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PMI | Africa IRS (AIRS) Project
Indoor Residual Spraying (IRS 2) Task Order Six

MOZAMBIQUE
END OF SPRAY REPORT 2016
SPRAY CAMPAIGN: OCTOBER 5 - NOVEMBER 26, 2016

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CONTENTS

Acronyms	v
Executive Summary	vii
1. Introduction	1
1.1. Project Objectives in 2016	1
1.2. Spray Sites.....	2
1.3. Insecticide Selection	4
2. Pre-Spray Activities	5
2.1. Micro-planning	5
2.2. Logistics needs and procurement.....	5
2.3. Human Resources Requirements	6
2.4. Training.....	7
3. Communications Activities	13
3.1. Preparation Stage (Pre Spray Campaign).....	13
3.2. Implementation Stage (During the Campaign)	13
3.3. IEC Material	14
3.4. Communication Findings and Recommendations	15
4. Spray Activities	17
4.1. Spray Operations.....	17
4.2. Logistics and Stock Management.....	20
5. Post-Spray Activities	21
5.1. Closing of IRS Operations	21
5.2. Logistics	21
6. Environmental Compliance	23
6.1. Pre-Season Environmental Assessment.....	23
6.2. Safety and Environmental Compliance during and after the Spray Campaign	25
6.3. Management of Insecticide Adverse Effects	27
6.4. Solid Waste Management	27
6.5. Incident Reports	27
6.6. Mitigation of Incidents	30
7. Entomology	31
7.1. Quality Assurance of IRS Program	31
7.2. Residual Efficacy of Actellic 300 CS.....	32
7.3. Disease Data Management Systems	32
8. Monitoring and Evaluation	33
8.1. Key Objectives and Approach.....	33
8.2. Data Collection and Management	33
8.3. Data Entry.....	36

8.4.	Data Storage	37
8.5.	Reporting	37
8.6.	Results.....	37
8.7.	Spray Operations Data	37
8.8.	Directly Observed Spraying.....	37
8.9.	Mobile Data Collection, Messaging and Reporting	39
9.	Challenges.....	43
10.	Recommendations	45
Annex A:	International and Local Procurement.....	47
Annex B:	Post Spray Campaign Program Inventory.....	51
Annex C:	Environmental Mitigation and Monitoring Report (EMMR)	55
Annex D:	Solid Waste Management Plan.....	61
Annex E:	Sample Recycling Product	63
Annex F:	Certificate of Incineration.....	65
Annex G:	Monitoring and Evaluation Plan Indicator Matrix.....	67

LIST OF FIGURES

Figure 1:	Map of Zambezia Province.....	2
Figure 2:	Cone Wall Bioassay Quality Assurance Summary	31
Figure 3:	Spray Coverage Based on DCV & SOP's Data Forms	36
Figure 4:	Directly Observed Spraying Red Flags Over Time (n=1700 over 39 days).....	38

LIST OF TABLES

Table 1:	2016 Spray Campaign Results at a Glance.....	viii
Table 2:	PMI-Funded IRS Coverage in Zambezia Province, 2007–2016.....	3
Table 3:	Seasonal Personnel by Numbers and Gender	6
Table 4:	2016 Training Dates and Description.....	7
Table 5:	2016 Training Matrix.....	11
Table 6:	People Trained to Deliver IRS with USG Funds.....	12
Table 7:	IRS Campaign Communication Activities	14
Table 8:	Distribution of Spray Teams by District and Operational Sites.....	19
Table 9:	Post Spray Insecticide Inventory Expiry Dates.....	22
Table 10:	Rehabilitation and Improvements of Operational Sites.....	24
Table 11:	Pre-Spray & Mid-Spray Pregnancy Test Results.....	25
Table 12:	Incident and Exposure Reports	Error! Bookmark not defined.
Table 13:	Cone Wall Bioassay Test Results Summary	31
Table 14:	Data Collection and Quality Assurance Tools	34
Table 15:	Number of Structures Visited Using the DCV Form	34
Table 16:	Use of DCV : Common Issues Found and Corrective Actions Taken	35
Table 17:	Data Collection Verification Coverage based on DCV by District	35
Table 18:	2016 Spray Results Summary by District.....	41
Table 19:	Insecticide Use By District.....	41
Table 20:	Non Sprayed Structures	43

ACRONYMS

AMETRAMO	<i>Associação dos médicos tradicionais de Moçambique</i> (Association of Traditional Healers of Mozambique)
AIRS	Africa Indoor Residual Spraying
BCC	Behavior Change Communication
BMP	Best Management Practices
BS	Brigade Supervisor
CISM	<i>Centro de Investigação em Saúde de Manhiça</i> (Center for Health Research)
CFV	Control Flow Valve
COP	Chief of Party
DCV	Data Collection Verification
DDMS	Disease Data Management Systems
DEC	Data Entry Clerk
DOS	Directly Observed Spraying
DPS	<i>Direcção Provincial de Saúde</i> (Provincial Health Directorate)
ECO	Environmental Compliance Officer
IEC	Information, Education and Communication
INS	<i>Instituto Nacional de Saúde</i> (National Health Institute)
IRS	Indoor Residual Spraying
M&E	Monitoring and Evaluation
MASA	Ministry of Agriculture and Food Security
MITADER	Ministry of Land, Environment and Rural Development
MOH	Ministry of Health
MOU	Memorandum of Understanding
MSP	Mobile Soak Pit
NMCP	National Malaria Control Program
ODK	Open Data Kit
PDH	Provincial Directorate of Health
PIRCOM	<i>Programa Interreligioso de Moçambique</i> (Interreligious Program of Mozambique)
PMI	President's Malaria Initiative
PMT	Performance Monitoring Tracker
PPE	Personal Protective Equipment
PSECA	Pre-Spray Environmental Compliance Assessment
RSL	Race to the Starting Line
SDSMAS	District Services for Health, Women and Social Welfare
SEA	Supplemental Environmental Assessment
SOP	Spray Operator
TL	Team Leader
ToT	Training of Trainers
USAID	United States Agency for International Development
WHO	World Health Organization
WHOPES	World Health Organization Pesticide Evaluation Scheme

EXECUTIVE SUMMARY

In Mozambique, Abt Associates implements the President's Malaria Initiative (PMI) Africa Indoor Residual Spraying (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), the Ministry of Agriculture and Food Security (MASA), and the Ministry of Land, Environment and Rural Development (MITADER) at the provincial and district levels.

In addition to entomological monitoring activities in Zambezia, in 2016, AIRS Mozambique continued to support the NMCP at the national and provincial levels in carrying out entomological activities and to enhance capacity for entomological monitoring, including hiring a Senior Medical Entomologist, seconded to the NMCP, and conducting training and roll-out of an entomological module of the Disease Data Management System (DDMS), which supports malaria data entry and storage and helps to produce reports and visual maps. Among those trained were technicians from NMCP, Institute of Public Health (INS), and the PDH. AIRS also conducted a two-part workshop – Managing Indoor Residual Spraying (IRS) Operations: Workshop for IRS Project Managers at District and Provincial Levels, and Coaching and Training to Improve Spray Operator Performance – for malaria focal points and IRS provincial and district managers from 11 provinces (39 districts), representing IRS implementation funded by PMI, the Global Fund, the Government of Mozambique, and the private sector. Lastly, AIRS Mozambique played a critical role in the IRS Planning Committee with the NMCP and Goodbye Malaria in preparation for the government's 2016 spray campaign with a primary focus on planning and implementation tools developed by the PMI AIRS project. A total of 22 districts were sprayed by the NMCP and/or through Goodbye Malaria in 2016.

In the 2016 approved work plan, AIRS Mozambique identified an estimated 400,139 structures for spraying in the seven target districts: Derre, Milange, Mocuba, Molumbo, Morrumbala, Mopeia, and Quelimane. AIRS Mozambique worked in collaboration with USAID's GeoCenter and the Peace Corps to conduct GIS mapping in select target districts to determine more accurate estimates of eligible structures and population. The project identified Milange, Mocuba, and Quelimane as priority districts, given the fact that in 2015, the disparity between structures targeted for spraying and those actually found by spray operators (SOPs) was greatest in those districts. The Open Street Map software employed by the Peace Corps produced macro- and micro-level maps by locality; however, without clear geographic boundaries at the village level, the maps were not very useful for AIRS Mozambique operational planning. For this reason, AIRS conducted an enumeration exercise in selected villages in the three priority districts in order to estimate population and structures eligible for spraying, as well as to determine the basic geography and relative location of villages in close collaboration with SDSMAS. The number of structures found was 150 percent of what was targeted in 2015, particularly in Milange and Quelimane; Mocuba was found to be more in line with the 2015 spray targets.

Given the lack of credible updated enumeration data, AIRS Mozambique in consultation with PMI Mozambique, the NMCP, and the PDH decided that for the purposes of planning the 2016 spray campaign AIRS Mozambique would use structures found by SOPs in 2014, with the exception of Mopeia, where target structures were based on randomization at the village level post census conducted by the Manhica Center for Health Research (*Centro de Investigação em Saúde de Manhiça* (CISM)) in 2016. Therefore, the agreed upon number of targeted structures was 481,296.

At the end of the 2016 spray campaign, SOPs reported 508,295 eligible structures found. SOPs reported spraying 405,597 structures, resulting in 80 percent spray coverage. At the beginning of the spray campaign, there were issues of SOPs failing to report eligible structures that were found but not sprayed. For example, SOPs did not report locked structures that they found locked and therefore could not spray. This reporting error was rectified, and ultimately 102,698 structures found but not sprayed were registered, affecting the ultimate denominator. Mocuba and Quelimane districts accounted for over 50 percent of the found but not sprayed structures.

The total population protected during the campaign was 1,929,654. Of these, 284,468 were children under five years and 115,639 were pregnant women. AIRS led community mobilization activities in coordination with all key stakeholders to raise community awareness of IRS, and to encourage beneficiary and stakeholder ownership and acceptance. The 2016 Post Spray Evaluation meeting was held on December 5, 2016 with the PDH and SDSMAS to discuss spray coverage, lessons learned, challenges, and recommendations for the 2017 spray campaign. The 2016 spray campaign results are summarized in Table I.

TABLE I: 2016 SPRAY CAMPAIGN RESULTS AT A GLANCE

Number of provinces/districts covered by PMI-supported IRS in 2016	7 districts in Zambézia Province (Derre, Milange, Mocuba, Molumbo, Mopeia, Morrumbala, and Quelimane)
Insecticide class	Organophosphate (Actellic CS)
Number of structures targeted for PMI-supported IRS in 2016 (based on structures found by SOPs in 2014)	481,296
Number of structures found by SOPs in 2016	508,295
Number of structures sprayed by PMI-supported IRS in 2016	405,597
2015 spray coverage	80%
Population protected by PMI-supported IRS in 2015	1,929,654 (including 115,639 pregnant women and 284,468 children under 5)
Dates of PMI-supported IRS campaign	October 5 - November 26, 2016
Length of 2016 spray campaign	44 days
Number of people trained with U.S. government funds to deliver IRS*	2,129

*Based on the PMI indicator definition, this number includes only spray personnel such as SOPs, team leaders, brigade supervisors, and clinicians. It excludes data entry clerks, M&E assistants, database coordinators, drivers, washers, porters, pump technicians, and security guards.

I. INTRODUCTION

I.I. PROJECT OBJECTIVES IN 2016

Through PMI support, AIRS Mozambique has implemented five spray rounds of IRS in Mozambique. As outlined in the approved 2016-2017 work plan for the period of April 1, 2016 through March 31, 2017, the 2016 spray campaign covered seven target districts: Derre, Milange, Mocuba, Molumbo, Mopeia, Morrumbala, and Quelimane. Mopeia District was partially sprayed in conjunction with the cost-effectiveness evaluation of vector control interventions through the NGenIRS project. AIRS Mozambique continued to work with the Ministry of Health (MOH) through the NMCP, Zambezia's PDH, the SDSMAS, and other stakeholders on the 2016 spray campaign which took place from October 5 through November 26, 2016.

Specific objectives of the AIRS Mozambique program for 2016 included the following:

- Cover at least 85 percent of the targeted and eligible structures found in seven selected districts of Zambezia and protect as many as 2,496,939 lives from malaria transmission in the targeted areas;
- Support training, capacity building, and advocacy at the national, provincial, and district levels as a means to achieving IRS sustainability. This included building the capacity of government, counterparts, and partners to undertake high-quality IRS;
- Provide regular monitoring and evaluation (M&E);
- Carry out a logistics assessment in all districts and arrange all procurement, shipping, delivery, and storage of spray pumps, spare parts, insecticide, and personal protective equipment (PPE);
- Work with PMI, the USAID GeoCenter, and the Peace Corps to conduct mapping in select target districts to ascertain population estimates and estimated eligible structures in Mopeia as well as the basic geography and relative location of villages in all seven targeted spray districts;
- Prepare and submit the 2016 Letter Report;
- 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 approved 2015 Supplemental Environmental Assessment (SEA);
- Lead community mobilization; information, education, and communication (IEC) efforts; and behavior change communication (BCC) sensitization and mobilization activities with other stakeholders to raise community awareness of IRS and to encourage beneficiary and stakeholder ownership and acceptance;
- 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.

Table 2 provides an overview of the number of sprayed structures and population protected since 2007, and insecticide used. In consultation with PMI Mozambique, the MOH selected the PMI IRS target districts in Mozambique per the National Malaria Strategy. In 2016, AIRS Mozambique sprayed seven of the 22 districts in Zambezia, namely, Derre, Milange, Mocuba, Molumbo, Mopeia, Morrumbala, and Quelimane. In these seven districts, the PMI AIRS Project operated in 35 localities that were served by 25 spray operations sites with complete wash bays, soak pits, refurbished stores, and men’s and women’s segregated changing rooms and latrines. The program central warehouse was located in Quelimane city. The selection of the spray sites in the seven districts remained the same as with the 2015 campaign with the exception of Mopeia District, which was partially sprayed in conjunction with the cost-effectiveness evaluation of vector control interventions.

TABLE 2: PMI-FUNDED IRS COVERAGE IN ZAMBEZIA PROVINCE, 2007–2016

Year	No. and Names of Districts Covered	Insecticide Used	No. of Structures Sprayed	Population Protected
2007*	8 Districts – Quelimane, Nicosadala, Namacurra, Mocuba, Morrumbala, Mopeia, Maganja da Costa, and Milange.	DDT	363,962	1,572,413
2008*	8 Districts – Quelimane, Nicosadala, Namacurra, Mocuba, Morrumbala, Mopeia, Maganja da Costa, and Milange	DDT	412,433	1,457,142
2009*	8 Districts – Quelimane, Nicosadala, Namacurra, Mocuba, Morrumbala, Mopeia, Maganja da Costa, and Milange	DDT (Mocuba only); others PY	560,023	1,985,729
2010*	8 Districts – Quelimane, Nicosadala, Namacurra, Mocuba, Morrumbala, Mopeia, Maganja da Costa, and Milange	PY	618,290	1,943,643
2011*	8 Districts – Quelimane, Nicosadala, Namacurra, Mocuba, Morrumbala, Mopeia, Maganja da Costa, and Milange.	PY	660,762	2,018,730
2012	6 districts – Milange, Morrumbala, Mocuba, Namacurra, Nicosadala, 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	6 districts – Milange, Molumbo, Morrumbala, Mocuba, Derre, and Quelimane	PY (Milange, Molumbo & Quelimane); others OP	337,433	1,631,058
2016	7 districts – Quelimane, Mocuba, Milange, Molumbo, Derre, Morrumbala, Mopeia	OP	405,597	1,929,654

* 2007–2011 data from the NMCP & PMI

I.3. INSECTICIDE SELECTION

With the emergence of insecticide resistance throughout Africa, insecticide selection for IRS is a critical issue. In accordance with PMI technical guidance for entomological monitoring, 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 2016 to help guide appropriate insecticide selection and reported in the 2016 Annual Entomological Monitoring Report.

Based on the study data, with PMI approval and in partnership with the NMCP, an organophosphate insecticide, Actellic® 300CS, used for the first time in Mozambique in 2015 in three of the six target districts, was used in all seven target districts in 2016. The insecticide was donated by the MOH, procured by the Global Fund for Mozambique.

2. PRE-SPRAY ACTIVITIES

2.1. MICRO-PLANNING

The 2016 IRS micro planning meeting was held in Quelimane on August 2-3, 2016, with participants from the NMCP, PMI Mozambique, the PDH, the SDSMAS, MITADER, and MASA of the respective districts; and AIRS Mozambique. The meeting was co-facilitated by the PDH and the AIRS team. The second day of the meeting was dedicated to the completion of the district plans that were begun at the district level with collaboration between AIRS district coordinators and the SDSMAS in order to incorporate details that they had missed, for instance, spraying the hard-to-reach areas early in implementation of spray operations. The importance of maps as a planning and monitoring tool was discussed and each district was encouraged to develop simple maps for use during the campaign. Each district developed maps indicating all the operations sites and spray catchment areas. The micro-planning meeting culminated into a province-wide plan drawn from the district plans, which included insecticide and PPE quantification, human resources, transportation, and training plans. The spray campaign was planned for 35 days, which necessitated an increase in SOPs and transportation.

In line with recommendations from the 2015 campaign, an additional level of team supervisors, namely, brigade supervisor, was introduced to strengthen supervision. In addition, the number of SOPs per team was reduced from six to five, and the SOP daily target was reduced from a minimum of 12 structures per day to 10. Consequently, a spray team had seven persons (one team leader, five SOPs and one mobilizer), while a brigade had 21 persons (one brigade supervisor who supervised three teams, i.e., three team leaders, 15 SOPs, and three mobilizers). A site supervisor was in charge of all spray and mobilization teams operating from an operational site.

During the meeting, each district presented its plans for seasonal worker recruitment, training, and spraying. In addition, the district presented its logistics needs. The districts that previously used the Mocuba training site for the SOPs were assigned to investigate appropriate training sites within their districts to reduce congestion and massive movement of the trainees.

2.2. LOGISTICS NEEDS AND PROCUREMENT

A logistics needs assessment was conducted to plan for the increase in human resources and replacement of materials from previous campaigns that could not be reused. This included local and international procurement of PPE, spare parts, and other spraying supplies and materials for environmental compliance and human safety. No new spray pumps were procured this year. Maintenance was done on a total of 1,572 pumps, as was repair when needed, and these were used for the spray campaign. Additionally, there are another 1,324 spray pumps in the central warehouse that were transferred from the previous contractor and require parts if they are to be repaired for future use.

A total of 276,308 bottles of Actellic 300 CS was available for the 2016 IRS campaign. The program received 221,232 bottles of Actellic 300 CS from the central MOH as procured by the Global Fund. This was in addition to the 55,076 bottles that remained from the 2015 spray campaign. The insecticide was stored at the central AIRS warehouse in Quelimane and transported to the districts on a weekly basis during the spray campaign. The distribution was based on usage and requirements at the operational sites. For a list of the local and international procurements, please refer to Annex A.

2.3. HUMAN RESOURCES REQUIREMENTS

The AIRS Mozambique human resources requirement for the 2016 campaign was calculated based on a 35-day spray campaign and the new IRS supervisory structure as explained earlier. A total of 2,385 seasonal workers of various categories were recruited in the seven districts, out of whom 880 (37 percent) were women, a 3 percent increase from 2015 (Table 3). Women’s interest in participating in IRS spray campaigns continues to grow in Mozambique, as a direct result of efforts by AIRS and the MOH. While the number of women applicants was much greater, unfortunately, many women failed the writing and reading tests, particularly in Molumbo and Derre districts.

TABLE 3: SEASONAL PERSONNEL BY NUMBERS AND GENDER

Type of Personnel	No. of Males	No. of Females	Total	% Females
Spray operators	942	462	1,404	33
Team leaders	155	125	280	44
Brigade supervisors	61	31	92	38
Site supervisors	25	0	25	0
Mobilizers	163	117	280	42
Pump technicians	27	3	30	10
Storekeepers	28	8	36	22
Washers	4	117	121	97
Security guards	55	0	55	0
Database coordinators	5	0	5	0
M&E assistants	14	3	17	18
Data entry clerks	26	14	40	35
Total	1,505	880	2,385	37
Percentage	63	37	100	

The seasonal spray personnel were recruited at the community level, in a province-wide social mobilization activity, co-led by the PDH and the AIRS team, and implemented by the SDSMAS and AIRS in collaboration with community leaders. The vacancies were announced over the radio and in meetings with the local leadership system. The application process required identification of the candidates by the local leaders who submitted a list of candidates’ names to the local health facility, from where the list was collected by the district.

The candidates first took a written and oral interview administered by the SDSMAS and the AIRS district coordinators to ascertain their ability to read and write. The candidates deemed sufficiently literate were then selected to participate in the spraying activities. All the seasonal workers took a medical examination, and all female candidates took a pregnancy test. (See Table 11 in Section 6.2 for pre-spray pregnancy test results.) The candidates who were declared fit were invited to participate in the training. In order to safeguard dropout during the training and spray operations, an additional 10 percent seasonal spray workers were trained as a buffer. The second round of pregnancy testing was conducted 30 days after the initial test. (See Table 11 for mid-spray pregnancy test results).

2.4. TRAINING

Capacity building to prepare workers for spray operations is a critical component of the AIRS Mozambique program. In collaboration with the PDH and SDSMAS, several trainings were conducted between July and October 2016 (Table 4). All the training sessions involved theoretical and practical sessions relevant to each cadre of spray campaign worker. Training of the seasonal personnel (SOPs, team leaders, and brigade supervisors) was conducted in two phases, the first for the districts of Quelimane, Mocuba, and Milange, and the second for the remaining four districts, Molumbo, Morrumbala, Derre, and Mopeia. Training was conducted in various sites. Quelimane, Derre, and Mopeia trained the seasonal personnel in Namacurra, where there was sufficient space for presentations on theory and walls for practice spraying. Milange and Molumbo trained in Milange, Morrumbala trained in Morrumbala, and Mocuba trained in Mocuba. AIRS Mozambique trained 2,888 people in 2016 (Table 5).

TABLE 4: 2016 TRAINING DATES AND DESCRIPTION

Training Dates	Training Location	Participants	Type of Training	Description of Training
August 29	Quelimane	Health facility nurses and/or technicians from the 25 operational sites' facilities	Insecticide Exposure and Treatment	Insecticide toxicity, routes of exposure to insecticides, measures to prevent insecticide contamination and exposure, and treatment for exposure.
August 29 - 30	Quelimane	PDH and SDSMAS Health Officers (Malaria Supervisor, IRS Coordinator/Supervisors and IEC Coordinator), District and Provincial Environmental Officers (MITADER and MASA)	Environmental Compliance	Environmental compliance standards and requirements for IRS in accordance to best practices management for IRS.
August 29 - September 5	Quelimane	PDH and SDSMAS Health Officers (Malaria Supervisor, IRS Coordinator/Supervisors and IEC Coordinator, seasonal workers base supervisors); Environmental Officers, District Health Directors Environmental Officers (MITADER and MASA)	Training of Trainers	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.
October 3; September 26; September 22; September 29; October 2	Quelimane Mocuba, Milange, Molumbo Morrumbala, Derre Mopeia	Washers from each of the 25 operations sites	Washer Training	Environmental compliance for IRS, procedures and standards to handling and washing PPE, and personal safety measures.

Training Dates	Training Location	Participants	Type of Training	Description of Training
September 6 - 7	Quelimane	Storekeepers from each of the 25 operations sites stores	Warehouse and Stock Management for Storekeepers	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.
October 2	Quelimane	Storekeepers from each of the operational site stores, district and central warehouse	Storekeeper Refresher Training	Stock control and warehouse management
October 3 September 26 September 22 September 29 October 2	Quelimane Mocuba Milange Molumbo Morrumbala Derre Mopeia	Security guards from each of the 25 operational sites	Operational Sites Security	Security standards and requirements during the spray campaign.
September 12-19 September 22-29	Namacurra (for Quelimane) Mocuba, Milange Morrumbala, and Namacurra (for Derre and Mopeia) Milange (for Molumbo)	SOPs, team leaders, brigade supervisors	SOP Training	Training comprised both lectures and practical exercises. The lecture component included: IRS concept; spraying techniques; insecticide mixing and handling of 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 focused on spray techniques, preparation, dilution and mixing of insecticide, and progressive rinsing.
September 20 September 30	Quelimane Mocuba Milange Morrumbala Derre Molumbo Mopeia	Team leaders, and brigade supervisors	Leadership and Supervisory roles	One-day training followed SOP training and provided the following skills: supervision, use of supervisory tools, roles and responsibilities in order to provide leadership and supportive supervision to the SOPs.

Training Dates	Training Location	Participants	Type of Training	Description of Training
September 27-30	Quelimane	Database coordinators, M&E assistants, data entry clerks	M&E and Database Training	Two training sessions were held on the following topics: the PMI AIRS Access database as a tool, roles and responsibilities, data collection tools, data entry, data 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.

Training Dates	Training Location	Participants	Type of Training	Description of Training
September 6	Quelimane	Pump technicians from each of the 7 districts and 25 operational sites	Pump Technicians Training	Spray pump parts and functions, pump repair kits, and pump repair, calibration, and maintenance.
September 22 September 23 September 25 September 30 September 30 October 2 October 6	Quelimane Mocuba Milange Morrumbala Derre Mopeia Molumbo	Drivers from each of the contracted transportation service providers (trucks and SUVs)	Driver Training	Transport of spray personnel, safety and security of people, insecticide and PPE, road safety, including spillage handling.

TABLE 5: 2016 TRAINING MATRIX

Categories of Persons Trained	Training on IRS Delivery ²												Other Trainings								TOTAL			
	Training of Trainers		Spray Operations		Data Capture		Logistics Training		Environmental Compliance		Poison Management		IEC Mobilizers		Technical Maintenance		Site Security		Washing				Transport & Security	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
MOH – Central, Provincial and District	52	8	37	12					24	1	26	1											139	22
Data Entry Clerks					36	21																	36	21
M&E Assistants					14	3																	14	3
Database Coordinators					5	0																	5	0
SOPs, Team Leaders, Brigade Supervisors, & Site Supervisors			1,428	614																			1,428	614
Storekeepers							28	9															28	9
Security Guards																	56	0					56	0
Pump Technicians															24	2							24	2
Washers																			4	125			4	125
Drivers																					67	1	67	1
Mobilizers													170	120									170	120
TOTAL Male/Female	52	8	1,465	626	55	24	28	9	24	1	26	1	170	120	24	2	56	0	4	125	67	1	1,971	917
TOTAL	60		2,091		79		37		25		27		290		26		56		129		68		2,888	

² Includes Boot Camp Training

Table 6 shows training based on the PMI indicator definition; it includes only spray personnel such as SOPs, team leaders, brigade 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 Training of Trainers	52	8	60
Spray Operations	1,428	614	2,042
Poison Management for Health Clinicians	26	1	27
Total	1,506	623	2,129

3. COMMUNICATIONS ACTIVITIES

Social mobilization is integral to any successful campaign. For the 2016 spray campaign, AIRS Mozambique, in collaboration with the PDH of Zambezia, SDSMAS of the seven target districts, the Municipality of Quelimane, religious leaders, and other local and influential leaders at all levels prepared and implemented a solid mobilization campaign.

3.1. PREPARATION STAGE (PRE SPRAY CAMPAIGN)

During the preparation stage, meetings were held at provincial and district levels to create awareness about the impending spray campaign and to engage all the community in mobilizing for it. These meetings culminated in various activities, including community meetings led by community leaders, Community Theater, and information dissemination through religious services, schools, and other venues.

Training in Interpersonal Communication and Counseling was conducted for SDSMAS IEC officers and members of Mozambique's Interreligious Program (*Programa Interreligioso de Mocambique*, PIRCOM) and Association of Traditional Healers (*Associação dos médicos tradicionais de Moçambique*, AMETRAMO), who disseminated information about the spray campaign widely throughout the communities. After their own training, they trained community leaders and preachers in their districts and localities, who did further dissemination of key messages to individual groups.

3.2. IMPLEMENTATION STAGE (DURING THE CAMPAIGN)

3.2.1. MEDIA

AIRS Mozambique established partnerships with media channels, including radio and television, to disseminate the 2016 mobilization and spray calendars, spots, interactive programs, debates, interviews, and testimonies. The spray campaign calendar was disseminated daily. Programs were broadcast in Portuguese and in the predominant local languages in the districts by the following media:

- Televisão de Moçambique
- Institute of Social Communication
- Rádio Moçambique (Portuguese, Elomwé, Echuwabo e Ciscena)
- Rádio Comunitária de Mocuba (Lomué, Portuguese, Manhaua and Emocuba)
- Rádio Comunitária Tumbine (Portuguese, Chichewa and Marengo)
- Televisão de Moçambique – Delegação da Zambézia (Portuguese and Echuwabo)
- Rádio Comunitária de Morrumbala (Sena, Lomue, Chuabo and Portuguese)
- Rádio Comunitária Cua – Mopeia (Sena, Portuguese and Phoso)
- Rádio Paz (Txuabo, Lomwe and Portuguese).

3.2.2. PIRCOM

PIRCOM is an important program for social and behavior change at the community level. During the spray campaign, PIRCOM was actively involved with AIRS, particularly in Quelimane. It contributed greatly through different religious groups, street campaigns using motorcycles and megaphones, and working closely with AIRS mobilizers and spray teams doing door-to-door visits in villages where refusals were highest.

3.2.3. COMMUNITY LEADERS

Community leaders constituted the core of the mobilization effort. Spray team mobilizers sought them out first when entering a community and, together, they mobilized the area’s population. They also accompanied the SOPs into the houses and in case of refusal they worked to persuade the family to agree to spray. In communities where there were large numbers of refusals, the chiefs of administrative posts and/or localities called meetings with all leaders in the area to remind them of their responsibility in the campaign. This measure helped greatly in the secondary, “mop-up,” spraying because it allowed the recovery of many houses whose owners had refused the first spray visit.

3.2.4. POSITIVE REINFORCEMENT FROM PEERS

In addition to community leaders, testimonies from neighbors and relatives who had had their houses sprayed were helpful in encouraging families to agree during mop up efforts.

3.2.5. MOTORCYCLE MOBILIZERS

During the 2016 spray campaign, mobilizers on motorcycles were used. These mobilizers varied from district to district – they were religious or community leaders, and influential persons. They held megaphones to announce the spray the day before the spray, and on the day of spray they supported the spray team mobilizers. Religious leaders in particular proved to be helpful in opening many houses whose families initially did not accept spraying.

3.3. IEC MATERIAL

For the 2016 spray campaign, the following IEC material was produced and distributed: leaflets, guidance guides for journalists, posters for vehicle identification, signs, and T-shirts and hats for mobilizers. Table 7 shows the types and numbers of communication activities.

TABLE 7: IRS CAMPAIGN COMMUNICATION ACTIVITIES

Activity	Frequency
Spray campaign official launch	7; 1 official launch per district; Quelimane District hosted provincial launch
Radio spots (pre-spray campaign calendar announcements/instructions for homeowners)	117
Radio spots (during spray campaign)	685
Debates	32
Mobilization and spray calendar distribution	699
Interviews and testimonies	85
Banners	27
Posters	600
Leaflets	5,000
T-shirts	750
Hats	600
Guidelines for journalists	1

COMMUNICATION FINDINGS AND RECOMMENDATIONS

Situations that AIRS Mozambique thought influenced the campaign are highlighted below:

Politicization of the campaign: In some areas, the population refused spraying because they felt that only ruling party members were recruited to work in the campaign or because they had been excluded from the process of distributing support material during the floods that devastated the province in 2015.

Recommendation: AIRS proposes working with the community structures, health councils, community health activists, and interreligious groups, as well as leveraging existing resources with other PMI partners, including PIRCOM and HC3; AIRS proposes to implement year round social mobilization to get the population to better accept IRS.

The INS is currently conducting a qualitative study in Zambezia and Nampula Provinces about IRS acceptance, an issued faced throughout the country. AIRS plans to take lessons learned from this study to help inform community mobilization.

To help address politicization, AIRS is considering:

- Engaging civil society, including health councils, traditional healers and others to carrying out continuous awareness and sensitization before, during and beyond the spray campaign.
- Utilizing the community structures, already trained and working in the communities to strengthen social mobilization.
- Utilizing community radio to broadcast IRS key messages.
- Utilizing mobile phones to issue continuous IRS messages to community leaders.

Absence of IEC routine activities for IRS: IEC activities did not occur throughout the year and ceased at the end of the spray campaign.

Recommendation: AIRS proposes to conduct year round IEC/BCC activities as part of integrated malaria messaging to raise awareness about the importance of IRS, its connection to malaria prevention and to address misconceptions or myths about IRS.

Political-military situation: The political-military situation, especially in parts of Derre, Mocuba, Mopeia, and Morrumbala districts, made community leaders fearful of reprisals from militias and dissuaded them from fully playing the support role for IRS. Lack of clear leadership to guide and accompany the teams made it difficult to convince residents to open their doors to sprayers.

Recommendation: The security situation is beyond the control of AIRS Mozambique. We can only hope for the normalization of the political-military situation.

Lack of inclusion in the SOP selection process: Some community leaders who were asked to propose people within the community to apply for seasonal positions did not share this information with fellow leaders. The latter felt left out and did not help mobilize their communities.

Recommendation: Recruitment of seasonal staff should be properly monitored to ensure full transparency and inclusion.

Lack of active involvement of the heads of administrative posts and localities: The heads of administrative posts and localities, although they are counted as members of the ruling party, have much influence over community leaders, especially those who have been appointed by the government. However, during the campaign there was a lack of engagement with these heads.

Recommendation: Given the influence and ability to demand results from the local leaders that heads of administrative posts and localities have, they should be involved in preparations for the spray campaign and possibly as supervisors in the administrative posts and localities where they work.

4. SPRAY ACTIVITIES

4.1. SPRAY OPERATIONS

Insecticide was delivered on September 19, 2016 to the central warehouse and distribution to districts commenced on September 28, 2016.

The spray campaign was initially scheduled to start on October 3, 2016, but it began on the October 5, 2016 to accommodate the October 4 National Holiday.

The spray campaign started first in Quelimane, Mocuba, and Milange on October 5, and in Derre, Morrumbala, Molumbo and Mopeia on October 10. The spray campaign concluded on November 26, 2016.

Intermittent rain interrupted spraying for two days in Milange, Morrumbala, Molumbo, and Derre. Two operations sites in Mocuba, namely Namanjavira and Mocuba Sede, missed spraying for one day due to a protest by seasonal workers. In Namanjavira, the workers refused to work due to the dismissal of colleagues for insecticide theft or misuse, while Mocuba Sede seasonal workers protested against the payment through MPESA. In addition, SOP performance was slower than planned which led to a decision to extend the spray period to ensure coverage

Security concerns, and deserted villages, affected some spray operations bases and the spraying itself. Spraying was conducted from 25 out of the planned 26 operations bases as indicated in Table 8. The Saba site in Morrumbala district was not operational due to security concerns. Consequently, Saba catchment was not sprayed. The spray team contracted and trained for Saba was merged with the Morrumbala Sede teams. In addition, some villages in the catchment area of the Mugeba operations base in Mocuba District were not accessible; the number of villages and estimated structures were not known. Security issues have prevented these villages from being sprayed for the past two years

During the campaign, the program used mobile soak pits (MSPs) in areas of Milange, Molumbo, Mocuba, Derre, and Mopeia. This facilitated mobility of the teams: it allowed teams to camp in hard-to-reach areas rather than return daily to the operations bases, thus saving the time and transport costs it takes to transport them. Each spray team was composed of five SOPs, one mobilizer, and a team leader; three spray teams constituted a brigade under the supervision of a brigade supervisor. The mobilizers sensitized the community a day before spraying, and a few remained to accompany the SOPs in the field. Within the villages, the spray teams were accompanied by local leaders who identified the households, and facilitated getting household acceptance for spraying. Some households were reluctant to have their houses sprayed because they said the insecticide left a bad odor, while others refused for no reason. Nearly 60% of the structures found but not sprayed were due to refusals. Historically, refusals have been attributed to poor community mobilization. In 2016 refusals and/or closed structures were predominantly found in the urban and peri urban areas, with Mocuba and Quelimane registering the highest numbers. This required the intervention of senior leadership at the district, provincial, and AIRS program level to resolve.

Based on the 2015 experience, supervision structures and hierarchy of supervision was restructured to include five spray operators per team; one mobilizer, one Team Leader (TL) per team, and one Brigade Supervisor (BS) per each three teams. AIRS Mozambique added the new role of Brigade Supervisor to increase field supervision.

The Team Leaders role was to:

- Supervise each spray team (five spray operators) for spray quality and correct use of PPE, and integrity.
- Supervise the mobilizer in his/her team.
- Directly observe spray operators applying insecticide to walls and other qualifying surfaces.
- Enforce health and environmental safety mitigation measures in their teams.
- Receive insecticide from the storekeeper for his/her team and distribute to the spray operators.
- Account for insecticide issued daily to the team.
- Enforce health and environmental safety mitigation measures and report daily on the health status of each spray operator in the team, using prescribed checklists.
- Enforce triple-rinsing of insecticide bottles during insecticide mixing.
- Enforce discipline among spray operators and mobilizers.
- Ensure spray operator data forms are accurately filled out.
- Respond promptly to queries from M&E Assistants.
- Review progress and completeness of spraying based on reports from the brigade supervisor.

The Brigade Supervisor role was to

- Manage and supervise three spray teams (brigade) for spray quality and correct use of PPE.
- Enforce health and environmental safety mitigation measures in their teams.
- Supervise the use of the soak pit during triple rinsing by spray operators.
- Enforce discipline among spray operators, mobilizers, and team leaders.
- Ensure spray operator and team leader data forms are correctly filled out.
- Respond promptly to queries from M&E Assistants.
- Review progress and completeness of spraying based on reports from the M&E database.
- Work closely with the operational site supervisor, the AIRS District Coordinator, SDSMAS Malaria, IRS and IEC Supervisors to ensure community mobilization and spray operations are progressing according to the approved progression plan.

Despite receiving role specific training and clear description of their roles, the selected TLs and BSs did not adequately execute their roles. We attribute this failure to the fact that TLs and BSs were selected by community leaders from members of the community. This meant that TLs and BSs had familial or friendship relationships with the SOPs they were supervising, which made effective supervision difficult.

TABLE 8: DISTRIBUTION OF SPRAY TEAMS BY DISTRICTS AND OPERATIONAL SITES

District	Operational Sites	No. of SOPs	No. of Team Leaders	No. of Brigade Supervisors	No. of Mobilizers	No of Site Supervisors
Quelimane	Namuinho	141	28	9	28	1
	Madal	30	6	2	6	1
	Maquival	49	10	3	10	1
Mocuba	Mocuba Sede	153	30	10	30	1
	Muaquiua	36	7	2	7	1
	Mugeba	91	18	6	18	1
	Munhiba	50	10	3	10	1
	Namanjavira	44	9	3	9	1
	Alto Benfica	28	6	2	6	1
	Derre	Derre Sede	40	8	3	8
	Guerissa	10	2	1	2	1
Morrumbala	Chire	60	12	4	12	1
	Megaza	21	4	1	4	1
	Morrumbala Sede	124	24	8	24	1
	Muandua	50	10	3	10	1
	Pinda	30	6	2	6	1
Molumbo	Corromana	56	11	4	11	1
	Molumbo Sede	72	14	5	14	1
Milange	Dachudua	48	10	3	10	1
	Dulanha	29	6	2	6	1
	Liciro	34	7	2	7	1
	Milange Sede	151	30	10	30	1
Mopeia	Chimuara	10	2	1	2	1
	Posto Campo	18	4	1	4	1
	Mopeia Sede	29	6	2	6	1
Total		1404	280	92	280	25

During the 2016 campaign, one primary focus was to reduce and/or eliminate incidents of insecticide theft. The number of occurrences in the 2016 spray season was low compared to the same period last year as shown in Table 12 in Chapter 6.

Daily spray operations started at 6 am with a daily meeting in which the issues identified the previous day were addressed and the spray teams were assigned their areas for the day. Spray operations at the field level were planned to end at 3 pm, by which time the last structure was supposed to be sprayed. However, spray teams often returned from the field as early as 1:00 pm whether they had achieved the daily spray target or not. In order to correct this in the future, ownership and leadership by team leaders and brigade supervisors will concentrate on meeting and/or exceeding daily spray targets. In addition, daily schedules must continue to be adjusted as necessary to spray all targets, including adjusting for the farming community upon their return from the field.

The time teams were in the field was adjusted so that the SOPs would find people at home from the farms from around 9 am. However, there were still often homes without people when the SOPs visited them. Several of the residents who returned from the field were not willing to prepare the houses saying they were too tired to do so. Some used this as an excuse to refuse spraying, even when SOPs offered to help move things out of the house. In some cases, household owners refused spraying saying the house was not theirs and the owners were away.

Spray data were collected by the SOPs using the SOP daily form. After the team leaders verified the data, they summarized the data in the team leader data form. The forms were handed to the brigade supervisor for verification before submission to the site supervisor. In 2016, the Performance Monitoring Tracker (PMT) was implemented for the first time. The PMT is designed to provide the district coordinators and senior management team real-time information to enable quick corrective decisions to improve ongoing spray operations. Every day, via SMS, operational site supervisors reported to a central server the four key indicators specific to their operational sites: number of structures found; number of structures sprayed; number of insecticide bottles used; and number of SOPs who worked that day. At the operational site level, the paper based Spray Performance Tracking Sheet was the primary management tool.

4.2. LOGISTICS AND STOCK MANAGEMENT

IRS campaigns entail detailed logistics. All storekeepers were trained on best practices for IRS logistics management to ensure compliance. A logistics distribution plan was developed after the micro planning meeting indicating the quantities of commodities required in each district and operational sites, and was guided by the number of seasonal workers.

Once the logistical plan is finalized, local procurement should commence as soon as possible taking into consideration the competitive process (bidding and award) to select a supplier and issue purchase orders and supplier lead time to produce and deliver the materials, and in the case of material procured internationally, the shipping time from supplier to Mozambique. Once the materials are delivered to the Central Warehouse, they should be distributed to the operational sites at least two weeks from the start of the spray campaign. In the week leading up to a spray campaign, a site operational store audit should occur to ensure that all materials are on site and in sufficient quantities. The audit should also check that the store keepers have the requisite inventory management tools such as Stock Cards, Daily Distribution Form, and Store Ledger etc.

In 2016, there were delays in executing the local procurements, which resulted in the spray campaign starting without all the material in place. For example, PPE was not available at the start of the campaign, which precluded the start of spraying on time in Morrumbala, Mocuba and Mopeia. In addition, stock tracking tools such as store ledgers, stock cards etc. had not been printed in time and were not available the first couple of days to facilitate stock management by the store keepers.

Insecticide boxes were marked with district names and codes when being dispatched from the central warehouse, while at the operation sites, the bottles were marked with SOP codes. Each day, the used and unused insecticide bottles were returned to the stores and a thorough cross check was done to ensure the issued and returned matched. On a weekly basis, empty insecticide bottles were moved from the operations sites to the district stores and subsequently to the provincial stores. At the same time, insecticide was distributed to the districts and operational sites.

5. POST-SPRAY ACTIVITIES

5.1. CLOSING OF IRS OPERATIONS

5.1.1. POST-SPRAY INSPECTION

The EC post-spray inspection was concluded by mid-December in the seven spray districts, led by the AIRS Mozambique Environmental Compliance Officer (ECO) in coordination with the provincial and district officers of the Ministries of Agriculture and Environment.

5.1.2. POST-SPRAY EVALUATION MEETING

The 2016 post-spray evaluation meeting was held on December 5, 2016, in Quelimane. Participants were drawn from the PDH, each of the spray districts' SDSMAS, and MASA. The meeting was led by the PDH and AIRS Chief of Party (COP), and participants discussed the spray results, challenges, and lessons learned. The low coverage in the province and the causes were highlighted, but no conclusive decisions were made on how to address the challenges before and during next year's campaign. Meeting attendees did point out that the team leaders and brigade supervisors did not provide quality supervision, thereby missing the critical spray operations monitoring and organization standards for good performance. They also raised concerns about the low seasonal worker subsidy and the MOH supervisor allowances. The PDH and the SDSMAS attributed the poor SOP performance and lack of motivation to the low allowances. The selection of the SOPs by the communities was criticized as a contributor to the poor performance as it was not transparent and there was nepotism, bringing into the program people who were mainly interested in the allowance and not quality performance.

5.2. LOGISTICS

The 2016 spray campaign ended on November 26, 2016, in Mopeia. The operational sites were demobilized immediately after the spraying ended in each site and all demobilization was finalized on December 3 in all the districts. All IRS commodities were returned to the central warehouse in Quelimane where they are being sorted out and inventoried to identify what is usable and not usable in order to guide the 2017 logistics needs and procurement.

Priority was given to the unused insecticide and empty bottles. All the contaminated materials, recovered stolen insecticide, and all other commodities and equipment used for the spray campaign were moved from the district-level storage facilities to the provincial central warehouse. They are currently being separated to determine the stock balance that is reusable in the next campaign. The spray pumps have been reviewed and separated into those that are re-usable and those requiring repairs, to facilitate the procurement of spare parts, repairs, and maintenance for 2017. Annex B shows the remaining inventory currently in the central warehouse as of the end of the spray campaign.

AIRS Mozambique began its campaign with 276,308 bottles of insecticide. At the end of the campaign, the stock balance was 21,296. A total of 254,952 empty bottles were returned from districts; 48 empty bottles were missing, and 12 full bottles were batch samples sent to quality assurance testing.

A detailed insecticide balance after the campaign of 21,296 bottles is shown in Table 9 below.

TABLE 9: POST SPRAY INSECTICIDE INVENTORY EXPIRY DATES

Manufacture Date	Quantity	Expiration Date
October 8, 2015	982	October 7, 2017
October 15, 2015	13	October 14, 2017
October 26, 2015	31	October 25, 2017
October 27, 2015	0	October 26, 2017
October 28, 2015	5	October 27, 2017
November 4, 2015	487	November 3, 2017
November 11, 2015	25	November 4, 2017
November 16, 2015	810	November 15, 2017
November 19, 2015	1,895	November 18, 2017
November 20, 2015	839	November 19, 2017
November 24, 2015	15,634	November 23, 2017
March 2016	575	February 28, 2018
Total Stock	21,296	

6. ENVIRONMENTAL COMPLIANCE

A Supplemental Environmental Assessment (SEA) for implementing PMI-supported IRS in Mozambique was approved in 2015. It authorizes IRS nationwide in Mozambique, using all World Health Organization Pesticide Evaluation Scheme (WHOPES)-recommended insecticides in the pyrethroid, carbamate, organochlorine, and organophosphate classes as well as chlorfenapyr (when recommended by WHOPES), provided that the chosen insecticide(s) is (are) registered by the government of Mozambique. Previous SEAs authorized PMI IRS activities in Zambezia Province, whereas the new SEA is applicable to IRS activities nationwide and could allow the expansion of PMI IRS activities throughout the country. The SEA is valid for the period 2015–2020.

6.1. PRE-SEASON ENVIRONMENTAL ASSESSMENT

In July 2016, AIRS Mozambique conducted Pre-Spray Environmental Compliance Assessments (PSECA) in the seven target districts in 25 of 26 operational sites. The PSECA were conducted using smartphones pre-programmed with environmental assessment checklists. Data were entered in the e-checklists at operational sites and submitted to a central database on an automated server at Abt's office in Bethesda. A work list was generated and then instantly shared with the COP, Operations Manager, and the ECO to guide the work plan for the rehabilitation of the operational sites for the 2016 spray campaign. The assessment involved identifying storage facilities of sufficient space, determining the suitability of soak pits that were used the previous year and identifying places where MSPs were to be used. The 26 operational sites within the seven districts are located in SDSMAS' premises. One of the sites, Sabe, in Morrumbala district, was not assessed or utilized during the spray campaign due to security concerns. During the PSECA, five districts (Derre, Milange, Mocuba, Molumbo, and Mopeia) were identified as eligible to use MSPs. Mopeia district was last sprayed in 2014, with three existing operational sites, Mopeia Sede, Chimuarra, and Posto Campo; in 2016, it was partially sprayed in conjunction with the cost-effectiveness evaluation of vector control interventions. Posto Campo is located about 100 kilometers from Mopeia Sede, and its villages are dispersed, making it an ideal area for MSP use. Additionally, the AIRS ECO, MITADER, and the PDH conducted a water crossing assessment in Quelimane in September from the mainland to Idugo and Longe Islands. There was no credible data or information confirming that either of these islands has ever been sprayed, although the Quelimane SDSMAS says they were sprayed in 2007. The islands have an estimated 6,927 structures and a total population of 17,262, about 75 percent of which is on Idugo. These structures were included in the original spray target at the time of micro planning. However, a decision to **not spray the islands was made** based on the precarious and unreliable means for crossing: unsafe shallow boats with mechanical problems would make the half-hour crossing dangerous for people and certainly for insecticides.

A detailed description of the rehabilitation and/or improvements of the operational sites and use of MSPs are shown in Table 10.

TABLE 10: REHABILITATION AND IMPROVEMENTS OF OPERATIONAL SITES

District	Operational Sites Rehabilitation
Molumbo	1 wash area rehabilitated (Corromana) 1 soak pit and wash area rehabilitated (Molumbo Sede) 4 restrooms built, segregating female and male personnel rehabilitated 2 changing rooms built 2 operational site fences reinforced 1 store increased in size to accommodate greater volume of Actellic, and the ventilation of its pesticide storage area also increased (Corromana) 2 MSPs built
Quelimane	1 store size increased (Namuinho) 1 store rehabilitated (Maquival) 2 changing rooms built (Madal and Maquival) 2 toilets rehabilitated (Maquival) 1 spray site fenced (Madal)
Mocuba	1 soak pit rehabilitated (Mocuba Sede) Fencing of all 5 operational sites rehabilitated 6 changing rooms reinforced and 5 female and male restrooms rehabilitated 2 storage rooms built (Mocuba Sede and Munhiba) 4 MSPs built
Morrumbala	2 soak pits sawdust and charcoal replaced and 1 rehabilitated, fences at the 5 operational sites rehabilitated 3 restrooms rehabilitated 5 storage facilities rehabilitated 5 changing rooms built, segregated by gender
Milange	1 soak pit and wash areas rehabilitated 1 storage facility rehabilitated 1 storage facility expanded its size 5 MSPs built 3 operational sites fenced (Liciro, Dulanha, and Dachudua) 2 changing rooms built (Liciro and Dulanha)
Derre	1 storage facility expanded in size (Derre Sede), and 1 rehabilitated (Guerrissa) Fencing at 2 operational sites repaired (Derre Sede and Guerrissa) 1 changing room segregated by gender 4 MSPs built
Mopeia	2 soak pits re-built with fresh sawdust and charcoal (Mopeia Sede and Chimuarra) Fencing at 1 operational site rebuilt 4 MSPs built 2 changing rooms built; segregated by gender (Mopeia Sede and Chimuarra)

6.2. SAFETY AND ENVIRONMENTAL COMPLIANCE DURING AND AFTER THE SPRAY CAMPAIGN

Prior to the start of the spray campaign, all eligible females were given pregnancy tests. In addition, all seasonal workers received medical check-ups. A second round of pregnancy testing was conducted where spraying extended to more than 30 days (on November 3 for the three districts where spraying started on October 5 (Quelimane, Mocuba, and Milange) and November 8 for the remaining four districts that started on October 10 (Molumbo, Morrumbala, Derre, and Mopeia). With good effort and coordination, all women found pregnant were reassigned as mobilizers. As shown in Table II, the 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 were tested in round two because some number of women were dismissed or left the program voluntarily.

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	73	58
Total number of women tested	73 (100%)	58 (100%)
Total positive	5	4
Mocuba: Total number of women	218	168
Total number of women tested	218 (100%)	168 (100%)
Total positive	10	3
Milange: Total number of women	103	118
Total number of women tested	103(100%)	118 (100%)
Total positive	2	4
Molumbo: Total number of women	59	57
Total number of women tested	59 (100%)	57 (100%)
Total positive	2	5
Quelimane: Total number of women	106	129
Total number of women tested	106 (100%)	129 (100%)
Total positive	3	0
Derre: Total number of women	22	14
Total number of women tested	22(100%)	14 (100%)
Total positive	0	0
Mopeia : Total number of women	63	34
Total number of women tested	63(100%)	34 (100%)
Total positive	0	0
Total number of women	644	578
Total number of women tested	644 (100%)	578(100%)
Total positive	22	16

Regarding health and safety, AIRS focused on reducing the number of incidents found and reported in 2015. All staff and supervisors were trained in insecticide handling that included best practices in mixing and using insecticide, identification of the symptoms of intoxication, the negative impact of insecticide on the environment, and the importance of correct use of full PPE. 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, head and neck protection, gloves, boots, socks, helmets, face shields, and dust masks for use throughout the campaign. To ensure protection of SOPs, they were trained and at morning mobilization were reminded to wash their face shields, boots, and gloves at the end of each day. 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 a tarpaulin. Each vehicle was equipped with spill kits, a first aid kit, Material Safety Data Sheets, accident/emergency procedures sheets, and a fire extinguisher. 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 best management practices for IRS to ensure compliance with safety and environmental requirements. Vehicles were then certified, and inspected throughout the spray campaign.

Fixed and mobile 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 fixed soak pits and wash areas were fenced and gated around the perimeter of the operational site to prevent unauthorized access to the premises. The progressive (triple) rinsing system was used at each soak pit for rinsing spray pumps. Trained washers washed the overalls 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. Where an MSP was used, it was pulled out after use and the pit was filled with natural soils to avoid accidents, and to return the site to its original status. The SOP was provided with clean PPE from the fixed operations site to ensure best practices were being followed by all members. After use, the MSPs were transported to the central warehouse, to wait for capacity testing to determine if they were suitable for use in next year's campaign.

Mid-spray environmental compliance inspections were conducted in all 25 operational sites and all places using MSPs to monitor compliance with liquid waste disposal procedures, and ensure that mitigation measures were adhered to and that seasonal workers were not exposed to pesticide. Inspections were done by the ECO with the districts' environmental and agricultural officers. The provincial agriculture technical personnel also were involved and used the newly acquired smartphones.

The inspection teams assessed the correct use of full PPE during spraying and washing activities, stores' records and arrangement, warehousing of insecticide in recommendable conditions and temperature, 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 storage 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 25 operational sites was completed within two weeks after the end of the spray campaign. The ECO with the districts' environmental officers did the inspection to evaluate the conditions of spray sites in terms of the removal of all IRS items and their return to the central warehouse, decontamination of warehouses, and clean-up of soak pits. All but three of the 25 stores were adequately decontaminated at the time of the post spray inspection; the remaining 3 were subsequently completed to avoid contamination if they are used for other purposes during the non-spray period. All restrooms and latrines were closed to avoid unauthorized use. One of the 25 soak pits contained weeds, which the team removed prior to their departure. All soak pits were covered with metal covers and gated in accordance with AIRS' best practices. During this process, the team had

discussions with the health technicians to determine whether there were reports of any negative human health or environmental impacts during the spray campaign to ensure that any such cases were included in the environmental monitoring and mitigation plan (EMMP). Health technicians confirmed that in 2016 there weren't many cases of human exposure compared with 2015, when the insecticide used was new. They mentioned that the experience acquired last year helped them to manage all situations. They also mentioned the importance of health technician training, which contributed to their knowledge of the correct protocols to handle issues regarding human insecticide exposure. AIRS district coordinators ensured that fences at all operational sites were properly closed to avoid unauthorized access by people, animals, etc.

6.3. MANAGEMENT OF INSECTICIDE ADVERSE EFFECTS

Each of the seven spray districts had a resource team responsible for handling adverse effects. The team was composed of a coordinator, a doctor who was based at the district hospital, and nurses based at each health center affiliated with an operational site. These teams were responsible for conducting pregnancy tests and medical checks of all candidates and addressing any adverse effects experienced by seasonal workers or community members during the spray operations. Before the start of the spray campaign, teams received training in Quelimane on management of IRS adverse effects. The government provided all health centers adjacent to operational sites antidotes (atropine) for use in the case of human exposure or contamination at a high level. During the 2016 campaign, there were two separate incidents of SOPs splashing themselves with Actellic® 300CS while pressuring the spray pump; SOPs in Mocuba and Quelimane districts were treated at the local health facility and were able to return to work quickly.

6.4. SOLID WASTE MANAGEMENT

IRS solid waste generated by the 2016 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 on December 13-16, 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. This operation was conducted in coordination with the MITADER Provincial Environmental Officer.

AIRS Mozambique's solid waste plan for 2016 is currently being implemented. Washing and preparation of the empty bottles from the 2016 spray season began on November 4 and it was completed on February 17, 2017. The process of grinding bottles from the 2015 spray season has started at Incala. This process is supervised by the AIRS ECO in coordination with MITADER Zambezia to ensure Incala is following all environment procedures and best practices stated in the memorandum of understanding (MOU) between PMI AIRS and Incala.

6.5. INCIDENT REPORTS

As previously highlighted, during the 2016 spray season AIRS Mozambique focused on following all environmental, safety, and health procedures in order to have a safe spray season and reduce the number of incidents that occurred in 2015. The number of incidents was reduced, from 15 to 11. In 2017, AIRS Mozambique is seeking to reduce the number of incidents to zero, and will continue improving and working to achieve this number.

TABLE 12: INCIDENT AND EXPOSURE REPORTS

Operational Site	Date	Description of Incident	Insecticide Loss	Corrective Action Taken
Maquival, Quelimane	October 7, 2016	SOP at her second insecticide mix for the day on October 7, over pressurized the spray pump causing the hose to come lose; while SOP was wearing face shield and mask, insecticide got on her face and eyes. SOP was taken immediately to nearest health facility; face and eyes were thoroughly washed with water and soap, and was applied ophthalmic tetracycline ointment.	N/A	Spray pump handling procedures reviewed with SOP, and all spray teams in the following morning mobilization, specific to the accurate pressurization, insecticide mixing, and proper closing of the pump, importance of keeping face shield and mask on at all times while handling insecticide.
Namuinho, Quelimane	October 17, 2016	At Chuabo Dembe village, during QA by AIRS Ento Coordinator, and Dr. Aklilu on STTA, in a particular house came across a 2 liter Coke bottle and a 1.5 liter water bottle filled with insecticide; structure confirmed by the ento team as not eligible, was marked as sprayed; however in reality it was not sprayed.	3.5L of insecticide recovered	The SOP was taken into custody and dismissed from the spray campaign without compensation. Insecticide was recovered and taken to the Namuinho Ops Site, for further transport to the Central Warehouse for final disposition post spray campaign. At the time of this ESOR revision, the insecticide had been incinerated.
Namuinho, Quelimane	October 22, 2016	M&E Assistant while doing DCV found SOP with falsified spray data; an equivalent of 1.5 bottles of insecticide was poured into a 1.5 litre water bottle	1.5 bottles of insecticide recovered	The SOP was dismissed from the spray campaign without compensation. Spray data for this SOP were verified beyond the day of the incident; data of the 22 were null and void.
Namuinho, Quelimane	October 24, 2016	SOP found with 1.5 bottles of insecticide in a water bottle (by the district Environmental officer during supervision); insecticide recovered and taken to the Namuinho operations site for further transport to the central warehouse for final disposition after the spray campaign. At the time of this ESOR revision, the insecticide has been incinerated	1.5 bottles of insecticide recovered	The SOP was dismissed from the spray campaign without compensation. Spray data for this SOP are being verified beyond the day of the incident. During the morning mobilization, this kind of activity was discussed and discouraged.

Mocuba Sede, Mocuba	October 15, 2016	Provincial and district environmental officers through field supervision found 4 SOPs with falsified spray data; insecticide had been exchanged for livestock; poured into domestic containers, and on the ground.	An equivalent of 2 bottles lost based on the contaminated soil; recovered approximately 10L of insecticide	4 SOPs were dismissed without pay; Insecticide and contaminated soil were taken to the Mocuba District store, both were transported to the central warehouse. Insecticide was incinerated under ECO supervision on December 16, 2016.
Munhiba, Mocuba	October 19, 2016	In the village of Muchite during field supervision, 2 SOPs found to have falsified spray data; confirmed that structures weren't sprayed and 5 bottles of insecticide by each SOP were hidden into domestic containers.	10 bottles of insecticide recovered	2 SOPs were dismissed without pay; the 10 bottle equivalent of insecticide recovered was transported to the district store, and subsequently to central warehouse. Insecticide was incinerated under ECO supervision on December 16, 2016.
Namanjavira, Mocuba	October 24, 2016	DC and district environmental officer during supervision found 5 SOPs to have falsified spray data, an equivalent of 5 bottles of insecticide had been poured into domestic jugs and left at the home of one of the 5 SOPs	5 jugs of insecticide recovered (equivalent to the 5 bottles)	All 5 SOPs were dismissed from the spray campaign without compensation. Spray data for these SOPs were verified beyond the day of the incident; data of the 24 were null and void.
Mocuba Sede, Mocuba	October 29, 2016	TL assisting an SOP, over pressurized the spray pump causing the hose to come lose and insecticide on her face and chest area. Wearing face shield and mask, some insecticide got on her face and chest through the wet uniform. PPE was immediately removed, and chest and face washed with water and soap, and hydrocortisone from first aid kit applied on affected areas. Taken to the nearest health facility as a safety measure, she was evaluated and released; and went back to work on the same day.	n/a	Spray pump handling procedures reviewed with TL and other spray teams in the following day particularly accurate pressurization, insecticide mixing, and proper closing of the pump, importance of keeping face shield and mask on at all times while handling insecticide.
Milange Sede, Milange	October 29, 2016	Vehicular accident involving 24 seasonal workers. Morning field deployment; a 4 vehicle caravan just over 1 km away from the operational site driving towards Josina Machel Village; a 8 ton Toyota Hino, Plate ADP 218 MC carrying 24 seasonal workers lost control landing on its side (driver side) throwing everyone off, workers included, 1 brigade supervisor, 4 team leaders, 16 Spray operators, 1 mobilizer).	No insecticide lost	All 24 people were taken to Hospital Rural de Milange. PPE and insecticide was collected immediately from the accident scene. Investigation underway. Initial findings suggest vehicle had mechanical issues not identified in the daily inspection or reported by driver. Reinforced the importance of inspections to

				ensure the truck and driver were certified each day without exceptions.
Posto Campo, Mopeia	October 19, 2017	During the field supervision of MSP use, ECO found SOP with nausea and a headache. Suspected he worked 2 consecutive days without changing PPE.	No Insecticide lost	SOP was taken to the health facility where he was treated and hydrated. DC and team instructed on the importance of daily change of complete PPE; everyone must wear clean PPE daily to prevent insecticide exposure.
Chimuara, Mopeia	October 25, 2016	Theft and sale of insecticide by SOPs and pump technician.	4 bottles of insecticide recovered	Police investigation started. Conducted data collection verification in the village where the SOP worked. Driver, SOP, and pump technicians were dismissed without pay.

6.6. MITIGATION OF INCIDENTS

To avoid the problems encountered in the 2015 spray season, AIRS Mozambique incorporated into 2016 training the lessons learned and recommendations from the previous year.

- District-level environmental and agricultural technicians were actively involved during training and throughout the spray campaign. Their involvement in operations trainings added much to their knowledge and gave them an understanding of how to work with SOPs.
- Using the CommCare m-health system has contributed greatly to environmental monitoring, because it gives the ECO and others senior members of the AIRS team timely knowledge of issues in the field, and enables them to rapidly take corrective action and/or mitigation measures.
- Discussing in depth during the environmental compliance training the possible, immediate and long-term impacts of insecticide on human health and the environment helped SOPs and other spray team members understand the importance of managing, mixing, and correctly applying insecticide.
- Communication made by radio, television, mobilizers, and community meetings contributed to achievement of the goals of the Mozambique EMMP. AIRS Mozambique will continue working to reduce possible negative health and environmental impacts of IRS.

7. ENTOMOLOGY

In 2016, the AIRS Mozambique program continued its collaboration with the NMCP and PDH, as well as SDSMASs, in the implementation of IRS in seven targeted districts in Zambezia Province.

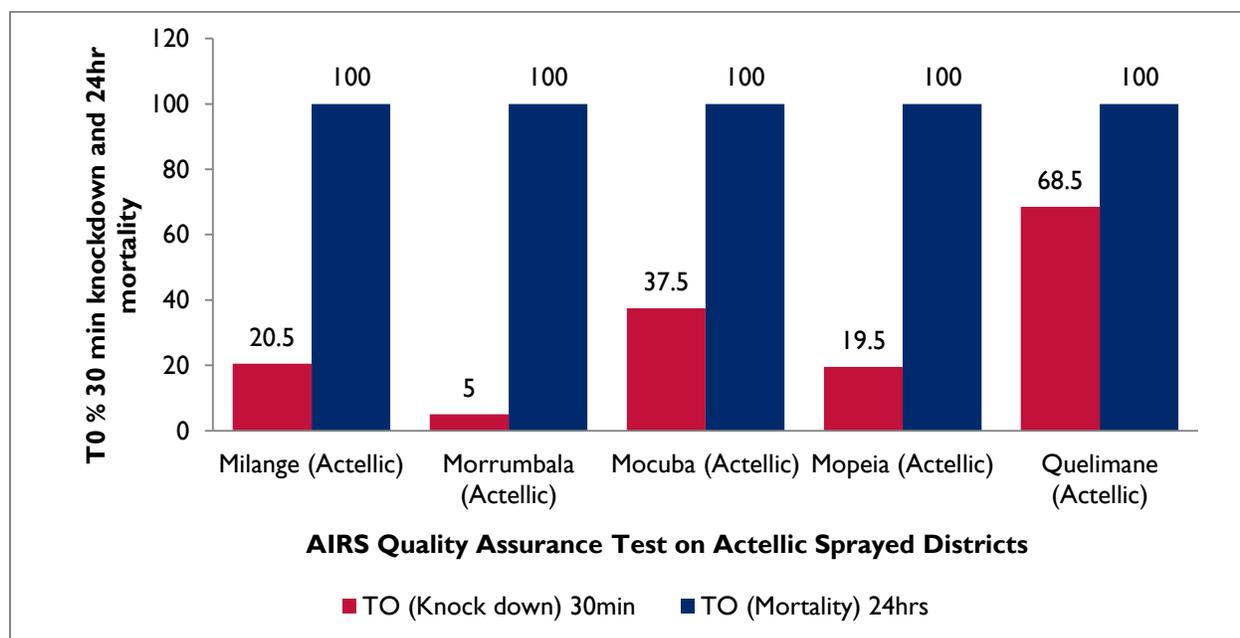
7.1. QUALITY ASSURANCE OF IRS PROGRAM

The spray quality assessment performed in five of the seven spray districts (Milange, Morrumbala, Mocuba, Quelimane, and Mopeia) is critical for evaluating spray quality on sprayed surfaces. The standard WHO cone bioassay test used within the first two weeks of the 2016 spray campaign showed high quality of spray in all districts, with a mortality rate of 100 percent after the 24-hour holding period.

TABLE 13: CONE WALL BIOASSAY TEST RESULTS SUMMARY

District	Sentinel Site	# Houses	# Mosquitoes Exposed	30 Minutes KD	# Mosquitoes Dead After 24 Hrs	% Exposure Mortality	% Control Mortality After 24 Hrs
Milange	Muriamundi	5	200	20.5	200	100	2
Mocuba	Muracua	5	200	37.5	200	100	0
Morrumbala	Coqueiro	5	200	5	200	100	4
Mopeia	Cimento	5	200	19.5	200	100	2
Quelimane	Chuabo Dembe	5	200	68.5	200	100	0

FIGURE 2: CONE WALL BIOASSAY QUALITY ASSURANCE SUMMARY



7.2. RESIDUAL EFFICACY OF ACTELLIC 300 CS

The residual efficacy of the Actellic® 300 CS was also measured at T1 (one month after spraying) and the results remained acceptable with mortality rates varying from 96.5 percent to 100 percent. The residual life of this insecticide will be measured monthly until mortality is below the standard cut-off point of 80 percent for two consecutive months.

7.3. DISEASE DATA MANAGEMENT SYSTEMS

The Disease Data Management System (DDMS) was rolled out to Mozambique in August 2016. Eleven people were trained, namely AIRS Mozambique's Entomological Coordinator, Insectary & Entomology Technician, Senior Entomologist, and Database Manager, as well as three Zambezia Provincial Health Directorate entomology technicians, three NMCP entomologists, and one entomologist from the National Institute of Public Health. DDMS is up and running and fully utilized by the AIRS team; all AIRS data from 2012 through 2015, including Susceptibility and Bioassay data, has been uploaded onto the system. The 2016 and current data is being uploaded as well. In the meantime, the server designated for the NMCP is fully configured and ready to go, waiting on NCMP to resolve internal internet services.

8. MONITORING AND EVALUATION

8.1. KEY OBJECTIVES AND APPROACH

For the 2016 spray campaign's M&E, AIRS Mozambique closely followed the processes outlined in the approved work plan. The main objectives of the M&E activities, based on lessons learned, 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 them to future project years.

8.2. DATA COLLECTION AND MANAGEMENT

Data were collected using standardized data collection forms designed to capture all core PMI indicators. All data collection was preceded by training on data capture and data quality. During the spray campaign, all household data were collected by SOPs and verified through data quality assessment processes. To ensure data integrity, improve supervision, and, ultimately, enhance quality of data collection and data entry, AIRS Mozambique also used quality assurance and control tools (i.e., the Error Eliminator [EE] and the Data Collection Verification [DCV] form). Table 14 describes all of the 2016 data collection and quality assurance tools, their purposes, and intended users.

TABLE 14. DATA COLLECTION AND QUALITY ASSURANCE TOOLS

Tool	Purpose	Users	Frequency Used
Daily SOP Form	Capture structures found, structures sprayed, structures not sprayed, population protected, population not protected	Primary: SOPs Secondary: None	Daily
Daily Team Leader Form	Summarize daily performance by 1 spray team, including structures found, structures sprayed, structures not sprayed, population protected, population not protected, and bottles of insecticide received, used and returned, empty and/or full bottles	Primary: Team leaders Secondary: None	Daily
Error Eliminator	Verify completeness and accuracy of data collected by SOPs; highlight common data collection errors so they can be quickly identified and corrected immediately; elucidate issues requiring retraining	Primary: Team leaders, brigade supervisors Secondary: Site supervisors, district coordinators, M&E assistants, operations manager, database manager, M&E manager	Daily
DCV	Check data accuracy during randomized household visits; ensure data collected by SOPs matches information reported by households	Primary: M&E assistants, database coordinator, database manager, M&E manager	Every 2-3 days

In 2016, the DCV was converted from a paper form into a form within the mobile supervisory app suite. Having more DCV forms completed and analyzed during the campaign proved to be very effective. Table 15 and 16 show the numbers of households interviewed using the DCV form and issues observed and resolved, respectively. Table 17 and Figure 3 show a comparison of spray coverage based on structures found by SOP and structures visited during DCV. Overall, there was a slight difference (below 10%) between the DCV data and the SOP data collection forms, with the exception of Derre, where there was a 21% difference that can be attributed to SOPs recording closed structures as sprayed structures.

TABLE 15: NUMBER OF STRUCTURES VISITED USING THE DCV FORM

District	No. of Structures Visited
Derre	418
Milange	299
Mocuba	345
Molumbo	244
Mopeia	402
Morrumbala	475
Quelimane	490
Grand Total	2,673

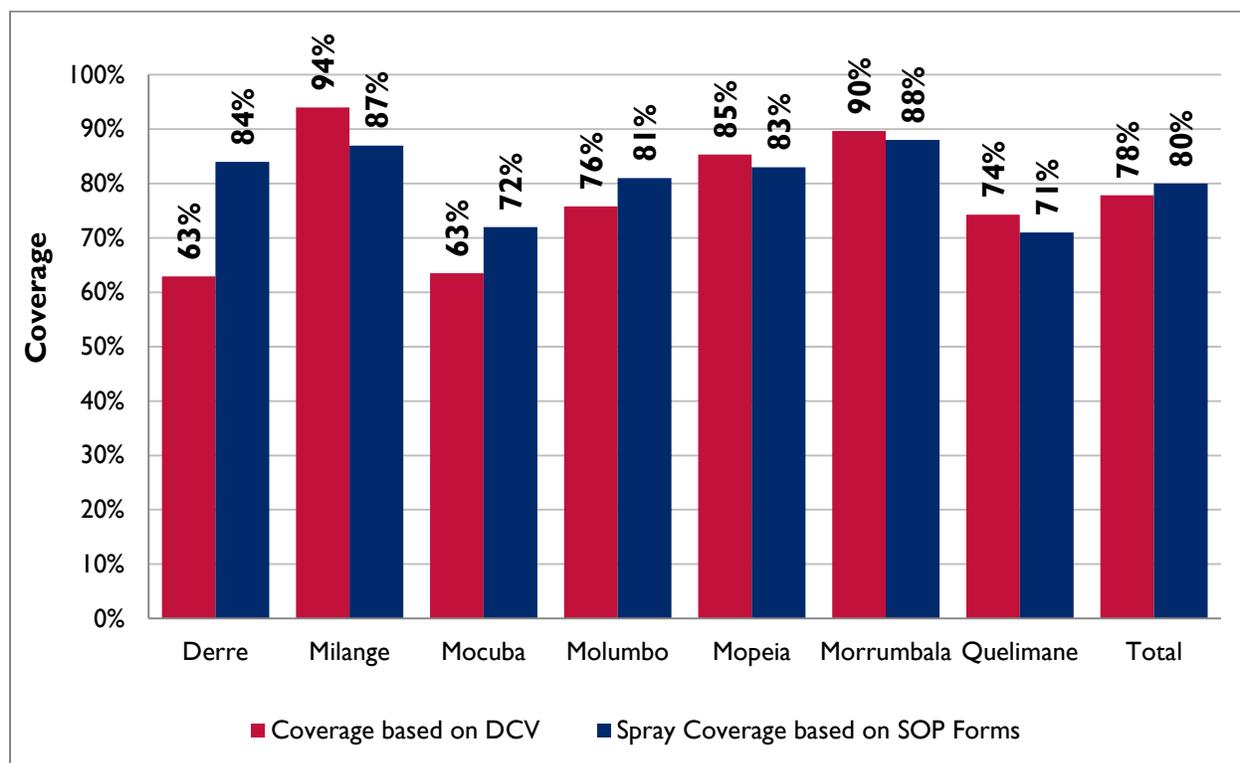
TABLE 16: USE OF DCV : COMMON ISSUES FOUND AND CORRECTIVE ACTIONS TAKEN

Errors/Issues Observed	Corrective Actions Taken
Names of head of households are not filled for the non-sprayed houses.	These issues were addressed with brigade supervisors, team leaders, and SOPs at morning assemblies.
IRS household stickers are not issued to non-sprayed houses.	SOPs were reminded to issue stickers to both sprayed and non-sprayed households.
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.	The issue was discussed with spray teams and SOPs were encouraged to probe further when collecting population figures to ensure that they included all those living in the structure (adults and children). Example: instead of asking how many “men” live in the structure, SOPs should ask how many “males,” including children and adults, live there.
All eligible structures encountered by SOPs were not appropriately reported, particularly non-sprayed eligible structures.	The issue was discussed with spray teams and SOPs during the morning assemblies and SOPs were reminded to mark and record all eligible structures found in a village.
SOPs were not consistently marking structures with chalk as per the PMI AIRS Project’s standard guidelines, but rather relying only on the household sticker.	The issue was discussed with spray teams and SOPs during the morning assemblies and SOPs were reminded to mark and record all eligible structures found.
Some villages were only partially sprayed.	Team leaders and brigade supervisors were reminded that all parts of villages not reached during the day must be reported to the site supervisor at the end of the day.

TABLE 17: DATA COLLECTION VERIFICATION COVERAGE BASED ON DCV BY DISTRICT

Districts	Structures Visited	Structures Sprayed	Structures not Sprayed	Coverage Based on DCV
Derre	418	263	155	63%
Milange	299	281	18	94%
Mocuba	345	219	126	63%
Molumbo	244	185	59	76%
Mopeia	402	343	59	85%
Morrumbala	475	426	49	90%
Quelimane	490	364	126	74%
Total	2673	2081	592	78%

FIGURE 3: SPRAY COVERAGE BASED ON DCV & SOP'S DATA FORMS



8.3. DATA ENTRY

As in previous years, the AIRS Mozambique M&E team worked with the AIRS home office M&E specialist and Client Technology Center to strengthen the Microsoft Access-based AIRS Database. Additional laptops were procured to replace older, unusable computers, adding to the stock of data entry clerk (DEC) laptops that were available from previous years. Forty DEC's were contracted, staffing five data centers. Due to the lack of infrastructure, poor connectivity, and unstable electricity in Molumbo and Derre districts, these two districts were co-located with the Milange and Morrumbala data centers, respectively. The database set-up entailed using a shared server and individual workstations in each data center. The project team installed the 2016 AIRS Mozambique database on 45 computers and the Directly Observed Spraying (DOS) database worked on the server. The DOS database was created specifically to store, manage and report on data collected using the DOS Form, as used by team leaders. The DOS database is separate from the AIRS M&E database, which stores and manages all spray data. The central DOS database runs on the server(s) alongside the AIRS/M&E Database, with the front end shared on the DEC's computers. Four to eleven DEC's were assigned per data center, depending on the amount of data a district collected per day.

Data were entered simultaneously at each of the five data centers. The AIRS M&E 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 each day, during and after spray. 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 the Microsoft Access-based IRS Cleaning/Reporting tool as in previous years. The DEC's, Database Coordinators, and M&E Assistants cleaned spray data daily throughout the spray campaign with final data cleaning completed nine days after the close of the spray campaign.

8.4. DATA STORAGE

Paper data forms are stored in two-ring binders. Spray data were filed by district, date, and operational site name. At the end of every day, all data were backed up electronically. Back-up was done in two ways: into a back-up folder on the district data entry server and into the Dropbox-based back-up system.

8.5. REPORTING

Regular district-level reporting for both internal planning purposes and external reporting was done daily using the automated reports in the AIRS Cleaning/Reporting Tool and mobile data/PMT SMS. The report provides feedback to spray teams to facilitate program management and decision-making.

On a national level, data from all seven districts was aggregated to produce the Weekly Spray Progress Reports for the home office, PMI COR and Mozambique teams, NMCP, PDH, and SDSMAS.

8.6. RESULTS

The complete list of all indicators for the 2016 spray campaign is presented in the M&E Plan Matrix in Annex G.

8.7. SPRAY OPERATIONS DATA

During the 2016 spray campaign, SOPs found 508,295 eligible structures, of which 405,597 were sprayed, representing 80 percent spray coverage. The total population protected by IRS (all ages) was 1,929,654. This included 284,468 children under five years of age and 115,639 pregnant women. Table 25 provides a summary of spray results.

8.8. DIRECTLY OBSERVED SPRAYING

Due to growing concerns over spray quality, house preparation before spray, and the level of team leader supervision observed in some AIRS countries, including Mozambique in 2015, the PMI AIRS Project introduced the Directly Observed Spraying (DOS) supervision tool to ensure technical aspects of the campaign met best practice standards.

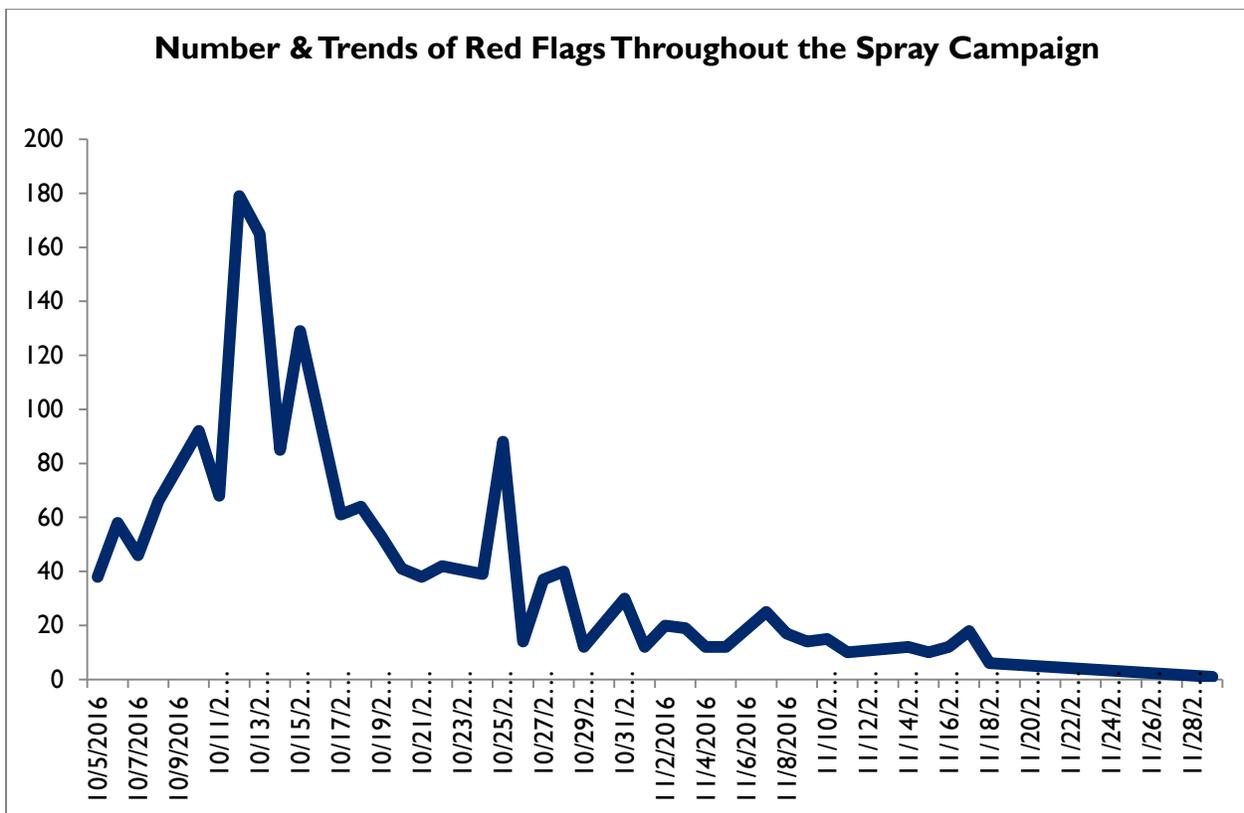
One of the most important technical requirements of IRS is the application of the right amount of insecticide on a sprayable surface. While SOPs were trained on the correct application, field performance typically varied. Supervisors observed SOP preparations and spraying techniques such as keeping a distance between the nozzle tip and the wall and speed of spray. If errors were noted, team leaders immediately provided retraining. The PMI AIRS team designed a DOS form with 10 questions to help supervisors directly observe and monitor the quality of key activities carried out by SOPs, including

the correct use of PPE, making sure equipment is functioning and structures are prepared for spraying, and correct mixing and applying of insecticides with special emphasis on spray quality.

In Mozambique, team leaders were the primary users of the DOS form as supervisors at higher levels had a more robust supervisory checklist that included similar questions. The AIRS team stipulated that each team leader was to critically observe each SOP under his/her supervision at least once per day. All team leaders received training on how to use the DOS form during the Team Leaders and Spray Operators training. Team leaders were also trained to provide instant feedback and on-the-spot corrective measures if any “red flag” issues were observed.

To monitor the use of the DOS form and the number of errors being observed and corrected, AIRS Mozambique implemented a database to capture data collected through the DOS form. In total, team leaders completed only 1,932 DOS inspections over the 39-day (a total of 52,000 verification/inspections were expected over the course of the spray campaign had TLs followed the requirements). Of these, 427 (22 percent) inspections did not identify any red flags. The remaining 1,507 inspections (78 percent) identified a total of 1,700 red flags. Just over a third of the red flags (142, or 36 percent) were observed in the first two days of spraying. The remaining 64 percent were spread over the following 28 days. DOS data showed that about 86 percent of the 1,700 red flags were due to spray pump leakages; however, upon further data analysis it was confirmed that these red flags were due to clogged CFVs. Team leaders were retrained to better understand that leakages were identified as the type that leads to spillage of insecticides, not the non-exit of insecticide due to CFV clogging.

FIGURE 4: DIRECTLY OBSERVED SPRAYING RED FLAGS OVER TIME (N=1700 OVER 39 DAYS)



8.9. MOBILE DATA COLLECTION, MESSAGING AND REPORTING

In 2016, AIRS Mozambique implemented mobile phone data collection, messaging, reporting, and supervision tools using the Open Data Kit (ODK) and CommCare platforms. These tools were implemented in conjunction with the AIRS subcontractor, Dimagi LLC. The mHealth tools were:

- Bulk SMS job aids;
- PMT; and
- Mobile-based supervisory forms.

The first two tools are driven by SMS messaging, while the third is a smartphone application built on two mobile platforms.

8.9.1. BULK SMS JOB AIDS

Bulk SMS job aids were introduced to remind spray teams and supervisors of standard operating protocols and key environmental compliance issues as well as to reinforce the need to create a work environment without discrimination against individuals based on their gender, religion, or ethnicity. Through the bulk SMS job aids, AIRS Mozambique issued notices and information to all categories of spray campaign actors at least two or three times a week throughout the spray campaign.

The major challenge in 2016 was delayed arrival of some messages due to slow network connectivity around some operational sites. To mitigate this, AIRS Mozambique also used the *WhatsApp* application to communicate with district coordinators when immediate action was required.

8.9.2. PERFORMANCE MONITORING TRACKER

Every day, via SMS, operational site supervisors reported raw performance data to a central server. Supervisors reported on four key indicators specific to their operational sites:

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

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

8.9.3. MOBILE-BASED SUPERVISORY FORMS

For the 2016 campaign, AIRS Mozambique implemented a mobile-based supervisory application. These tools were developed, tested, and standardized across all AIRS spray countries. In 2015, AIRS Mozambique piloted the mobile based supervisory application. In 2016, the application was rolled out throughout the campaign. The supervisory tools were on two different platforms: ODK housed the environmental compliance supervisory forms (Pre-season Store and Soak Pit Assessment, Pre-contract Transport Inspection, and the Post-IRS Environmental Compliance Inspection) used mainly by the AIRS project; CommCare housed the other supervisory forms (Morning Mobilization and Vehicle Inspection, Homeowner Preparation and Spray Operator Performance, Storekeeper Performance, and End of Day Clean-up, and DCV).

The purpose of transitioning to mobile tools was to get quick feedback on compliance reports coming from the field and to enable immediate corrective actions when needed. All supervisory tools were programmed on Android-based smartphones and used before, during, and after the spray campaign. The supervisors (AIRS team and government stakeholders) used the mobile-based systems to supervise all aspects of the spray operations.

Each day, after data were submitted to a cloud server, an email was generated and sent to a set of recipients, including the COP, Operations Manager, ECO, M&E Manger, Database Manager, and Communications Coordinator. All persons or staff who used the mobile supervision and reporting systems received training during the Training of Trainers. The Dimagi representative responsible to the AIRS Mozambique team also followed up with the team frequently before and during the campaign to set up the systems and troubleshoot if any obstacles arose. A common complaint was the synchronization of data with the server and loss of information before saving, but the issue was resolved expeditiously.

TABLE 18: 2016 SPRAY RESULTS SUMMARY BY DISTRICT

District	Structures Found by SOPs	Structures Sprayed	Spray Coverage	Total Population Found	Total Population	Population Protected				
						Males	Females	Pregnant Women	Children <5 Years	% of Population Found
Derre	20,585	17,213	84%	89,410	75,630	38,365	37,265	5,182	12,061	85%
Milange	94,888	82,425	87%	450,770	395,178	195,603	199,575	22,297	58,629	88%
Mocuba	116,021	83,865	72%	598,867	448,415	223,628	224,787	30,059	66,271	75%
Molumbo	54,360	44,006	81%	230,908	188,072	95,805	92,267	10,151	31,112	81%
Mopeia	19,992	16,500	83%	89,258	76,669	39,148	37,521	3,908	11,513	86%
Morrumbala	104,128	91,974	88%	438,966	391,129	194,132	196,997	24,237	58,316	89%
Quelimane	98,321	69,614	71%	490,649	354,561	176,198	178,363	19,805	46,566	72%
Total	508,295	405,597	80%	2,388,828	1,929,654	962,879	966,775	115,639	284,468	81%

TABLE 19: INSECTICIDE USE BY DISTRICT

District	Structures Found	Structures Sprayed	Insecticide Bottles				Spray Operators			
			Issued	Returned Full	Used	Not Returned	SOPs Worked	Structures/SOP day	Bottles/SOP day	Structures/Bottle
Derre	20,585	17,213	10,560	1,735	8,823	2	1,835	9.4	4.8	2.0
Milange	94,888	82,425	46,644	2,084	44,560	0	9,636	8.6	4.6	1.9
Mocuba	116,021	83,865	69,354	1,001	68,353	0	14,732	5.7	4.6	1.2
Molumbo	54,360	44,006	22,404	0	22,325	40	4,255	10.3	5.2	2.0
Mopeia	19,992	16,500	11,213	610	10,603	0	2,107	7.8	5.0	1.6
Morrumbala	104,128	91,974	51,428	0	51,428	0	9,746	9.4	5.2	1.8
Quelimane	98,321	69,614	48,990	124	48,860	6	8,575	8.1	5.7	1.4
Grand Total	508,295	405,597	260,593	5,593	254,952	48	50,886	8.0	5.0	1.6

9. CHALLENGES

1. **Homeowner refusals/closed structures:** Spray coverage was low due to lack of access to eligible structures. The number of and reasons for non-spray are in Table 20 below. Historically, refusals, which lead to low coverage, have been attributed to ineffective community mobilization that leads to a high rate of “refusals” in the first days. The higher number of refusals and/or closed structures is more predominant in the urban and peri urban areas with Mocuba and Quelimane, registering the highest numbers.

TABLE 20: NON SPRAYED STRUCTURES

Districts	Reasons for Non-Spray					Grand Total
	Closed	Refusal	Sick	Funeral	Others	
Derre	729	2,274	178	46	144	3,371
Milange	3,130	7,793	1,071	158	311	12,463
Mocuba	6,122	16,448	5,371	393	3,820	32,154
Molumbo	1,547	7,667	688	34	418	10,354
Mopeia	1,204	1,481	91	13	705	3,494
Morrumbala	3,762	6,824	669	115	785	12,155
Quelimane	2,976	17,740	3,762	450	3,779	28,707
Grand Total	19,470	60,227	11,830	1,209	9,962	102,698

Solution: AIRS needs to find a way to improve mobilization by finding context specific solutions to get people to agree to IRS. Such solutions include but are not limited to ensuring the spraying is scheduled at a time that homeowners are present and not away at work, e.g. farming. In addition, AIRS plans to conduct off season BCC activities in collaboration and partnership with other PMI partners to advocate for IRS and to link IRS to malaria so that the communities are more open to IRS.

The INS is conducting a qualitative research on IRS refusals in Zambezia and Nampula provinces. AIRS plans to review and take lessons learned into account in the 2017 spray campaign.

2. **Non-recording of unsprayed structures:** Some SOPs did not record found but not sprayed structures.

Solution: In the daily morning assemblies, team leaders and brigade supervisors were reminded to track the practice in the field and ensure that SOPs registered all eligible structures reached and sprayed. There was a marked improvement thereafter.

3. **Data Integrity:** Field supervision and DCV revealed that some SOPs in all districts were still forging spray data.

Solution: SOPs involved were terminated on the spot without pay; increased field supervision and DCV continued.

4. **Insecticide theft and waste:** Some seasonal workers were caught with stolen insecticide, and/or attempting to steal, by emptying the insecticide into other domestic containers.

Solution: Workers, including SOPs, team leaders, and brigade supervisors, involved were terminated on the spot without pay. The cases were reported to the police for further investigation and action.

10. RECOMMENDATIONS

Following are a few recommendations for the next spray campaign:

1. **Seasonal Worker Recruitment:**

AIRS Mozambique must lead recruitment, including contracting, particularly for the operational site supervisors, brigade supervisors, team leaders, and storekeepers, the same recruitment and selection process as applied for the M&E support functions of 2015 and 2016 that yielded highly qualified personnel

2. **Community Mobilization:**

Mobilizers should be embedded with spray teams to ensure closer coordination on the day of spraying between mobilizers and spray teams, so that houses are ready when SOPs arrive.

Mobilizers, and spray teams need to communicate better that all items should be removed from the house as part of preparation.

Political allegiances (i.e., FRELIMO, RENAMO) created pockets of high refusals in both Quelimane and Mocuba; additional community meetings with traditional and religious leaders are encouraged to promote IRS acceptance.

3. **Supervision:**

Team leaders, brigade supervisors, and site supervisors need to better embrace their role as frontline supervisors by providing on-the-spot feedback to team members to quickly correct their actions.

4. **Operational Sites Rehabilitation:**

Though operational site rehabilitations were completed in time for the start of the campaign, a few of the sites were only completed a week prior to the onset of the spray campaign. Going forward, in 2017, all rehabilitation and/or construction of new sites must be finalized at least two weeks prior to the onset of the spray campaign; Work plan and timeline for site readiness shall be better monitored and adhered to under the leadership of the Operations Manager, in coordination with district coordinators at the district levels.

5. **Local Procurement :**

Abt uses the Race to the Starting (RSL) line tool to schedule and monitor performance of critical activities leading up to the first day of the spray campaign.

The RSL was not used effectively as timeliness and milestones for local procurement were not followed or achieved. Local procurement fell short of timely delivery of all materials and supplies procured locally. Materials such as IRS Household stickers, PPE, and other critical materials and consumables were not delivered on schedule. All materials and items should be procured and in the central warehouse no later than 30 days from the start of the campaign.

All materials and items should be at the operational sites a week prior to the onset of the spray and a site audit should be conducted to confirm receipt of all materials the week leading to the campaign. This allows the AIRS Mozambique to remedy any shortfalls prior to the start of the campaign.

6. Spray Calendar:

The spray calendar was not prepared and distributed in a timely manner; it was also not adhered to. Spray teams' distribution and supervision by team leaders was chaotic in some districts, resulting in low performance by SOPs and teams and not achieving established targets.

The Spray Calendar should be ready and distributed a week prior to the start of the spray campaign. During the week leading up to the start of the campaign, the Operations Manager should walk the TLs, BSs, and other relevant staff through the Spray Calendar to ensure that all staff is on same page.

7. Staffing Changes:

During the campaign, a number of key Abt staff members did not carry out their duties, thereby hampering the spray campaign. Abt is looking to replace those individuals.

8. Sprayable Structures & House Preparation:

There were cases where SOPs counted eligible structures as ineligible structures; this was primarily seen in Quelimane District, Maquival area, where there is a higher number of thatched homes, which may or may not be sprayable, depending on the inner wall mud texture. There were also cases where SOPs sprayed houses without following the preparation standards, e.g., not removing food as an example.

For 2017, AIRS is looking at ways to translate what the seasonal personnel are taught in a classroom into the field setting, including actual house preparation, team distribution, and identification of eligible versus ineligible structures.

In addition, AIRS is currently translating its comprehensive training curriculum into Portuguese and plans to roll it out in 2017. This training has role specific modules with practical case studies dealing with common scenarios that seasonal personnel encounter.

9. Seasonal Personnel Payment Rates:

The current payment rates for seasonal personnel are established by the MOH for the entire country. In 2015 SOP rates was increased from MZN 120 to 150 per day; currency devaluation has lessened these earnings greatly. Some operational sites began spraying late as the seasonal workers were not happy with their daily rates.

In collaboration with MOH, AIRS shall seek to pay a rate that takes into account inflation and other market factors so that seasonal personnel are better compensated in 2017.

AIRS Mozambique will establish a performance based payment scheme towards off setting low earnings

ANNEX A: INTERNATIONAL AND LOCAL PROCUREMENT

Line Items	Quantity Procured
Visor	1289
Helmet with Connector	977
Thermometers	15
Respiratory Masks	80000
Team Leader Vest (Light Green reflective)	305
Brigade Supervisor Vests (Orange Reflective)	102
Spray Pump Spare Part Kits	10
SOP Gloves	1300 pairs
Washer Gloves	190 pairs
Washer Aprons	135
Local Procurement	
Transportation Services	
Operational Sites Rehabilitation Transportation (double cabin 4x4 for 15 days)	7
Insecticide Distribution from Central level to Districts, and Sites Transport; includes transport of empty bottles from districts to central level) 10 ton truck	4
Seasonal Personnel Transportation (trucks for 45 days)	90
Supervision Transportation(double cabin 4x4 for 60 days)	20
Motorcycles for Data Collection Forms Transportation from Sites to Datacenters	15
Motorcycle for Community Mobilization used by Religious Leaders	69
Demobilization Transportation 10 ton trucks for 5 days	4
Printing Services	
Household Stickers	468,239
SOP Daily Form (Front & Back)	83,863
Team Leader DOS Form (Front & Back)	27,873
Standalone Error Eliminator	25,151
Stock Cards (A4)	4,000
Stock Requisition Form	6,000
Delivery Note	6,000
Daily Insecticide Control Form	20,000
Weekly Insecticide Tracking Form	1,500
Warehouse Ledger Books	10
Requisition Books (A4)	60
Banners	29
Posters	700
Warning Signs	220

Line Items	Quantity Procured
T-shirts	750
Hats	600
PPE & Other Materials	
Pregnancy Tests	1650
First Aid Kits (contents)	778
Consumables	
Powder Soap 100g (boxes)	13000
Bathing Soap (cartons)	21906
Materials	
D Batteries for Megaphone	146
Megaphone Batteries C	352
Flashlights	1898
Flashlight Batteries D	22776
PPE	
SOP	1000
Socks	3868 Pairs
Towels	1550
Gum Boots	676
2 Piece Blue Overalls	125
1 Piece Blue overalls	1100
1 Piece Overalls	1000
Toothbrushes	1555
Respiratory Masks	4640
SOP Gloves (pairs)	350
Washer Gloves (pairs)	20
Other Material	
Warning Signs	80
Pump Lubricant Oil	40
Thermometer Batteries	54
Clipboards	2139
Pens	6364
Flip Charts	20 rolls
Permanent Markers	1440
Chalk	300 boxes
1 Liter Jugs	1527

Line Items	Quantity Procured
Plastic Sheeting(50M) roll	4600
Plastic Water Container with Tap(50lts)	35
90 Liter Plastic Basins	50
50 Liter Basins	90
90 Liter Plastic Bucket(90 liters)	277
Plastic Bucket(20 liters)	100
20 Liter buckets ; MSPs	8
Fires Extinguisher	8

ANNEX B: POST SPRAY CAMPAIGN PROGRAM INVENTORY

Description	Initial Stock	Procured in 2016	Total Stock	Used and/or Damaged/Lost	Stock Balance	Usable Stock
Insecticide (Actellic CS) Bottles	55,076	221,232	276,308	255,012 ³	21,296	21,296
Insecticide (Deltamethrin) Pali Sachets	255,781	0	255,781	184,535	71,246	71,248 ⁴
Megaphones	159	0	159	62	97	97
Markers	545	4323	4,868	3,868	1,000	1,000
Adhesive Tape	48	0	48	48	0	0
Calculators	116	105	221	0	221	221
Clipboards	0	2,539	2,539	2,509	30	30
First Aid Kits Contents	0	100	100	100	0	0
Pregnancy Tests kits	60	1635	1,695	1595	74	74
Washer Aprons	76	135	211	211	0	0
Team leader Green Vests	132	305	437	78	359	359
Brigade & Site Supervisor Red/Orange Vests	25	102	127	1	126	126
Masks	5,182	84,800	89,982	82,797	7,185	7,185

³ A total of 255,012 bottles were used; 254,952 empty bottles were returned from the districts. The 60 bottles difference includes 48 empty bottles that were not returned and 12 bottles that were batch samples sent for quality assurance testing.

⁴ Deltamethrin stored in the AIRS Mozambique central warehouse belongs to the NCMP; stock procured in early 2015 for the Zambezia province prior to the insecticide resistance report issuance. Stock used in 2016 is 77,500 for Niassa province, 82,000 for Cabo Delgado, and 25,000 for Maputo City. The PDH of Zambezia used 35 sachets used to spray the Governor' house, and the training center. Expiration data for the remaining stock is February 2018.

Description	Initial Stock	Procured in 2016	Total Stock	Used and/or Damaged/Lost	Stock Balance	Usable Stock
Rubber Gloves (SOP)	1,363	1722	3,085	3085	0	0
Rubber Gloves (Washers)	267	210	477	477	0	0
Funnels with Filter	299	0	299	0	299	299
Detergent (150g,250gm)	142	9,053	9,195	9,000	195	195
Batteries	571	2,080	2,651	2,651	0	0
Batteries Size D	0	23,000	23,000	23,000	0	0
Flashlights	386	1,898	2,284	2279	5	5
Strainers (large)	50	0	50	0	50	50
Towels (SOP pump cleaning)	1,537	1,550	3,087	2,633	454	454
Gum Boots (pairs)	1,679	676	2,355	100	2,255	2,255
SOP Uniform 2-piece (blue and beige)	3,274	1,000	4,274	1035	2,258	2,258
SOP Uniform 1-piece	0	1,125	1,125	0	1,125	1,125
SOP Bags (small size)	973	0	973	548	425	425
SOP Bags (Syngenta offer Actelic)	0	816	816	453	363	363
SOP Bags (school bags)	0	1,000	1,000	146	854	854
SOP socks	0	3,868	3,868	3868	0	0
Head/Shoulder Protector	1,923	0	1,923	285	1,439	1,439
Bracket Plastic	89	1700	1,789	50	1,739	1,739
Bracket Metal	985	0	985	171	814	814
Face Shields	3,091	1,700	4,791	4,711	80	80
Helmets	1700	1700	3,400	1,646	1,754	1,754
Grass/Weed Cutter (handheld)	23	0	23	2	21	21
Machetes	17	7	24	3	21	21
Rakes	8	0	8	0	8	8
Hoes	11	0	11	2	9	9
Shovel	24	7	31	2	29	29

Description	Initial Stock	Procured in 2016	Total Stock	Used and/or Damaged/Lost	Stock Balance	Usable Stock
Rope 100m	18	5	23	10	13	13
Water Hose	10	0	10	3	7	7
Screwdriver	9	6	15	1	14	14
Hammers	24	0	24	0	24	24
Pliers	8	6	14	0	14	14
Fastening Tools Wrench (size 10/11)	7	0	7	0	7	7
10L Hudson Spray Pumps (functional)	1,382	0	1,382	0	1,382	1,382
10L Hudson Spray Pumps (completely destroyed)	1460	0	146		146	146
8 L Hudson Spray Pumps (can be repaired)	627	0	627	627	627	627
Hudson Spray Pumps (65) 3/4 Gal Kits (all incomplete missing parts)	30	0	30	30	30	0
10L Hudson Spray Pumps (missing parts & welding)	404	0	404	404	404	404
10L Hudson Spray Pumps (spare parts needed for repairs)	395	0	395	395	395	395
10L Hudson Spray Pumps (unusable)	146	0	146	146	146	0
Wall thermometers	15	16	31	2	29	29
Tooth Brushes	0	1567	1,567	1232	335	335
SOP Measuring Cup	0	891	891	250	641	641
Manometers	220	0	220	220	0	0
Manometer Filters	0	0	0	0	0	0
Spray Pump filters	1683	0	1,683	83	1,600	1,600
Lubricating Oil	0	26	26	18	8	8
Plastic Rolls for SOP	0	153	153	153	0	0
Basins(100litres)		131	131		131	131
Buckets (20L)	0	277	277	10	267	267

Description	Initial Stock	Procured in 2016	Total Stock	Used and/or Damaged/Lost	Stock Balance	Usable Stock
Buckets 50 L	0	107	107	10	97	97
Metal Buckets 20 L	137	0	137	0	137	137
Washing Bar Soap	0	36500	36,500	15000	21,500	21,500
Pens	0	6690	6,690	6562	128	128
Chalk	0	33000	33,000	32900	100	100
Window Mesh for Filtering Water	0	24	24	22	2	2
Activated Charcoal	0	5	5	4	1	1
Sleeping Bags	103	0	103	5	98	98
Wheelbarrow	17	0	17	4	13	13
Stock Control Registers	18	20	38	26	12	12
Stock Distribution Registers (insecticide)	0	76	76	58	18	18
Calibrated Plastic Jugs 1 liter	0	80	80	80	0	0
Calibrated Plastic Jugs 500ml	0	483	483	483	0	0
Measuring Tape 5 Meters	0	5	5	0	5	5

ANNEX C: ENVIRONMENTAL MITIGATION AND MONITORING REPORT (EMMR)

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
Ia. Pre-contract inspection and certification of vehicles used for pesticide or spray team transport.	AIRS ECO inspected 68 trucks in collaboration with District environmental officers, SDSMAS, and transportation department.		
Ib. Driver training	68 drivers trained; 1 female and 67males were trained on safety issues while transporting seasonal personnel, and insecticide.	No issues identified during the inspections	
Ic. Cell phone, personal protective equipment (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.	Truck drivers were not provided the required PPE (mask, boots and gloves), spill kits are present in all trucks	Need to improve PPE quantification to ensure enough PPE is available for all people handling insecticide including truck drivers transporting insecticide.
Id. Initial and 30-day pregnancy testing for female candidates for jobs with potential pesticide contact.	Females SOPs, TLs and/or brigade supervisors diagnosed as pregnant assigned to roles of mobilizers. The first round of pregnancy test was prior to training in three districts on September 12 and on September 21 for four districts. The second round was November 3 and November 8 respectively.	No issues identified during the inspections	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
Ie. Health fitness testing for all operators	60% of seasonal personnel under medical check prior to the onset of spraying. Medical check was conducted on September 10 in Mocuba and September 20 in Milange, Mopeia and Molumbo	Morrumbala, Derre and Quelimane Districts didn't conduct the required medical check due to the lack of health technicians availability to conduct medical checks; the other 4 districts were fully compliant.	AIRS operations to work closely with the health facility to ensure availability of health technicians to carry out medical tests in the future.
If. Procurement of, distribution to, and training on the use of PPE for all workers with potential pesticide contact.	Identified some issues with insufficient PPE for SOPs and other personnel. The situation occurred during the first week of spray, but was resolved by the end of the week.		
Ig. Training on mixing pesticides and the proper use and maintenance of spray pumps.	SOPs were trained on mixing insecticides before spraying.	There were 331 inspections and 21 red flags. There were issues identified with some SOPs during mixing of insecticide, largely resulting from SOPs not always closing the spray pump air tight prior to pressurization. Reinforcing mixing techniques during training and operations, will be priority for AIRS Mozambique for next spray round to reduce the number of red flags. Another priority will be to the role and responsibility of the TLs and BSs throughout the spray days.	
Ih. Provision of adequate facilities and supplies for end-of-day cleanup,	All spray sites have adequate facilities and supplies. Sites using MSP also ensured changing facilities segregated by gender. Water, wash soap and other supplies were provided to facilitate end-of-day clean up for both men and women. All SOPs, TLs and BSs were provided soap to take a shower or at least wash hands and face at the of the end of day. There were 81 inspections.		

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
1i. Enforce spray and clean-up procedures.	Seven progressive rinsing barrels available in each of the wash bays; procedures to SOPs, TLs, BSs and washers.	Each of the operational sites contained the required seven water barrels for progressive rinsing	
2a. IEC campaigns to inform homeowners of responsibilities and precautions.	IEC information disseminated to population through radio, television, community leaders, church announcements, and mobilizers, as well as the SOPs. However, some homeowners claimed they hadn't received the information ahead of time. There were 28 red flags during 33 I inspections; red flags reflect homeowner not being informed previously.	COP and ECO issued daily reminders to the AIRS team to reinforce all red flags found during supervision and/or inspection; issues also addressed during morning mobilizations to emphasize continued improvement.	
2b. Prohibition of spraying houses that are not properly prepared.	Households were prepared before spraying activities. Some SOPs sprayed houses without removing and/covering food and water. There were 14 red flags identified within 33 I inspections; red flags included poor quality and/or small size tarps.	SOPs were stopped, and instructed to prepare the house accordingly. In situations where an SOP was deemed to have been negligent, the SOP was fired.	Safety of homeowners is very important and is a top priority during and post spraying
2c. Two-hour exclusion from house after spraying	All householders were instructed to stay out of the house for two hours after house was sprayed. All householders were instructed to open and air their homes for 30 minutes before entering. There were 7 red flags regarding homeowners claiming the SOP had not informed them. In these cases, supervisors instructed the residents immediately.	Morning mobilization was used to emphasize and remind spray teams about safety procedures.	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
2d. Instruct homeowners to wash itchy skin and go to health clinic if symptoms do not subside.	All homeowners were instructed to wash itchy skin with soap and water, and go the nearest health facility in case of contact with insecticide. However, some SOPs were not providing the accurate information to homeowners. In these cases, supervisors conducting supervision visits and/or inspection instructed the homeowner accordingly. 23 red flags were found within 331 inspections. These red flags were identified as SOPs not providing homeowner the required information; it was not related to exposure.	Reminders to spray teams during morning mobilization.	
3a. Indoor spraying only	Spraying was conducted inside the structure, and eaves only. However some SOPs were found spraying outside the doors, which was corrected immediately on site. There were 17 red flags recorded of the 331 inspections.	Morning mobilization was used to remind SOPs, TLs and BSs of eligible surfaces. Supervisors were reminded of their role to correct this situation immediately.	
3b. Training on proper spray technique	Spray techniques were included in SOP training; however, some SOPs weren't following accurate spray techniques. The following are red flags found: 8 red flags for not pressuring the pump accurately, 21 red flags regarding distance from the wall, and 31 red flags for inaccurate spray speed	Continued efforts and emphasis on spray technique and quality for the next spray round	All SOPs were trained in spray technique before spray start; however, there was some confusion among spray teams. Some SOPs were found without CFVs. Need to improve CFV quantification (including a buffer to replace lost CFVs) and timely procurement and delivery.

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
3c. Maintenance of pumps	<p>Pump repairs and calibration was done before spray campaign, and during the operations. Spray pump technicians handled all issues at the field level.</p> <p>Out of 331 inspections, 26 red flags regarding pumps leaking were identified</p>	<p>After operations all pumps were transported to the central warehouse for inventory, repairs and calibration. This process is underway</p>	
4a. Choose sites for disposal of liquid wastes, including mobile soak pit sites, according to PMI BMPs.	<p>All contaminated liquid wastes were disposed in the fixed soak pits and MSPs.</p> <p>One operational site (Mocuba Sede) is located within the town, close to residence area. Mocuba Sede will be revised with PMI in the offseason, on the relocation of the operational site, as well as to stop spraying the urban area</p>		
4b. Construct fixed and mobile soak pits with charcoal to adsorb pesticide from rinse water	<p>AIRS ECO constructed 19 MPS as well as supervised the rehabilitation of five (5) fixed soak pits; all in coordination with the district environmental officials</p>		
4c. Maintain soak pits as necessary during season	<p>Cleaning of soak pits was required of three operational sites during the spray campaign, namely Namuinho (Quelimane) , Mugeba (Mocuba) , and the Central Warehouse (bottle washing)</p>		
4d. Inspection and certification of solid waste disposal sites before spray campaign	<p>Conducted by ECO in coordination with the district environmental officials of MASA and MITADER.</p>		

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
4e. Monitoring waste storage and management during campaign	<p>All wastes from the operational site stores were properly stored in district stores prior to transporting to the district level, and ultimately to the central warehouse for disposal post campaign.</p> <p>There were 6 red flags regarding waste storage; common issue was segregation of contaminated and non-contaminated waste.</p>		
4f. Monitoring disposal procedures post-campaign	The AIRS ECO supervised all IRS waste to disposal sites by the AIRS ECO.		
5a. Maintain records of all pesticide receipts, issuance, and return of empty bottles	<p>Proper stock records were maintained and checked.</p> <p>During storekeeper performance inspections, some instances of lacking of stock recoding were identified and resolved immediately</p> <p>There were 8 red flags for not accurate recording insecticide movement.</p>		
5b. Reconciliation of number of houses sprayed vs. number of bottles used	<p>405,597 structures sprayed</p> <p>255,000 bottles used</p>	Some issues were found during inspections regarding updating the PMT to allow for this comparison	
5c. Visual examination of houses sprayed to confirm pesticide application	<p>Supervisors examined houses sprayed to ensure SOPs sprayed according to the established spray techniques.</p> <p>Team Leaders reported a total of 1,932 DOS inspections. 1,507 (78%) inspections raised red flags. DOS showed that about 86 percent of the 1,700 red flags were due to spray pump leakages; however upon further data analysis it was confirmed that these red flags were due to clogged CFVs; there was no leakage.</p>	Team leaders were retrained to better understand that leakages were identified as the type that leads to spillage of insecticides, not the non-exit of insecticide due to CFV clogged.	Team Leaders were retrained to identify different types of issues that would affect pesticide application and to report them correctly.

ANNEX D: SOLID WASTE MANAGEMENT PLAN

Category	Quantity	Procedure	Completion Date
Actellic CS Bottles	381,340 Actellic empty bottles	Actellic empty bottles triple rinsed during the spray campaign at time of insecticide mix. Empty bottles are kept at the operational site stores in their original boxes, inventoried and picked up weekly and transported to the district level stores. Then, they are further consolidated and transported to the Central Warehouse in for final counting, and prepared for recycling. To ensure that there is no insecticide remaining in the bottles, they go through a final wash with liquid soap, labels are removed and bottles are cut in halves (vertically). AIRS transports ready bottles to Incala where they are ground for recycling. Bottles are recycled into products usable in future spray campaigns, such as basins for PPE washing, and Triple Rinsing Buckets, chairs, jugs and MSPs buckets.	In progress
Cardboard Boxes	8,645 cardboard boxes	Empty contaminated insecticide cardboard boxes of Actellic CS were incinerated with the remainder of the hazards materials generated by the spray campaign at Ceramica Okanga located in Nicoadala District.	December 16, 2016
Rubber Gloves and Aprons	383 pairs of gloves and 48 aprons	All damaged SOPs and washers' gloves were thoroughly washed with water and soap, and sent to a local landfill in Ceramic Okanga located in Quelimane District .	December 15, 2016
Gum Boots	1,049 pairs	Damaged but usable boots are thoroughly washed with water and soap; and will be offered/ donated to SOPs as appropriate with the appropriate warning that said boots cannot be used in chemical environments. AIRS Mozambique is exploring recycling options for all unusable boots. Should recycling not be an option, these boots will be sent to a local landfill in Ceramic Okanga.	Completed on January 17, 2017

Category	Quantity	Procedure	Completion Date
Dust Masks	56,820 dust masks	Dust masks, are used once only in accordance with established standards for IRS. Used masks by SOPs, TLs, Brigade supervisors, washers, storekeepers, and all other personnel are kept in containers in the insecticide storage room at the operational sites, transported to the district level where they are consolidated and transported to the central warehouse for final counting, and subsequently incinerated.	December 15, 2016
2-piece Uniform, Entomology bottle Isotherm holders (leftover from RTI days), SOP bags, clipboards, socks and towels	26; 269; 27; 1968, 2,222 pairs of socks and 1530 towels respectively	Damaged and unusable overalls were washed and incinerated, as were SOP haversacks, clipboards and towels. AIRS Mozambique team is still working on separating damaged but usable overalls which may be donated to health councils and other community groups. The overalls were washed in the field after spray operations and washed again in central wash bay to ensure that they are not contaminated. Damaged Isotherm bottle holders were incinerated at Okanga incinerator.	December 15, 2016
Charcoal & Saw Dust	300 Kgs of degraded charcoal, and 125Kgs of degraded saw dust	Based on pre-spray assessment of all operational sites in the 7 districts, degraded charcoal and sawdust was replaced with new charcoal and sawdust in soak pits in Mocuba Sede, Chire, Chimuara, Mopeia Sede, and Mugeba. The degraded sawdust and charcoal was stored in large heavy-duty plastic bags in the local operational sites and designated as Solid Waste. This waste was transported to the central warehouse, and then sent for incineration.	December 15, 2016
Insecticide (Actellic) Contaminated soil (2016)	50 Kgs of soil where SOPs dumped insecticide on the ground	SOPs dumped Actellic insecticide on the ground in Mocuba district. The contaminated soil was removed from the ground and transported to the central warehouse for incineration.	December 15, 2016
Insecticide (Actellic) poured into domestic bottles	62 bottles	Actellic (equivalent to 62 bottles) was poured into domestic containers (e.g., 1.5 liter water bottles or 5 liter water jugs). The domestic bottles were recovered by field supervision teams and transported to the central warehouse. AIRS Mozambique is negotiating with the Quelimane Central Hospital to conduct the incineration.	Completed on January 17, 2017
Damaged and unusable visors and toothbrushes	2270 and 1517 respectively	Destroyed and sent to Ceramic Okang Landfill, District of Quelimane.	December 15, 2016
Used MSPs	19 MSPs	MSPs were all transported to the central warehouse; where they will be tested, as part of required testing within 3 to 6 months post use.	To be completed by March 30, 2016

ANNEX E: SAMPLE RECYCLED PRODUCT



Sample non-consumptive 20-liter basin made from Actellic bottle caps from 70% bottle cap combined with 30% pure plastic. Products made with insecticide bottle are made with a 15% bottles with 85% other materials combination. Recycling is done by Incala under the MOU terms and conditions of the MOU with AIRS Mozambique.

ANNEX F: CERTIFICATE OF INCINERATION



CERÂMICA E CARPINTARIA DE NICOADALA LDA.

CERTIFICADO

Certifica-se que nos dias 13, 14 e 15 do corrente mês nos fornos da Fábrica de Cerâmica se procedeu a inceneração dos resíduos sólidos nomeadamente: 8.645 caixas vazias, 56.820 máscaras contaminadas, 1.530 toalhinhas para limpeza de bombas e 2.222 meias estragadas, levadas a cabo pela Abt, em coordenação com a Direcção Provincial de Terra Ambiente e Desenvolvimento Rural da Zambezia.

Quelimane, aos 19 de Dezembro de 2016

CERÂMICA E CARPINTARIA DE NICOADALA LDA
CAXA POSTAL N.º 18 - ZAMBEZIA - NICOADALA

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								
1.1.1 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	1; 100%	1	0 ⁵	0		
1.1.2 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	1; 100%	1	0 ⁶	0		

⁵ Global Fund procured the insecticide for NMCP

⁶ Global Fund through NMCP provided insecticide for all AIRS target districts. Remaining Stock from the 2015 spray season of 55,076 bottles of Actellic® CS was used in Mopeia district, and the remainder was used in Mocuba and Quelimane 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
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	1; 100%	2	1; 100%	0 ⁷		
I.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; 100%	0 ⁸		
I.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; 100%	Completed		
I.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	Completed	Completed		
1.2 In-Country Logistics, Warehousing, and Training								
I.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	45; 100% 35 Men 10 Women	37; 82% 28 Men 9 Women 24% Women		
I.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% ⁹	25; 100%	25; 100%		

⁷ International procurement was not delivered at least 30 days prior to the onset of the spray campaign, due to delays in procurement and delivery

⁸ Some of the PPE and other materials were delivered the week prior to the onset of spraying and during the first week.

⁹ 2015/16 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
1.2.3 Submit up-to-date inventory records 30 days after the end of each spray campaign	Data source: Project records Reporting frequency: Each spray campaign	By Spray Campaign	Completed	Completed	Completed	Completed		
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	Data source: Project records Reporting frequency: Annually	By Spray Campaign	Completed	Completed	Completed	Completed		
2.1.2 Percentage reduction in project operational expenses per structure from the previous year, excluding insecticide costs.	Data source: Project financial records Reporting frequency: Annually	By Spray Campaign	5%	N/A ¹⁰	5%	6.5%		
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	Data source: Project records – submitted SEAs/letter reports Reporting frequency: Each spray campaign	By Spray Campaign	Completed	Completed	Completed	Completed		
2.2.2 Number of spray personnel trained in environmental compliance and personal safety standards in IRS implementation	Data source: Project records – Training reports Reporting frequency: Each spray season	By Spray Campaign By Gender	1,505	1,886 ¹¹	1,769	2,545		
				1,281 Men, 605 Women	1,150 Men 619 Women	1,766 Men 779 Women		

¹⁰ Given the additional costs incurred due to the campaign's interruption, cost reduction was not measured.

¹¹ This number includes ToT training, SOP training, storekeepers, Washers, and EC 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
2.2.3 Number of health workers receiving insecticide poisoning case management training in IRS implementation	Data source: Project records – Training reports Reporting frequency: Each spray season	By Spray Campaign By Gender	28	25 22 Men, 3 Women; 9% (women)	30 18 Men 12 Women	27 26 Men 1 Woman; ¹² 3%		
2.2.4 Number of adverse reactions to insecticide exposure documented	Data source: Incident report forms Reporting frequency: Each spray campaign	By Spray Campaign By Residential/occupational exposure	0	2	0	2		
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				44 Soak pits (25 fixed and 19 mobile) 27 Storehouses (1 central; 7 district; 19 Sites)		
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	770	117 Spots pre campaign 685 Spots during Campaign 32 Debates 85 Interviews		

¹² HFs have fewer female health technicians on staff

¹³ Approved work plan included rehabilitation of the 21 operational sites; two new sites were built (1 in Quelimane and 1 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
2.3.2 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	1 brochure 450,000 copies	5,000 Leaflets ¹⁴ 200 Posters 27 Banners 750 T-shirts 600 Hats		
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	n/a	n/a		
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 Spray Operator Forms (results) Reporting frequency: Daily per spray campaign	By Spray Campaign	468,239	383,139	481,296	508,295		
2.4.2 Number of structures sprayed with IRS	Data source: Daily Spray Operator Forms Reporting frequency: Daily per spray campaign	By Spray Campaign	398,003 (85% of target)	337,433	340,118 (85% of target)	405,597		
2.4.3 Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	Data source: Daily Spray Operator Forms Reporting frequency: Daily per spray campaign	By Spray Campaign	85%	88%	85%	80%		

¹⁴ MOH's IRS brochure which AIRS scheduled to produce 450,000 copies for distribution in 2016 was discontinued in June 2016.

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
2.4.4 Number of people residing in structures sprayed (Number of people protected by IRS)	Data source: Daily Spray Operator Forms	By Spray Campaign	2,177,912	1,631,058	1,910,109 ¹⁵	1,929,654		
	Reporting frequency: Daily per spray campaign	By Gender		810,659 Men, 820,399 Women		962,879 Men 966,775 Women		
		By pregnant women		105,400 Pregnant Women		115,639 Pregnant Women		
		By children <5 years old		287,813 Children <5		284,468 Children <5		
Component 3: Ongoing Monitoring and Evaluation and Quality Control Measures								
3.1 Submit PMI-approved M&E plan to PMI-Mozambique for approval	Data source: Project records Reporting frequency: Semi-annual	By Spray Campaign	Completed	Completed	Completed	Completed		
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	Completed	N/A	N/A		
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	9	10		

¹⁵ Population residing in structures found by SOPs in 2015.

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
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	1 in Entomology	1; 100%		
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	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	1	1		
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	4	5		
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%	4; 100%	5; 125%		

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
5.1.3 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	0	4 ¹⁶		
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%	8; 100%	3; 42.8% ¹⁷		
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, Quelimane not included)	20 (tests conducted in 20 houses in 4 targeted districts)	18	30 ¹⁸		
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)	115 (in 25 houses at months 1, 2, 3, 4, 5, and 6)	80	In progress; 105 bioassays have been conducted to date		

¹⁶ Secondary PMI indicator testing conducted in Milange, Mocuba, Morrumbala and Maganja da Costa using CDC light trap samples

¹⁷ Conducted IR testing in September 2016 in 3 districts (Maganja da Costa, Derre and Molumbo), remaining districts (5) will be conducted in Jan – Feb 2017

¹⁸ 30 tests conducted in 30 houses in 5 targeted districts; in Mopeia it was conducted in 2 different villages

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
5.1.7 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 ¹⁹ ; (3 sites, two of them tested for all four classes and two repetitions)	18 (3 sites, each testing all 4 classes of insecticides)	27 (3 sites each testing 6 insecticides using WHO methodology and 9 bottle assay testing)		
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	N/A	N/A		
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	N/A	N/A		
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%	1,769 1,150 Men 619 Women	2,457 1,705 Men 752 Women 31%		

¹⁹17 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
6.1.2 Total number of people trained to support IRS in target districts	Data source: Project records – Training reports	By Spray Campaign	1,774	2,117	2,087	2,504		
	Reporting frequency: Semi-annually	By Gender	710 women	1,494 Men, 623 Women;	1,357 Men 730 women	1,748 Men 756 Women		
		Percentage of women trained	40%	29%	35%	30%		
6.1.3 Number of women recruited for IRS employment	Data source: Project records – Recruitment reports reports	By Country	33%	627 or 35%	750 or 45%	880 or 37%		
	Reporting frequency: Semi-annually	By Percentage of women recruited						
6.1.4 Number of people trained as IRS Training of Trainers (ToT)	Data source: Project records – Training reports	By Spray Campaign	34	41	64	60		
	Reporting frequency: Semi-annually	By Gender	5 women	32 Men, 9 Women	49 men; 15 Women	52 Men 8 Women		
		Percentage of women trained	15%	22%	23%	13%		
6.1.5 Total number of people hired to support IRS in target districts	Data source: Project records – Contracts signed	By Spray Campaign	1,419	1,772	1,548	2,457		
	Reporting frequency: Semi-annually	Gender	568 women	1,145 Men, 627 Women;	929 Men 619 Women	1,677 Men 760 Women		
		Percentage of women hired	40%	35%	40%	31%		

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, team leaders, 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	300 150 Men 150 Women or 50%	381 273 Men 108 Women 28% 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 trained	26 10%	60 43 Men, 17 women; 16% of those who completed gender awareness training are women	2,087 1357 Men 730 Women or 35%	2,829 1,1918 Men 911 Women 32% 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	80 Men 65 15 or 19 % Women	124 111 Men 12 Women 10% Women		
6.2. Implement all activities outlined in their yearly Capacity Building Action Plan	Data source: Project records – Capacity assessment reports Reporting frequency: <i>Semi-annually</i>	By Spray Campaign	Completed	Completed	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 ²⁰	Completed	Completed ²¹		

²⁰ SDSMAS' led seasonal personnel recruitment in collaboration with community leaders in the six districts; community mobilization was conducted by the PDH and the SDSMASs.

²¹ MOH leads IRS implementation independently in 9 provinces; in Zambezia, IRS is fully supported by PMI AIRS.