	7	0	7
Rakes	5	0	5	0	5

10L Hudson Spray Pumps	1,938	0	1,938	1	1,937
Hudson Spray Pumps (65) 3/4 Gal Kits	4	65	69	39	30
8002E Spray Pump CFV	0	1.600	1.600	110	1.490
Fire Extinguishers	0	45	45	0	45
Tooth Brushes	0	1.300	1.300	1.300	0

ANNEX C: ENVIRONMENTAL MONITORING AND MITIGATION REPORT

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
Pre-contract inspection and certification of vehicles used for pesticide or spray personnel transport	Vehicles were inspected by the ECO in collaboration with Environmental and Agriculture officials, SDSMAS, and transportation department.	Two vehicles found non-compliant	Issues rectified, before these two vehicles were contracted.
Driver training	Conducted training for drivers on safety issues while transporting SOPs.	Two drivers found non-compliant; driver's license expired.	Issues rectified, driver's license renewed.
Cell phone, PPE and spill kits on board during pesticide transportation	All responsible people in handling pesticides were given PPE, and emphasized use at all times whenever at the operational sites.	One seasonal personnel found non-compliant, not wearing full PPE	Issue rectified.
Pre-spray pregnancy testing for female candidates	Females found pregnant assigned to roles of mobilizers/porters.	No issues or red flags identified during inspection.	Compliant
Health fitness testing for all SOPs	Spray personnel were not medically tested.	Health fitness testing has not been implemented in Mozambique as part of the recruitment process.	Non-Compliant; health fitness will be implemented beginning in 2016.
Procurement of, distribution to, and training on the use of PPE for all workers with potential insecticide contact	Training on PPE use while handling insecticide conducted.	No issues identified during inspection.	Compliant
Training on mixing insecticides and the proper use and maintenance of spray pumps	SOPs were trained on mixing insecticides before spraying.	No red flags identified during inspection; however, systemic issues were identified through field supervision. At the refresher training during the campaign pause, all spray personnel attended a three-day training that concentrated on spray	Not fully compliant

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
		techniques and insecticide mixing.	
Provision of adequate facilities and supplies for end-of-day cleanup	Wash soap and other supplies were provided to facilitate end-of-day clean up.	No issues identified durign inspection.	Compliant
Enforce clean-up procedures.	Seven progressive rinsing barrels available in each of the wash bays; procedures to SOPs, TLs and washers.	No issues identified during inspection.	Compliant
Prohibition of spraying houses not properly prepared.	Households were prepared before spraying activities.	No issues identified during inspection.	Compliant
Two-hour exclusion from house after spraying	This was emphasized by SOPs and TLs.	No issues or red flags identified during inspection.	Compliant
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 visit health centers in case of contact with insecticide.	No issues or red flags identified during inspection.	Compliant
Indoor spraying only	Spraying was done inside the households.	No issues or red flags identified during inspection.	Compliant
Training on proper spray technique	Training of SOP was conducted with application of spraying techniques.	No issues or red flags identified during inspection	Compliant
Maintenance of pumps	Pump repair and maintenance was done before spray campaign.	No issues or red flags identified during inspection.	Compliant
Choose sites for disposal of liquid wastes according to PMI BMPs.	All contaminated liquid wastes were disposed in the soak pits.	No issues or red flags identified during inspection.	Compliant
Construct soak pits with charcoal to adsorb pesticide from rinse water	Construction (2) and rehabilitation (3) of soak pits were supervised by ECO in coordination with environmental officials of the government.	No issues or red flags identified during inspection.	Compliant
Maintain soak pits as necessary during season.	Cleaning of soak pits was done in two spray sites during spray campaign.	No issues or red flags identified during inspection.	Compliant
Inspection and certification of solid waste disposal sites before spray campaign.	Conducted by ECO in coordination with environmental officials of the government.	No issues or red flags identified during inspection.	Compliant

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
Monitoring waste storage and management during campaign.	All wastes from spray site stores were properly stored in district stores prior to transport to central warehouse for disposal post campaign.	No issues or red flags identified during inspection.	Compliant
Monitoring disposal procedures post-campaign.	All IRS wastes were accompanied to disposal sites by ECO. This happened in all spray sites that ECO visited during the spray.	No issues or red flags identified during inspection.	Compliant
Maintain records of all pesticide receipts, issuance, and return of empty sachets/bottles.	Proper records of the stock was maintained and checked.	No issues or red flags identified during inspection; however, out of the 30 storehouses only five were found without any issue during the supply chain verification.	Not fully compliant
Reconciliation of number of houses sprayed vs. number of sachets/bottles used	The ledger books were being reconciled.	Of the 19 storekeepers inspections, there were four instances where the stockcard was found not to be up to date.	Not fully compliant
Visual examination of houses sprayed to confirm pesticide application	Supervisors examined houses sprayed and to see if all SOP used spraying techniques acquired from training.	No issues or red flags identified during inspection; however, as stated in earlier sections, spray quality was an issue identified early in the spray campaign and was one of the leading reasons for the interruption of the campaign.	Not fully compliant
Perform physical inventory counts during the spray campaign.	All inventory checks were done by AIRS District Coordinators, storekeepers and site supervisors during the spraying campaign in all district stores.	No issues or red flags identified during inspection; however, as previously stated, there were deficiencies and issues found during the supply chain verification.	Not fully compliant

ANNEX D: SOLID WASTE MANAGEMENT PLAN

Category	Quantity	Procedure	Completion Date
PY Sachets	130,466 of empty sachets of Pali & 3,893 K-Othrine	Empty sachets are maintained in the same storage room at the operational sites as the insecticide throughout the spray campaign. They are counted at the end of each day, cross-referenced with the number of sachets distributed to TLs at morning deployment, and unused sachets are returned by TLs at the end of spray day and audited at the end of each spray week (Saturday). Empty sachets were kept in the empty insecticide boxes, consolidated by District until transported to the Central Warehouse (Quelimane) for final counting, and readiness for incineration, post spray campaign.	January 5-7, 2016
Actellic CS Bottles	126,328 empty bottles	Empty Actellic bottles are triple rinsed in the field at the time of insecticide mix, empty bottles kept in the operational site stores in its original boxes, inventoried and picked up weekly and transported to the district level stores. Due to the limited space in the district level stores, empty bottles are transported to the Central Warehouse weekly. Empty bottles were kept in the empty insecticide boxes until consolidated at the district level and transported to the Central Warehouse (Quelimane) for final counting, and prepped for recycling. AIRS Mozambique is exploring INCALA, a Quelimane-based company that shows real possibility to recycling, including a return to PMI AIRS Project with basins for washing PPE and Triple Rinsing Buckets.	TBD
Cardboard Boxes & clipboards	215 cardboard boxes and 726 clipboards	Empty contaminated insecticide cardboard boxes of both the deltamethrin (K-Othrine and Pali™ 250 WG), and Actellic CS were incinerated with the remainder of the hazards materials generated by the spray campaign at Ceramica Okanga located in Nicoadala District.	January 5-7, 2016

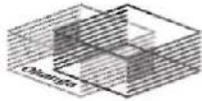
Category	Quantity	Procedure	Completion Date
SOP and Washers' Rubber Gloves	Estimated 388 pairs of gloves	All damaged SOPs and washers' gloves were thoroughly washed with water and soap, and sent to a local landfill in Mocuba District.	February 15, 2016
Gum Boots	314 pairs	All damaged and unusable boots were thoroughly washed with water and soap. Damaged, but still usable boots will be offered/ given to SOPs as appropriate. SOPs will be warned that these damaged boots cannot be used in chemical environments. AIRS Mozambique is exploring recycling facilities for all the unusable boots. Otherwise, these boots will be sent to a local landfill in Mocuba District.	February 15, 2016
Dust Masks	46,812 dust masks	This year, dust masks were used once only in accordance to established standards for IRS. Following the same procedure of the daily handling and management of empty sachets and plastic bags, used masks by SOPs, TLs, washers, storekeepers, and all other personnel working in the field, were kept in empty insecticide boxes in the insecticide storage room at the operational site, consolidated at the district level, until transported to the Central Warehouse for final counting, and readied for incineration post spray campaign.	January 5-7 2016
2-piece Uniform, Entomology sheets, SOP bags, socks	450; 112; 577; and 588 pairs of socks respectively	Following guidelines by AIRS COR team through AIRS ECM, damaged and/or unusable overalls will be washed and set aside for incineration with all other hazardous waste after the spray campaign. Damaged, but still usable overalls will be offered/given to SOPs when appropriate. Otherwise, 2-piece uniform and/or overalls which are not given to SOPs were set aside and incinerated with other solid waste.	January 5-7 2016
Charcoal & Saw Dust	75 Kgs of degraded charcoal, and 37.5 Kgs of degraded saw dust	Resulting from the pre-spray assessment of the existing operational sites in the 6 districts, degraded charcoal and sawdust was replaced in 3 soak pits in Guerrissa, Maquival, and Munhiba with new charcoal and saw dust. Both the degraded sawdust and charcoal were stored in large heavy-duty plastic bags, and are stored in the local operational site designated for Solid Waste. Both of these items will be included with other solid waste generated by the spray campaign and incinerated accordingly.	January 5-7, 2016

Category	Quantity	Procedure	Completion Date
Insecticide (Actellic) contaminated ground	35 Kgs of soil removed where SOPs had dumped insecticide in Mocuba District	Ground where SOPs dumped Actellic insecticide in Mocuba District was removed about 4 to 5Kgs in each location, stored in heavy plastic bags, and transported to the central warehouse.	20 kgs. was incinerated on Jan 5-7, 2016; remainder was stored in the central warehouse and incinerated Feb. 24, 2016.
Insecticide (Actellic) poured into domestic bottles	57 bottles	During the 2015 spray campaign Actellic (57 bottles equivalent) poured into domestic containers (1.5 liter water bottles, or 5 liter water jugs) recovered by field supervision teams was transported to the central warehouse. This insecticide is scheduled for incineration. However, there is not an incinerator in Mozambique equipped or licensed to handle insecticide incinerations. AIRS has submitted a request to the Food & Agriculture Administration to handle pick-up and disposition, in conjunction with the disposition of DDT from non PMI target provinces.	Pending pick-up by FAO
Insecticide (Deltamethrin)	21 sachets	During the 2015 spray campaign, deltamethrin (21 sachets equivalent) poured into plastics bags, recovered by field supervision teams was transported to the central warehouse. This insecticide is scheduled for incineration. However, there is not an incinerator in Mozambique equipped or licensed to handle insecticide incinerations. AIRS has submitted a request to the Food & Agriculture Administration to handle pick-up and disposition in conjunction with the disposition of DDT from non PMI target provinces.	Pending pick-up by FAO

ANNEX E: SAMPLE RECYCLING PRODUCT



ANNEX F: CERTIFICATE OF INCINERATION



CERÂMICA E CARPINTARIA DE NICOADALA LDA.

CERTIFICADO

CERÂMICA E CARPINTARIA DE NICOADALA LDA.

Certifica-se que neste mês de Janeiro do corrente ano, nos fornos desta Fábrica de Cerâmica se procedeu a inceneração dos resíduos sólidos nomeadamente: 134.359 saquetas vazias de deltametrina, 46.812 máscaras usadas e 215 caixas vazias de insecticida, levadas a cabo pela ABT na pessoa da ambientalista da empresa.

Quelimane, aos 18 de Janeiro de 2016

CERÂMICA E CARPINTARIA DE NICOADALA, LDA.
CADAPOSTAL Nº 19 - ZAMBEZA - NICOADALA

Afonso João

Afonso João

ANNEX G: MONITORING AND EVALUATION PLAN INDICATOR MATRIX

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
Component I: Establish cost-effective supply chain mechanisms and execute logistical plans								
I.1 Procurement								
I.1.1 Number and percentage of insecticide procurements that had a pre-shipment QA/QC test at least 60 days prior to spray campaign	<i>Data source:</i> Project records – insecticide procurements <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	I; 100%	1				
I.1.2 Number and percentage of international insecticide procurements delivered in country, at port of entry, at least 30 days prior to the start of spray operations	<i>Data source:</i> Project records – international procurements <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	I; 100%	1				
I.1.3 Number and percentage of international equipment procurements, including PPE, delivered in country, at port of entry, at least 30 days prior to start of spray operations	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	I; 100%	2				

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
1.1.4 Number and percentage of local procurements for PPE delivered 14 days before the start of spray operations	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	1; 100%	2				
1.1.5 Successfully completed spray operations without an insecticide stock-out	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	Completed	1; 100%	Completed				
1.1.6 Complete exemption and clearance process within the minimum 2 weeks	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	Completed	Completed				
1.2 In-Country Logistics, Warehousing, and Training								
1.2.1 Number and percentage of logistics and warehouse managers trained in IRS supply chain management	<i>Data source:</i> Training records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign By Gender	29; 100%	33 30 Men, 3 Women; 9% Women				
1.2.2 Number and percentage of base stores where physical inventories are verified by up-to-date stock records	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	21; 100%	23; 100% ¹⁰				
1.2.3 Submit up-to-date inventory records 30 days after the end of each spray campaign	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	Completed	Completed				

¹⁰ Approved work plan included rehabilitation of the 21 operational sites; two new sites were built (one in Quelimane and one in Molumbo)

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
Component 2: Implement safe and high-quality IRS programs and provide operational management support								
2.1 Planning and Design of IRS Programs								
2.1.1 Annual PMI AIRS country work plan developed and submitted on time	<i>Data source:</i> Project records <i>Reporting frequency:</i> Annually	By Spray Campaign	Completed	Completed				
2.1.2 Percentage reduction in project operational expenses per structure from the previous year, excluding insecticide costs.	<i>Data source:</i> Project financial records <i>Reporting frequency:</i> Annually	By Spray Campaign	5%	N/A ¹¹				
2.2 Support of Safety and Health Best Practices and Compliance with USAID and Host Country Environmental Regulations								
2.2.1 SEA/letter reports submitted on time based on schedule agreed upon with the PMI COR team	<i>Data source:</i> Project records – submitted SEAs/letter reports <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	Completed	Completed				
2.2.2 Number of spray personnel trained in environmental compliance and personal safety standards in IRS implementation	<i>Data source:</i> Project records – Training reports <i>Reporting frequency:</i> Each spray season	By Spray Campaign By Gender	1,505	1,886 ¹² 1,281 Men, 605 Women				
2.2.3 Number of health workers receiving insecticide poisoning case management training in IRS implementation	<i>Data source:</i> Project records – Training reports <i>Reporting frequency:</i> Each spray season	By Spray Campaign By Gender	28	25 22 Men, 3 Women; 9% (women)				

¹¹ Given the additional costs incurred due to the campaign's interruption, cost reduction was not measured.

¹² This number includes ToT training, SOP training, Warehouse Managers, Washers, and ECO training.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
2.2.4 Number of adverse reactions to pesticide exposure documented	Data source: Incident report forms Reporting frequency: Each spray campaign	By Spray Campaign By Residential/occupational exposure	0	0				
2.2.5 Number and percentage of soak pits and storehouses inspected and approved prior to spraying	Data source: Project records – Reports submitted by district environmental officers Reporting frequency: Each spray season	By Spray Campaign By Soak Pit By Storehouse	21 soak pits 23 storehouses	23 soak pits ¹³ 23 Storehouses				
2.3 Conduct Communications Activities and Community Mobilization								
2.3.1 Number of radio spots and talk shows aired	Data source: Project records Reporting frequency: Per spray campaign	By Spray Campaign	1,000	750				
2.3.2 Number of IRS print materials disseminated	Data source: Project records Reporting frequency: Semi-annually	By Spray Campaign By Type of printed material and message(s)	n/a	n/a				
2.3.3. Number of people reached with IRS messages via door-to-door mobilization	Data source: Mobilization Data Collection Forms Reporting frequency: Daily per mobilization conducted	By Spray Campaign By Gender	n/a	n/a				

¹³ Approved work plan included rehabilitation of the 21 operational sites; two new sites were built (one in Quelimane and one in Molumbo)

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
2.4 Spray Targeted Structures According to Technical Specifications								
2.4.1 Number of structures targeted for spraying	Data source: Previous spray campaign data, enumeration data (targets); Daily SOP Forms (results) Reporting frequency: Daily per spray campaign	By Spray Campaign	468,239	383,139				
2.4.2 Number of structures sprayed with IRS	Data source: Daily SOP Forms Reporting frequency: Daily per spray campaign	By Spray Campaign	398,003 (85% of target)	337,433				
2.4.3 Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	Data source: Daily SOP Forms Reporting frequency: Daily per spray campaign	By Spray Campaign	85%	88%				
2.4.4 Number of people residing in structures sprayed (Number of people protected by IRS)	Data source: Daily SOP Forms Reporting frequency: Daily per spray campaign	By Spray Campaign By Gender By pregnant women By children <5 years old	2,177,912	1,631,058 810,659 Men, 820,399 Women 105,400 Pregnant Women 287,813 Children <5				
Component 3: Ongoing Monitoring and Evaluation and Quality Control Measures								
3.1 Submit PMI-approved M&E plan to PMI-Mozambique for	Data source: Project records	By Spray Campaign	Completed	Completed				

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
approval	Reporting frequency: Semi-annual							
3.2 Conduct a post-spray data quality audit within 60 days of completion of spray operations	Data source: Spray operations reports Reporting frequency: Per spray campaign	By Spray Campaign	Completed	In Progress				
Component 4: Contribute to Global and Country-Level IRS Policy Setting and Develop and Disseminate Experiences and Best Practices								
4.1 Number of guidelines/checklists/tools related to IRS operations developed or refined with project support	Data source: Project records – Activity reports Reporting frequency: Semi-annually	By Spray Campaign By Guideline/checklist/tool	9	9				
4.2 Number of articles/best practices documents published	Data source: Project records – Activity reports Reporting frequency: Semi-annually	By Spray Campaign By IRS Technical Area	0	0				
4.3 Number of best practice presentations given at national/regional/international workshops and conferences	Data source: Project records – Activity reports Reporting frequency: Semi-annually	By Spray Campaign By IRS Technical Area	0	0				
4.4 Number of enterprises engaged through public-private partnerships	Data source: Project records – Activity reports Reporting frequency: Semi-annually	By Spray Campaign	0	0				

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
Component 5: Contribute to the collection and analysis of Routine entomological and epidemiological data								
5.1 Support entomological monitoring activities and insecticide resistance strategies								
5.1.1 Number of entomological sentinel sites supported by the PMI AIRS Project established to monitor vector bionomics and behavior (vector species, distribution, seasonality, feeding time, and location)	Data source: Entomological reports Reporting frequency: Annually	By Spray Campaign	4	4				
5.1.2 Number and percentage of entomological monitoring sentinel sites measuring all the five primary PMI entomological monitoring indicators	Data source: Entomological reports Reporting frequency: Annually	By Spray Campaign	4	4; 100%)				
5.1.3 Number and percentage of entomological monitoring sites measuring at least one secondary PMI indicator	Data source: Entomological reports Reporting frequency: Annually	By Spray Campaign	0 out of 0 planned	0 out of 0				
5.1.4 Number and percentage of insecticide resistance testing sites that tested at least one insecticide from each of the four classes of insecticides recommended for malaria vector control	Data source: Entomological reports Reporting frequency: Annually	By Spray Campaign	4; (4/4=100%)	4;100%				
5.1.5 Number of wall bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS*	Data source: Entomological reports Reporting frequency: Per spray campaign	By Spray Campaign	15 (test conducted in 12 houses in 3 of 4 target districts,	20 (tests conducted in 20 houses in 4 targeted districts)				

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results						
			Year 1		Year 2		Year 3		
			Target	Results	Target	Results	Target	Results	
			Quelimane not included)						
5.1.6 Number of wall bioassays conducted after the completion of spraying at monthly intervals to evaluate insecticide decay	Data source: Entomological reports Reporting frequency: Per spray campaign	By Spray Campaign	75 (in 15 houses at months 1, 2, 3, 4 and 5)	In progress; 70 bioassays have been conducted to date.					
5.1.7 Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites	Data source: Entomological reports Reporting frequency: Per spray campaign	By Spray Campaign By Type of Insecticide	16; (4 sites each testing all 4 classes)	17 ¹⁴ ; (3 sites, two of them tested for all four classes and two repetitions.)					

¹⁴17 tests conducted; including test repeats in Mocuba and Morrumbala (Mocuba =9 (Delta, Delta II, Delta III, Lambda, Lambda II, Lambda III, Bendio, DDT and Fenitro), Morrumbala= 7 (Delta, Delta II, Delta III, Lambda, DDT, Fenitro and Bendio); Milange =1 (Delta)

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
5.2 Support Epidemiological Malaria Data Collection and Analysis								
5.2.1 Collect routine epidemiological data	Data source: <i>Project Reports</i> Reporting Frequency: Annually	By Spray Campaign	Completed	Completed				
5.2.2 Number of targeted health facilities with routine epidemiological malaria data collection supported by the PMI AIRS Project	Data source: Epidemiological reports Reporting frequency: Annually	By Spray Campaign	7	7				
Component 6 (Cross-cutting): Capacity Building, Knowledge Transfer, Gender Inclusion								
6.1 Increasing the Role of Women and Addressing Gender Barriers								
6.1.1 Number of people trained to deliver IRS in target districts	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign By Gender Percentage of Women Trained	1,408 563 women 40%	1,746 1,239 Men, 507 Women; 29% of those trained were women				

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
6.1.2 Total number of people trained to support IRS in target districts	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign By Spray Campaign By Gender Percentage of women trained	1,774 710 women 40%	2,117 1,494 Men, 623 Women; 29% of those trained were women				
6.1.3 Number of women recruited for IRS employment	Data source: Project records – Recruitment reports reports Reporting frequency: Semi-annually	By Country By Percentage of women recruited	33%	627 or 35%				
6.1.4 Number of people trained as IRS Training of Trainers (ToT)	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign By Gender Percentage of women trained	34 5 women 15%	41 32 Men, 9 Women; 22% of those trained in ToT were women				
6.1.5 Total number of people hired to support IRS in target districts	Data source: Project records – Contracts signed Reporting frequency: Semi-annually	By Spray Campaign Gender Percentage of women hired	1,419 568 women 40%	1,772 1,145 Men, 627 Women; 35% of those hired are women				

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
6.1.6 Number of women hired in supervisory roles in target districts (this number includes site supervisors, TLs, M&E assistants and others who supervise seasonal staff)	Data source: Project records – Contracts signed Reporting frequency: <i>Semi-annually</i>	By Spray Campaign Percentage of women hired	102 40%	43; 19% of those in supervisory roles are women				
6.1.7 Number of staff (permanent and seasonal) who have completed gender awareness training	Data source: Project records – Training reports Reporting frequency: <i>Semi-annually</i>	By Spray Campaign Gender Percentage of women hired	26 10%	60 43 Men, 17 women; 16% of those who completed gender awareness training are women				
6.2 Capacity Building								
6.2.1 Number of government officials trained in IRS oversight	Data source: Project records – Training reports Reporting frequency: <i>Semi-annually</i>	By Spray Campaign By Gender Percentage of Women Trained	42	33 26 Men, 7 Women; 21% Women				
6.2. Implement all activities outlined in yearly Capacity Building Action Plan	Data source: Project records – Capacity assessment reports Reporting frequency: <i>Semi-annually</i>	By Spray Campaign	Completed	Completed				

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
6.2.3 Mozambican government implements at least one aspect of the IRS program independently.	Data source: Project records – MOUs Reporting frequency: Semi-annually	By Spray Campaign	Completed	SDSMAS' handled all seasonal personnel recruitment; and community mobilization ¹⁵				

* PMI Indicator

¹⁵ SDSMAS led seasonal personnel recruitment in collaboration with community leaders in the six districts; community mobilization was conducted by the PDH and the SDSMAS.