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PMI | AFRICA IRS (AIRS) PROJECT

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MOZAMBIQUE

END OF SPRAY REPORT 2017

SPRAY CAMPAIGN: OCTOBER 17 – DECEMBER 13, 2017

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Abt Associates Inc. | 6130 Executive Blvd.
Rockville, MD 20852 | Suite 800 North | T. 301.347.5000 | F.
301.913.9061 | www.abtassociates.com

MOZAMBIQUE
END OF SPRAY REPORT 2017
SPRAY CAMPAIGN: OCTOBER 17 – DECEMBER 13, 2017

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ACRONYMS

AIRS	Africa Indoor Residual Spraying
BCC	Behavior Change Communication
BMP	Best Management Practices
BS	Brigade Supervisor
CFV	Control Flow Valve
COP	Chief of Party
D2D	Door to Door Mobilization
DCV	Data Collection Verification
DEC	Data Entry Clerk
DOS	Directly Observed Spraying
ECO	Environmental Compliance Officer
IEC	Information, Education and Communication
IRS	Indoor Residual Spraying
M&E	Monitoring and Evaluation
MASA	Ministry of Agriculture and Food Security
MITADER	Ministry of Land, Environment and Rural Development
MOH	Ministry of Health
MOU	Memorandum of Understanding
MSP	Mobile Soak Pit
NMCP	National Malaria Control Program
ODK	Open Data Kit
OSS	Operations Site Supervisor
PDH	Provincial Directorate of Health
PMI	President's Malaria Initiative
PMT	Performance Monitoring Tracker
PPE	Personal Protective Equipment
PSECA	Pre-Spray Environmental Compliance Assessment
RSL	Race to the Starting Line
SDSMAS	Serviços Distrital de Saúde Mulher e Ação Social/District Services for Health, Women and Social Welfare
SEA	Supplemental Environmental Assessment
SMS	Short Message Service
SOP	Spray Operator
TL	Team Leader
ToT	Training of Trainers
WHO	World Health Organization
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 at the national level with Mozambique's National Malaria Control Program (NMCP). At the provincial and district levels, Abt collaborates with the Provincial Directorate of Health (PDH) in Zambezia Province, the District Services for Health, Women and Social Welfare (SDSMAS), the Ministry of Agriculture and Food Security (MASA), and the Ministry of Land, Environment and Rural Development (MITADER).

In addition to entomological monitoring activities in Zambezia, in 2017, AIRS Mozambique continued to support the NMCP at the national and provincial levels in carrying out entomological activities and to enhance its indoor residual spraying (IRS) capacity.

In the 2017 approved work plan, AIRS Mozambique identified an estimated 440,063 structures for spraying in the seven target districts: Derre, Milange, Mocuba, Molumbo, Morrumbala, Mopeia, and Maganja da Costa. Following discussions with the NMCP and PMI, all parties agreed that the project would not spray Mocuba Sede, the very urban area within Mocuba. The parties also agreed to reduce the initial Maganja da Costa target structures to reflect the 2017 national census. As a result, the newly agreed number of target structures dropped to 438,764. 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. At the beginning of the spray campaign, some spray operators (SOPs) failed to report eligible structures that they found but did not spray. For example, SOPs did not report structures that they found locked and therefore could not spray. The project rectified this reporting error, and ultimately registered 53,978 structures found but not sprayed.

At the end of the spray campaign, SOPs reported 435,395 eligible structures found and 381,463 structures sprayed, resulting in 88% spray coverage.

The total population protected during the campaign was 1,711,518. Of these, 253,962 were children under five years, and 103,302 were pregnant women. The 2017 Post-Spray Evaluation Meeting was held on January 25, 2018, with the NMCP, PDH, and respective SDSMAS' to discuss spray coverage, lessons learned, challenges, and recommendations for the 2018 spray campaign. The 2017 spray campaign results are summarized in Table 1.

TABLE 1: 2017 SPRAY CAMPAIGN RESULTS AT A GLANCE

Number of Provinces/Districts Covered by PMI-Supported IRS in 2017	Seven districts in Zambézia Province (Derre, Milange, Mocuba, Molumbo, Mopeia, Morrumbala, and Maganja da Costa)
Insecticide Class	Organophosphate (Actellic CS)
Number of Structures Targeted for PMI-Supported IRS in 2017 (based on structures found by SOPs in 2016 as amended in cosultantation with NMCP)	438,764
Number of Structures Found by SOPs in 2017	435,395
Number of Structures Sprayed by PMI-supported IRS in 2017	381,463
2017 Spray Coverage	88%
Population Protected by PMI-Supported IRS in 2017	1,711,518

	103,302 Pregnant Women 253,962 Children under 5
Dates of PMI-Supported IRS Campaign	October 17 – December 13, 2017
Length of 2017 Spray Campaign	50 days
Number of People Trained with U.S. Government Funds to Deliver IRS*	1,697

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

1. Introduction

1.1. Project Objectives in 2017

IRS continues to be a critical component of Mozambique's National Malaria Control Strategy, as reflected in the most recent strategy launched in December 2017 for 2017-2022. Through PMI support, AIRS Mozambique has implemented six spray rounds of IRS. As outlined in the approved 2017-2018 work plan for the period of April 1, 2017, through March 31, 2018, the 2017 spray campaign covered seven target districts: Derre, Milange, Mocuba, Molumbo, Mopeia, Morrumbala, and Maganja da Costa. Maganja da Costa replaced Quelimane district, which was sprayed in previous years. Mopeia District was partially sprayed for the second consecutive year in conjunction with the cost-effectiveness evaluation of the vector-control interventions study.

As in previous years, AIRS Mozambique continued to work with the Ministry of Health (MOH) through the NMCP, Zambezia's PDH, the SDSMAS, and other stakeholders on the campaign, which took place from October 17 through December 13, 2017.

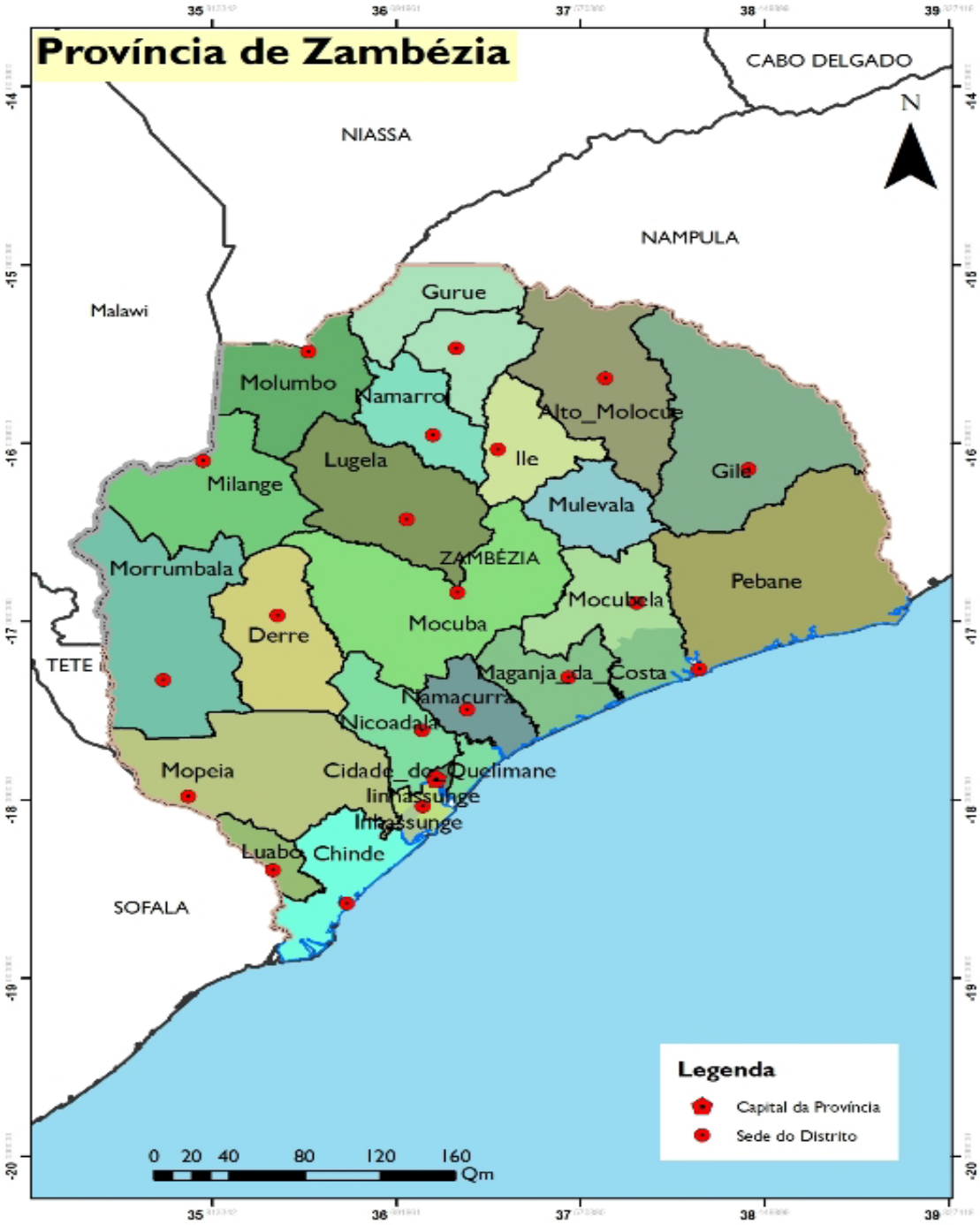
Specific objectives of the AIRS Mozambique program included the following:

- Achieve at least 85% spray coverage of targeted structures in the seven districts
- Support national and provincial government in entomological monitoring and IRS capacity building
- Undertake the implementation of lessons learned and take steps to improve gaps highlighted in the PMI-AIRS Mozambique 2016 spray campaign debrief meeting
- Provide regular M&E for the PMI AIRS Project
- Carry out a logistics assessment in all districts and arrange all international and local procurement, shipping, customs clearance, timely delivery, and storage of spray pumps, spare parts, insecticide, and personal protective equipment (PPE)
- Prepare and submit the 2017 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) campaigns; behavior change communication (BCC) sensitization; and mobilization activities to increase community awareness and acceptability of IRS
- 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
- Lead the set-up of a replacement insectary in Zambezia and provide technical support for the Nampula insectary set-up
- Promote cost efficiency through due diligence and efficient operations

1.2. Spray Sites

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

FIGURE 1: MAP OF ZAMBEZIA PROVINCE



In consultation with PMI Mozambique, the MOH selected the seven PMI IRS target districts in alignment with the National Malaria Control Strategy. AIRS Mozambique operated in 35 localities served by 25

operations sites with complete wash bays, soak pits, refurbished stores, and men's and women's segregated changing rooms and latrines.

The selection and location of operations sites remained the same as in 2016 with the exceptions of Maganja da Costa, the new district, where AIRS Mozambique established two new operations sites, and Milange, where the project set up an additional operations site.

Table 2 provides an overview of the number of sprayed structures and population protected since 2007 and the insecticides used.

TABLE 2: PMI-FUNDED IRS COVERAGE IN ZAMBEZIA PROVINCE, 2007–2017

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

**2007-2011 data from NMCP and PMI*

[1] Molumbo district was curved out a Milange district in late 2014

[2] Derre district was curved out of Morrumbala district in late 2014

1.3. Insecticide Selection

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

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

Based on the study data, with PMI approval and in partnership with the NMCP, AIRS Mozambique selected an organophosphate insecticide, Actellic® 300CS. The project introduced it in 2015 and has used it as the insecticide of choice for all seven target districts since 2016.

2. Pre-Spray Activities

2.1. Micro-planning

The 2017 IRS micro-planning meeting took place at two levels: district and provincial levels.

The AIRS district coordinator and the respective SDSMAS led district-level micro-planning. These meetings were held 21-23 August 2017, and focused on the following:

- Targeted number of structures and the length of spray campaign
- Human-resources requirements
- Spray team performance and target setting
- Quantification of logistical and insecticide needs
- Quantification of transportation needs
- Preparation of spray calendars, taking into account diverse geographical challenges and hard-to-reach areas
- IEC structure
- Monitoring and supervision plans
- Recruitment of spray team members
- Official launch of the 2017 spray campaign and beginning of spraying
- Partner roles and commitments

The seven districts completed their plans for presentation at the provincial level micro-planning meeting, which was held in Quelimane on August 24-25, 2017.

The provincial micro-planning meeting was attended by participants from the NMCP, PMI Mozambique, the PDH, the SDSMASs, MITADER, MASA representative of the respective districts, and AIRS Mozambique team. AIRS Mozambique and the Provincial Directorate of Health jointly led the meeting. The objective of the provincial micro-planning meeting was to consolidate district-level, micro-plans into an overall plan. Each district SDSMAS had the opportunity to present its plan with the respective AIRS district coordinator. District plans integrated into the provincial plan.

A few key decisions made during micro-planning included the following:

- The project would implement door-to-door mobilization
- The spray campaign would last 45 days and was scheduled to start October 16, 2017
- The plan revised the target number of structures in Maganja da Costa from 65,812 to 62,021 based on the 2017 national census data
- MOH would contract mobilizers, spray operators, and guards at the district level. Abt would contract directly other seasonal worker categories, including BS, TLs, operations site supervisors (OSSs), logistics assistants and storekeepers. This recruitment strategy for different cadres of seasonal personnel stemmed from recommendation from the 2016 campaign to have Abt conduct a more rigorous recruitment and contracting process for the BSs, TLs, operation site supervisor, and

storekeeper positions. Holders of these positions were considered critical to the overall success of the campaign

- SOP training would be held at the operations site level in each of the seven districts to allow for new "live fire" training sessions. Location change was a departure from district-level training
- The session finalized the overall operational plan and training calendar
- The project would hold the 2017 Provincial Spray Launch in Maganja da Costa, the new spray district
- The meeting discussed and finalized timelines for all planning activities, including recruitment and training. The agreed timelines guided the rollout and implementation of all activities and fed into the Race to the Starting Line leading up to the start of the spray campaign.

2.2. Logistics Needs and Procurement

AIRS Mozambique based quantification on information from the district- and provincial-level micro-planning on the number of structures targeted for spraying in 2017, a logistics assessment, and the duration of the spray campaign.

AIRS Mozambique conducted a logistics needs assessment to plan for the 2017 spray campaign. The purpose of the logistical needs assessment was to catalogue the supplies and materials required for implementation. The process involved visits to potential district operations sites and the central warehouse. The assessment included an evaluation of all spray pumps and the development of an action plan to service them for use for the spray campaign. AIRS Mozambique determined that the project did not require new spray pumps. AIRS Mozambique repaired more than 1,341 spray pumps from previous years and used them for the 2017 spray campaign.

Based on the information collected, AIRS Mozambique was able to quantify the required amount of insecticide, PPE, materials and supplies, number of operation sites, spray personnel, vehicles, and breakfasts, among other needs.

2.2.1. Quantification of Actellic 300 CS

According to the 2017 AIRS Mozambique approved work plan, the targeted number of structures for the 2017 spray campaign was 440,063. Using this number of structures and with an average of 1.6 structures per bottle of insecticide from the 2015 and 2016 spray campaigns, the 2017 campaign required 275,039 bottles of Actellic 300 CS. However, the MOH made available 326,688 bottles of Actellic 300 CS, the number the Global Fund had procured. Together with the 21,296 bottles left from 2016 less 13 bottles taken for insecticide quality control testing, the total amount of insecticide available for 2017 was 347,971 bottles.

The insecticide was stored at the central AIRS warehouse in Quelimane and transported to the districts on a weekly basis during the spray campaign. Usage and requirements at the operations sites determined the distribution.

2.2.2. Procurement

In 2017, AIRS Mozambique began its procurement activities around April 2017. In close collaboration with the home office backstop team, AIRS Mozambique identified which items to procure internationally and locally to ensure cost effective, quality, and timely procurement delivery. AIRS Mozambique used data from the quantification process to inform development of a procurement plan which:

(i) laid out the key procurement activities together with timeline for each activity (quantification, preparation of requests for quotations [RFQs], home office review and approval of relevant RFQs, etc.)

(ii) determined that the deadline for all procurement would be August 25, 2017, six weeks from the start of the spray campaign

(iii) completed a list of items and services to procure together with the associated procurement steps (e.g., purchase method, development of RFQ, approval of RFQ, issuance of RFQ, closing date, evaluation of bids, home office approvals, issuance of purchase orders, and delivery dates)

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

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

The project conducted all procurement in accordance with established procurement procedures, open and public procurement and bidding processes, vendor analysis, source selection, and contract award. Procurements ensured that items would be available and distributed to meet the set date of the spray campaign. For a list of the local and international procurements, please refer to Annex A.

In 2018, there will be a concerted effort to develop a procurement plan that covers both spray and non-spray procurement needs. It is important for the staff involved in procurement to know what the projected needs are so that they can plan accordingly. For example, the project failed to plan far enough ahead for training of trainers (ToT) procurements such as meals and vehicles to transport attendees to and from training. The result included delays of on-going spray procurements such as reviews of SOP breakfasts. In addition, the project must improve coordination between different country technical staff involved in procurement. For example, the project did not adequately plan vehicle inspections. Decisions on selected vehicles were not timely and when complete, the environmental compliance officer (ECO) was not available to conduct inspections because the ECO was in the midst of inspection of sites for readiness.

2.3. Human Resources Requirements

AIRS Mozambique calculated human resources requirement for the 2017 campaign based on a 45-day spray campaign. The project recruited 3,705 seasonal workers of various categories in the seven districts, of which 943 (25.5%) were women. This indicates an 11.5 percentage point decrease from the 2016 figure[3] (37%) (Table 3). Even though the percentage of women dropped between 2016 and 2017, the total number of females in 2017 (943) was more than in 2016 (880). Also, in 2017, 35.7% of SOPs were females compared with 33% in 2016. (Table 4)

[3] In 2016, a total of 2,385 seasonal workers were hired.

TABLE 3: 2017 SEASONAL PERSONNEL BY NUMBERS AND GENDER

Type of Personnel	No. of Males	No. of Females	Total	% Females
Spray Operators	626	348	**974**	35.7%
Team leaders	116	81	**197**	41.1%
Brigade supervisors	55	13	**68**	19.1%
Site supervisors	25	0	**25**	0.0%
Community Mobilizers	1752	401	**2,153**	18.6%
Pump technicians	30	0	**30**	0.0%
Storekeepers	21	3	**24**	12.5%
Washers	5	73	**78**	93.6%
Security guards	53	0	**53**	0.0%
Database coordinators	6	0	**6**	0.0%
M&E Assistants	14	3	**17**	17.6%
Data entry clerks	28	11	**39**	28.2%
Finance Assistants	2	1	**3**	33.3%
IEC Assistants	24	2	**26**	7.7%
Logistics Assistants	4	3	**7**	42.9%
Water fetchers	1	4	**5**	80.0%
Total	**2,762**	**943**	**3,705**	**25.5%**
Percentage	74.5%	25.5%	**100.0%**	

TABLE 4: CHANGE IN % OF FEMALES FROM 2016 TO 2017 IN DIFFERENT SEASONAL PERSONNEL CADRES

	2016			2017			
Type of Personnel	**Total hired**	**No. of Females**	**% Females**	**Total hired**	**No. of Females**	**% Females**	**Changes in % of females (2016 to 2017)**
Spray Operators	1,404	462	32.91%	974	348	35.73%	Increased
Team leaders	280	125	44.64%	197	81	41.12%	Decreased
Brigade supervisors	92	31	33.70%	68	13	19.12%	Decreased
Site supervisors	25	0	0.00%	25	0	0.00%	No change
Community Mobilizers	280	117	41.79%	2,153	401	18.63%	Decreased
Pump technicians	30	3	10.00%	30	0	0.00%	Decreased
Storekeepers[4]	36	8	22.22%	31	6	19.35%	Decreased
Washers	121	117	96.69%	78	73	93.59%	Decreased
Security guards	55	0	0.00%	53	0	0.00%	No change
Database coordinators	5	0	0.00%	6	0	0.00%	No change

[4] In Table 3, in 2017, Logistics Assistants and Storekeepers are reported separately unlike in 2016.

	2016			2017			
Type of Personnel	**Total hired**	**No. of Females**	**% Females**	**Total hired**	**No. of Females**	**% Females**	**Changes in % of females (2016 to 2017)**
M&E Assistants	17	3	17.65%	17	3	17.65%	No change
Data entry clerks	40	14	35.00%	39	11	28.21%	Decreased
Finance Assistants				3	1	33.33%	Increased
IEC Assistants				26	2	7.69%	Increased
Water fetchers				5	4	80.00%	Increased
Total	**2,385**	**880**	**36.90%**	**3,705**	**943**	**25.45%**	**Decreased**

Different factors that are not readily apparent may have contributed to the overall decline in the percentage of females. AIRS Mozambique will continue to discuss the importance of female participation with all stakeholders. In future spray campaigns, AIRS Mozambique will review and adapt lessons and strategies from other countries that have contributed to increased female participation.

Based on observations and recommendations from previous years, AIRS Mozambique directly contracted some seasonal staff, while the MOH and SDSMAS contracted others at the district level. For the last three years, AIRS recruited and contracted the M&E support functions directly: database coordinators, M&E assistants, and data entry clerks. This practice has secured higher performing personnel. In 2017, additional roles for which AIRS directly contracted personnel included logistics assistants, storekeepers, OSSs, BSs, and TLs. Recruitment was a collaborative effort among AIRS, government, and community leaders. AIRS Mozambique advertised these positions on the internet and in the districts and operations sites.

SDSMAS contracted directly SOPs, washers, security guards, and community mobilizers, but recruitment was a collaboration of AIRS, SDSMAS, and community leaders. The local leadership system announced these vacancies over the radio and in meetings. The application process required identification of the candidates by the local leaders, who submitted a list of candidates' names to the local health facility. The district health directorates collected the lists.

Candidates took a written and oral interview administered by the SDSMAS and the AIRS district coordinators to ascertain their ability to read and write. SDSMAS and AIRS district coordinators selected the candidates who were sufficiently literate to participate in training and eventually in the campaign.

All seasonal personnel involved with insecticide took a medical examination for fitness. Also, female candidates took a pregnancy test as part of the initial medical examination and another pregnancy test 30 days after the initial test. (See Table 12 in Section 6.2 for pre-spray and mid-spray pregnancy test results.) Candidates who passed medical checks were invited to participate in training.

To safeguard against dropout during the training and spray operations, the project trained an additional 10% seasonal spray workers as a buffer.

2.4. TRAINING

In collaboration with the PDH and SDSMAS, the project conducted training sessions between September and October 2017 (Table 5). All training involved theoretical and practical sessions relevant to each cadre of spray campaign worker. A total of 4,333 people received training; 3,365 were males, and 969 were females. (Table 6)

AIRS Mozambique led the ToT in Quelimane. Participants included OSSs, SDSMAS's malaria team (malaria focal point, IRS supervisor, and IEC supervisor), and representatives from PDH, NMCP, MITADER and MASA. In addition, some selected[5] BSs participated in the ToT to strengthen training capacity to train spray personnel at the district levels.

TABLE 5: 2017 TRAINING DATES AND DESCRIPTION

Training Dates	Training Location	Participants	Type of Training	Description of Training
August 7 – 12, 2017	Quelimane	NMCP, PDH, SDSMAS of 12 provinces, and Private Sector	National ToT, capacity building	National-level ToT for IRS project managers. Emphasis on planning, training, environmental compliance, spray techniques, and field simulation (live-fire), bridge classroom learning with real life situations. Effective training methodologies
September 11 – 15, 201	Quelimane	PDH and SDSMAS Health Officers (malaria supervisor, IRS coordinator/supervisors and IEC coordinator, seasonal workers base superviosrs); environmental officers, district health directors environmental officers (MITADER and MASA)	ToT	IRS concept, supervision of IRS, IRS spray technique, stock control of insecticide, data recording, spray-pump maintenance, IRS spray schedule and reporting, environmental compliance for IRS, gender balance and equity, use of PPE, general personal and community safety for IRS, and community mobilization
Septembr 29, 2017	Mocuba	Health facility nurses and/or technicians from the 25 operations sites' facilities	Insecticide exposure and treatment	Insecticide toxicity, routes of exposure to insecticides, measures to prevent insecticide contamination and exposure, and treatment for exposure
October 12	Mocuba, Milange Molumbo Morrumbala, Derre Mopeia Maganja da Coasta	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

[5] Initially, BSs were not scheduled to attend the ToT. However, upon revision of training requirements and with the new strategy of conducting SOP training at the operation site level, it became necessary to have more trainers. Therefore the project invited some BSs and TLs to attend the ToT to increase the number of trainers. Going forward, the project will include BSs in the ToT.

Training Dates	Training Location	Participants	Type of Training	Description of Training
August 4 – 6	Quelimane	Logistics assistants and storekeepers from each of the 25 operations sites stores	Warehouse and stock management for logistics assistants and storekeepers	Supply chain system, stock card use and logistics transaction recording, use of delivery note, storage and handling of insecticide, use of PPE, and other materials, loss of inventory, health and environmental risks related to IRS imlementation
October 12	Quelimane Mocuba Milange Molumbo Morrumbala Derre Mopeia Maganja da Costa	Security guards from each of the 25 operations sites	Operations sites security guards	Security standards and requirements before, during, and after the spray campaign
October 2 to 9	All 25 operations sites	SOPs, TLs, BSs	SOP training	Training comprised both lectures and field practical demonstrations. 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 and their maintenance; stock control of insecticides and other materials and equipment; proper use of PPE; gender equity; data collection and reporting; and general personal and community safety during the spray campaign. The practical exercises focused on spray techniques, preparation, mixing of insecticide, and progressive rinsing and field simulation of spray activites. One day was set aside to provide leadership training for TLs and bridage supervsiors on effective supervsion in the field and use of supervisory tools

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	Introduction to the PMI AIRS Access database as a tool, roles and responsibilities of the M & E team, data collection tools, data entry and cleaning processes, report generation. Data collection forms filing, storage, and security. Use of supervision tools, data-handling protocols, data security, electronic-data submission, computer use and care, and communication flow for IRS data
October 10	Quelimane	Pump technicians from each of the 7 districts and 25 operations sites	Pump technicians training	Spray pump parts and functions, use of pump repair kits, pump repair, calibration, and maintenance
October 13	Mocuba	Drivers from each of the contracted transportation service providers (trucks and SUVs)	Driver training	Transport of spray personnel, safety and security of people, insecticide and PPE, road safety, including spillage handling

TABLE 6: 2017 TRAINING MATRIX

Categories of Persons Trained	Training on IRS Delivery												Other Trainings										TOTAL	
	Training of Trainers		Spray Operations		Data Capture		Logistics Training		Environmental Compliance		Poison Management		IEC Mobilizers training		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	27	2	45	22					64	23	21	2											85	25
AIRS district coordinators	5	2							5	2													5	2
Data entry clerks					35	21																	35	21
M&E assistants					18	5																	18	5
Database coordinators					9	0																	9	0
SOPs, TLs, BSs, & site supervisors			1,093	424					1,093	424													1,093	424
Site supervisors	25	1							25	1													25	1
Brigade supervisors	25	3							25	3													25	3
Storekeepers							21	6															21	6
Security guards																	52	0					52	0
Pump technicians															25	0							25	0
Washers																			7	71			7	71
Drivers																					90	2	90	2
Mobilizers and IEC assistants													1,875	408									1,875	408
TOTAL male/female	*82*	*8*	*1138*	*446*	*62*	*26*	*21*	*6*	*1212*	*453*	*21*	*2*	*1875*	*408*	*25*	*0*	*52*	*0*	*7*	*71*	*90*	*2*	*3365*	*968*
TOTAL	**90**		**1,584**		**88**		**27**		**1665**		**23**		**2,283**		**25**		**52**		**78**		**92**		**4,333**	

In 2017, AIRS Mozambique adopted an improved SOP and team leader (TL) training strategy. Instead of a single central training for all SOPs and TLs in each district, AIRS Mozambique conducted the training for SOPs and TLs at the various operations sites. This strategy offered the opportunity for trainers to give attention to individual's needs to ensure good understanding of the spray technique. It also provided "live fire" training, a new session that provides a practical real-life simulation of spraying. AIRS Mozambique, PDH and SDSMAS staff provided supervision at the sites. To facilitate spray technique training at the operation site, the project erected temporary training walls using local materials.

2.4.1. Real-Life Training - "Live fire"

In 2017, AIRS Mozambique introduced "live fire" training to overcome the challenges of the traditional way of training SOPs and TLs, which did not expose TLs and SOPs to actual challenges they face when spraying. During the live-fire field demonstrations, SOPs and TLs went to homes in communities for a demonstration of the entire spraying process. This training enabled SOPs and TLs to practice the following skills: determining the eligibility of structures, including identifying sprayable and non-sprayable surfaces, how to prepare a structure before spraying, and spraying around obstacles and roofs. AIRS Mozambique will continue to implement this training and allocate more time for this exercise, following suggestions from some SOPs, TLs, and representatives from the PDH and SDSMAS.

Table 7 shows training based on the PMI indicator definition; it includes only spray personnel such as SOPs, TLs, BSs, and health technicians. It excludes data entry clerks (DECs), drivers, washers, porters, pump technicians, mobilizers, and security guards.

TABLE 7: PEOPLE TRAINED TO DELIVER IRS WITH USG FUNDS

Type of Training	Males	Female	Total
IRS delivery ToT	82	8	**90**
Spray operations	1,138	446	**1,584**
Poison management for health clinicians	21	2	**23**
Total	**1,241**	**456**	**1,697**

2.5. Logistics and Material Distribution

Before the start of implementation, AIRS Mozambique prepared a consolidated activity plan to harmonize implementation of integrated activities. Based on lessons learned from 2016, the project developed a detailed logistics distribution plan to guide the distribution of all logistical items to the operations sites. This year, we scheduled each district on a different day for fulfilment of supplies from the central warehouse. In 2016, we had served multiple districts at the same time at the central warehouse which did not work well.

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

AIRS Mozambique planned to ensure the readiness of all operations sites for the spray campaign at least two weeks before the start of the 2017 spray campaign. By September 28, all operations sites had received more than 90% of their logistical needs. This allowed enough time for logistics assistants and store keepers to record all items in their ledger books, document all items on the correct logistical forms, and identify any shortfalls or missing items. By October 10, all the operations sites had full stocks of all their logistical needs. By October 13, insecticides had arrived at each of the operations sites, which were ready for the 2017 spray campaign start.

2.6. Race to the Starting Line

The Race to Starting Line (RSL) is a week-by-week Gantt chart of key activities that have to happen over at least 12 weeks leading up to the start of the spray campaign. It maps out the activity, when to complete it, and who is responsible for the activity. The RSL lists indicators from the pre-spray environmental compliance assessment of the operational sites and stores, rehabilitation work plan, transportation plan, pre-contracting inspection and vehicle contracting, recruitment and contracting of seasonal workers, spray calendar completion, training schedules, etc. Adherence to the RSL is critical to

ensure all spray preparations are on track, monitored, and completed ahead of the spray campaign. In addition to the tool, RSL weekly meetings are held with the site office to monitor progress against the RSL.

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

3. Communications Activities

Social mobilization is integral to any successful campaign. For the 2017 spray campaign, AIRS Mozambique implemented communication and mobilization activities in collaboration with the PDH of Zambezia, SDSMAS of the seven target districts, religious leaders, and other local and influential leaders at all levels.

3.1. Organogram

To implement social and community mobilization activities, AIRS Mozambique changed the human resources structure for communication.

At the provincial level, the AIRS IEC coordinator led all communication activities. At the district level, the SDSMAS IEC representatives and the AIRS district coordinators led communication and social mobilization activities. AIRS Mozambique introduced new cadres of staff: IEC assistants and community-based mobilizers. The project recruited these categories in close collaboration with SDSMAS and community-level leaders. Each IEC assistant had responsibilities for a specified operations site and was to lead all social mobilization activities for that site. The IEC assistants reported to the SDSMAS and the AIRS District Coordinators. Community mobilizers were based in each of the targeted communities. Their duty was to lead all social mobilization efforts in their communities. They reported to the IEC assistants. The purpose of these changes in the organogram was to ensure a proper chain of communication from the provincial level to the community level.

3.2. Preparation Stage (Pre-Spray Campaign)

During the preparation stage, the project held meetings at provincial and district levels to create awareness about the impending spray campaign and to engage communities in mobilizing for it. These meetings culminated in various activities, including community meetings that community leaders led, community theater, and information dissemination through religious services, schools, and other venues. The project held 31 community meetings (Maganja da Costa: 2, Molumbo: 2, Mocuba: 7, Milange: 10, Mopeia: 6 and Morrumbala: 4) before the spray campaign in September and October. Information dissemination began in September and continued throughout the spray campaign.

AIRS Mozambique conducted training in interpersonal communication and counseling for SDSMAS IEC officers and members of Mozambique's Interreligious Program (*Programa Interreligioso de Mocambique*) and Association of Traditional Healers (*Associação dos médicos tradicionais de Moçambique*). They 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 in turn disseminated information to other groups.

3.2.1. Door-to-Door Mobilization (D2D) Before Spray

Before the 2017 spray campaign, AIRS Mozambique carried out D2D mobilization over a six-day period. AIRS Mozambique trained and engaged 2,153 community mobilizers to conduct the D2D mobilization in the seven districts between September 20 and 30. Mobilizers visited the structures within their communities to deliver IRS messages and sensitize households about the upcoming spray campaign by: 1) explaining the roles and responsibilities of households before, during, and after spraying; 2) correcting any misconceptions the households may have about IRS; and 3) informing households that the mobilizers were the first point of contact should the household have issues with IRS. Once mobilizers finished with

their work in a house, they registered the household and issued the household a sticker with a unique code.

The major challenge during D2D mobilization was inadequate supervision since the implementation took place in all communities simultaneously. This was due to lack of forward planning and a detailed day-to-day household mobilization plan. Such a plan would have identified which areas to mobilize each day and allotted adequate supervision or would have recognized from the outset that simultaneous mobilization would not be effective. In some communities, SOPs found some structures with stickers and others without, indicating that community may have been only partially mobilized. Such communities were evidence of weak D2D mobilization. Another major challenge was the myth of blood suckers (See Section 9 for more details). In some communities throughout the districts, people feared the IRS household stickers on their doors would identify them as blood suckers.

A key lesson learned is that a phased D2D mobilization approach is the way to ensure better supervision.

3.2.2. Media

Community radio stations were of paramount importance pre-campaign and during the campaign in 2017. They disseminated awareness and advocacy messages about IRS and encouraged discussion with AIRS district coordinators and other selected district health staff through listener participation via phone calls. AIRS Mozambique established partnerships with media channels, including radio, to produce and broadcast spots and disseminate the 2017 mobilization and spray calendars. Radio stations disseminated the spray campaign calendar daily. Programs were broadcast in Portuguese and in the predominant local languages in the districts by the following media:

- Institute of Social Communication
- Rádio Moçambique (Portuguese, Elomwé, Echuwabo e Ciscena) reached all seven districts between 9PM and 5AM
- Rádio Comunitária de Mocuba (Lomué, Portuguese, Manhaua, and Emocuba) reached Mocuba and areas of Maganja da Costa districts
- Rádio Comunitária Tumbine (Portuguese, Chichewa and Marenge) reached Milange and some areas of Molumbo districts
- Rádio Comunitária de Morrumbala (Sena, Lomue, Chuabo and Portuguese) reached Morrumbala and some areas of Derre districts
- Rádio Comunitária Cua – Mopeia (Sena, Portuguese and Phoso) reached only Mopeia district
- Rádio Comunitária da Maganja Da Coasta - (Portuguese, Lomue and Nharinga) reached in Maganja Da Costa and some areas of Mocuba districts

3.2.3. Community Leaders and Influential People

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 spraying. In communities where there were large numbers of refusals, the chiefs of administrative posts and/or localities called meetings with all leaders in the area to remind them of their responsibility in the campaign. This measure helped greatly in the secondary, mop-up spraying because it allowed the recovery of many houses whose owners had refused the first spray visit.

In addition to community leaders, influential people also helped greatly. Influential people are people living in the community who are well-respected despite not being part of the local government

leadership. These include religious leaders, teachers, and retired military men and women, among others. Due to their recognized influential role in their communities, the project identified and brought them into the campaign to help with mobilization. These people played a very important role, mainly in areas biased by politics as they are non-partisan and had credibility with the population.

3.2.4. Positive Reinforcement from Peers

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

3.2.5. Use of Community-Based Mobilizers During Spray

During the spray campaign, community mobilizers ensured that residents knew at least two days in advance about the exact spray dates for their community. On the day of spray, they helped ensure that each household was ready for spraying. In some cases, they helped households pack belongings and served as a guide for SOPs within the community. During mop up, especially in Mopeia District, community mobilizers scouted for unsprayed structures and presented a list to the spray teams for targeted spraying. However, the major challenge during the spray campaigns was the lack of communication between some mobilizers and their IEC assistants (See Section 10 for details).

3.3. IEC Materials

For the 2017 spray campaign, the project produced and distributed the following IEC material: guidelines for journalists, posters for vehicle identification, signs, and T-shirts and hats for mobilizers. Table 8 shows the types and numbers of communication activities.

TABLE 8: IRS CAMPAIGN COMMUNICATION ACTIVITIES

Activity	Frequency
Spray campaign official launch	7; 1 official launch per district; Maganja da Costa District hosted provincial launch
Radio spots (pre-spray, and during spray campaign campaign)	4500[6]
Debates on radio	125
Mobilization and spray calendar distribution on radio	125
Interviews and testimonies on radio	250
T-shirts	3500
Hats	3500
Guidelines for journalists	1

[6] These radio spots were exclusive of the debates, interview, mobilization, and spray calendar radio spots.

3.4. Main Recommendation for IEC Activities in 2018

In 2018, there needs to be a clear vision and plan for IEC activities. Proposed changes in IEC activities include:

- The role of the PMI AIRS IEC coordinator is to lead the IEC strategy and activities in close collaboration with the SDSMAS IEC focal points and in coordination with communities, stakeholders, and other AIRS staff. However, the overall coordination between the AIRS IEC coordinator and the respective SDSMAS IEC focal points did not provide the necessary guidance and management to personnel involved in IEC activities. The AIRS IEC coordinator needs to own the activity and be accountable for its progress and implementation.
- Identification and selection of IEC assistants and mobilizers should start weeks ahead of time with IEC coordinator leadership and with support of district coordinators. Members of health councils should have priority as a source of IEC assistants since they are community health workers supporting the same communities
- Strict supervision should accompany mobilization one month before the campaign to ensure that mobilizers meet their targets
- The project should track mobilization performance in 2018 as closely as SOP performance
- The project should review use of household stickers in 2018. We plan to discontinue the use of stickers and implement the use of IRS cards. In addition, to improve mobilization and in particular mobilizer performance, we plan to set a daily household mobilization target and system to track issuance and usage of IRS cards to manage performance and control shortages
- In each District, AIRS Mozambique should engage the district administrator, the highest government figure at the district level, to take a lead in some community mobilization activities. This would demonstrate how important the activities are and encourage administrators to require regular information from community leaders on progress within their communities. The project should encourage district administrator participation in morning assemblies and actual mobilization within communities
- SDSMAS supervisors are well known in the communities as they are nurses and trusted health professionals. Therefore, they always should be present in the communities during mobilization to promote spray acceptance
- The project should develop early mobilization calendars for D2D mobilization, and mobilization during the spray campaign and disseminate the information to the appropriate stakeholders. The mobilization calendar during the spray campaign should mirror the spray campaign.

4. Spray Activities

4.1. Spray Operations

In collaboration with the PDH and SDSMASs, the project launched the spray campaign on October 16 in Maganja da Costa. The remaining six districts also held district-level opening ceremonies and sprayed at least one house of a village chief or other influential community leader. Comprehensive spraying started on October 17 in all seven districts with a planned end date of December 7. AIRS Mozambique targeted spraying 438,764 structures in 45 days. The project developed district-specific spray calendars to guide the movement and distribution of spray teams in the field.

Spray operations were based in 25 operations sites. All operations sites met all environmental compliance requirements according to the best management practice (BMP) standards. An OSS managed each operations site.

A spray team comprised five SOPs and led by a TL. Three spray teams formed a brigade led by a BS. Table 9 provides details on the distribution of spray teams across the 25 operations sites in the seven spray districts.

TABLE 9: DISTRIBUTION OF SPRAY TEAMS BY DISTRICT AND OPERATIONS SITES

District	Operations Sites	No. of SOPs	No. of TLs	No. of BSs	No. of Site Supervisors
Maganja da Costa	Maganaja Sede	85	17	6	1
	Nante	50	10	3	1
Mocuba	Mocuba Sede	25	5	2	1
	Muaquiua	30	6	3	1
	Mugeba	55	11	3	1
	Munhiba	25	5	2	1
	Namanjavira	35	7	3	1
	Alto Benfica	20	4	2	1
Derre	Derre Sede	35	7	2	1
	Guerissa	11	2	1	1
Morrumbala	Chire	50	10	3	1
	Megaza	25	5	2	1
	Morrumbala Sede	70	14	5	1
	Muandiua	50	10	3	1
	Pinda	30	6	2	1
Molumbo	Corromana	50	10	3	1
	Molumbo Sede	70	14	5	1
Milange	Dachudua	40	8	3	1
	Dulanha	15	3	1	1
	Liciro	25	5	2	1
	Milange Sede	80	16	5	1
	Carico	50	10	3	1
Mopeia	Chimuara	10	2	1	1

District	Operations Sites	No. of SOPs	No. of TLs	No. of BSs	No. of Site Supervisors
	Posto Campo	15	3	1	1
	Mopeia Sede	20	4	2	1
Total		**971**	**194**	**68**	**25**

Each spray day started at the operations site with breakfast followed by PPE distribution. A short morning assembly followed, which the OSS led. District coordinators and SDSMAS representatives provided refresher speeches during morning assembly on topics including insecticides mixing, quality data collection, and adherence to correct spray technique and environmental compliance. The site supervisor then assigned spray teams to the various communities to spray that day and vehicles for transportation. TLs filled out health check forms for each SOP to ensure that each operator was fit for the day's work. Before proceeding to the field, SOPs would collect leftover insecticides from barrels 1, 3, 5, and 7, as the BMPs for insecticide mixing require. The target for each spray operator was to spray 10 structures a day.

TLs, BSs, district coordinators, and PDH and SDSMASs representatives provided supervision to ensure spray quality. TLs used the directly observed spraying (DOS) tool for supervision, while other supervisors used the standard AIRS supervisory tools for supervision. In addition, TLs, BSs, and OSSs played key roles in the distribution of spray teams to ensure better coverage of all targeted communities. Supervision focused on proper house preparation and adherence to environmental compliance requirements.

Within the communities, the spray teams worked with local leaders and community-based mobilizers, who identified the households and facilitated household acceptance for spraying.

AIRS Mozambique used both standard permanent soak pit and mobile soak pits (MSPs) for end-of-day clean up. We used MSPs in hard-to-reach areas. All seven districts used MSPs at some point. In some areas, teams used MSPs for two days, while other places such as Lua-Lua (Mopeia) used them for more than 20 days.

The project planned to spray all the communities within the target districts except for a few places. As in 2016, and as agreed with PDH, SDMAS and AIRS, the project did not spray Sabe in Morrumbala district due to insecurity. Vila Valdez, an island in Maganja da Costa, was not sprayed. AIRS Mozambique, PDH, and SDSMAS representatives visited the island before the campaign to assess the possibility of spraying the island. There were no secure boats to transport insecticides, logistical items, and spray teams safely over the water. In addition, there were no accessible roads on the island to the location of structures. The assessment team concluded and recommended that the estimated 1,000 structures on Vila Valdez use bed nets.

SOPs collected spray data using the SOP daily form. After TLs verified the data, they summarized the data onto the TL summary form. They handed the forms over to the BS for verification before submission to the OSS. The OSS transferred the data onto the performance monitoring tracker (PMT) at the operations site. Operations site teams use the tracker for quick decisions on the progress of the spray campaign at the operations site level. The OSSs sent the same information via short message service (SMS) to a central server where the senior project management team accessed the data to guide quick corrective actions to improve ongoing spray operations. The data points reported through the PMT SMS included: (i) number of structures found; (ii) number of structures sprayed; (iii) number of insecticide bottles used; and (iv) number of SOPs who worked that day. Once OSS sent the PMT SMS, the OSS transported the SOP and TL data collection forms to the district data entry center for data entry into the AIRS database.

Rains interrupted spraying for at least three to four days in all 25 operations sites. Some spray teams tried to make up for the lost days by spraying on Sundays. However, it became necessary to extend the spray campaign by a few more days. The project adjusted spray calendars by district and operation site based on number of days lost to rain, spray progress, and coverage. Morrumbala, Molumbo, and Maganja da Costa districts completed spraying and mop up by Saturday, December 9, and the remaining districts completed spraying and mop up by Wednesday, December 13.

In the first week, some trucks used for transporting spray teams did not have the recommended side railings. AIRS Environmental Compliance Officer identified all those trucks for appropriate retrofitting. This did not affect normal operations since the retrofitting occurred on Sundays and/or after the daily work.

4.1.1. Supervision of Spray Activities

In 2016 AIRS Mozambique took steps to improve supervision by introducing a new cadre of supervisors, namely BSs, and changing training to include separate supervision training for TLs and BSs. The project used the same strategy in 2017.

AIRS Mozambique ensured that there was adequate supervisory presence at all levels throughout the spray campaign. The project developed a 45-day supervision plan that indicated the distribution of all supervisors in the field and to operations sites. The plan also included the type of supervisory tools to use, by whom, and usage frequency. The list of the supervisory tools is in Annex C.

The COP, operations manager, M&E manager, database manager, IEC coordinator, ECO, and representative from PDH formed one supervision team to provide guidance to district teams at the provincial level. At the district level, the supervision teams comprised the AIRS district coordinator and SDSMAS representative. At the operations site, the OSS, BS, and TLs provided supervision.

In the first week, the project used a specified supervision strategy to address initial startup issues and set the right tone for the spray campaign. Each operations site had a dedicated senior supervisor (the same person from day 1 to day 6). The supervisors came from AIRS, PDH, or SDSMAS. Rotation of supervisors started in the second week. Some of the issues observed and corrected in week 1 included delay in the distribution of PPE and insecticide in the morning and congestion during end-of-day clean up. Other issues observed and corrected throughout the campaign included clogging of some constant flow valves (CFV) and non-washing or improper washing of face shields and CFVs.

4.2. Directly Observed Spraying

One of the most important technical requirements of IRS is the application of the right amount of insecticide on a sprayable surface. While SOPs received training on the correct application, field performance varies. AIRS Mozambique designed a Directly Observed Spraying (DOS) form as a supportive supervisory tool with 10 questions to help supervisors directly observe and monitor the quality of key activities SOPs carried out. They include the correct use of PPE, making sure equipment is functioning, ensuring preparation of structures before spraying, and correct mixing and application of insecticides, with special emphasis on spray quality. Supervisors observed SOP preparations and spraying techniques. If supervisors noted errors, they provided correction and feedback immediately. However, the supervisor would still note the type of error on the DOS form and use it as part of the morning assembly debriefing and re-training, as appropriate.

In Mozambique, TLs and BSs are the primary users of the DOS form. TLs are to observe each SOP under their supervision at least once a day. BSs are to observe any two SOPs under their supervision each day throughout the spray campaign. All TLs and BSs received training on how to use the DOS form. The training included how to provide instant feedback and on-the-spot corrective measures if any red flag issues arose.

To monitor the use of the DOS form and the number of errors supervisors observed and corrected, AIRS Mozambique implemented a database to capture data on the DOS form. TLs and BSs completed 5,978 DOS inspections over the 50 days.

Of these, 2,070 (35%) inspections did not identify any red flags. The remaining 3,908 inspections (65%) identified 773 red flags. DOS data showed that about 23% of the 773 red flags were due to incomplete use of PPE by SOPs. Milange was the district with the largest number of red flags (345), followed by Maganja da Costa (161) and Molumbo (139). In the remaining districts, TLs reported fewer than 100 red flags. Graphs of distribution of red flags over the 50-day spray campaign are in Figures 2 and 3.

FIGURE 2: DIRECTLY OBSERVED SPRAYING RED FLAGS OVER TIME (N=773 OVER 50 DAYS)

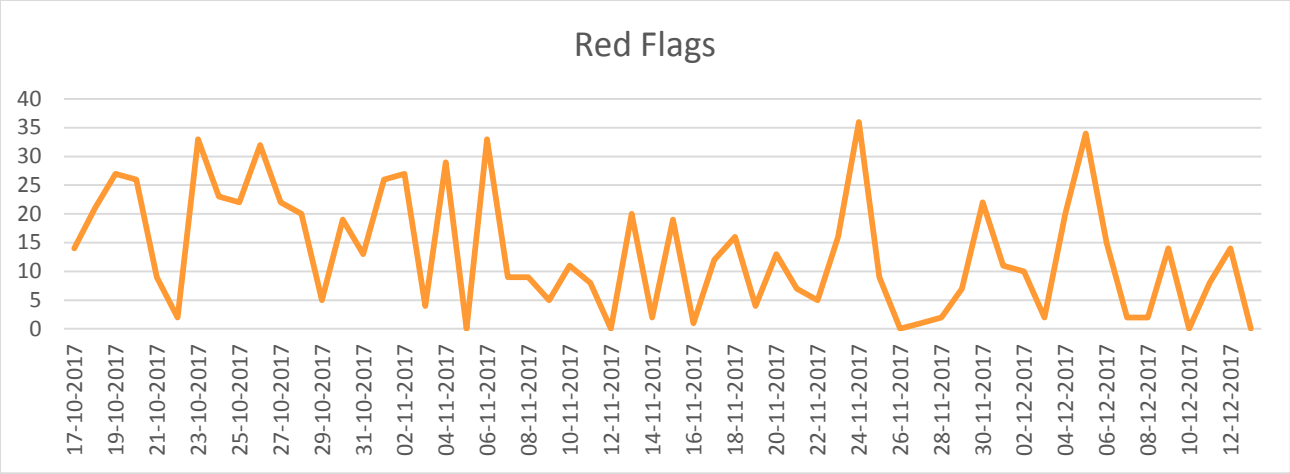
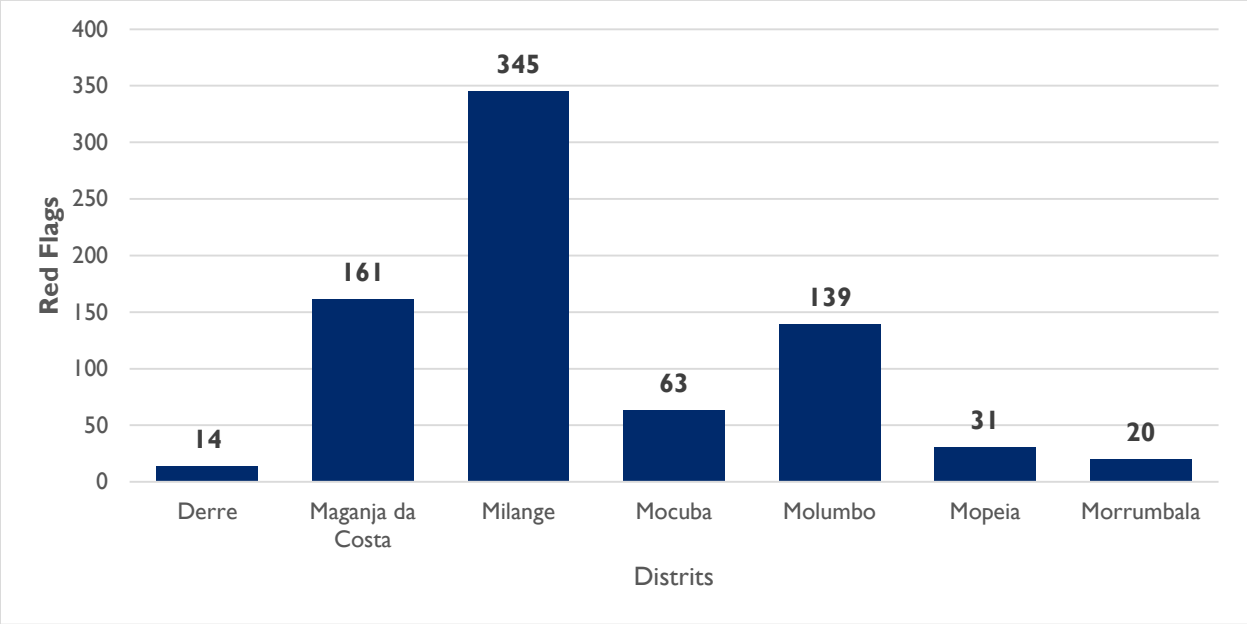


FIGURE 3: DIRECTLY OBSERVED SPRAYING RED FLAGS PER DISTRICT



4.3. Logistics and Stock Management

The project trained and hired seven district logistics assistants and 25 storekeepers to manage district and operations site stores. Before and during the spray campaign, they maintained and updated all logistics records, including stock cards and ledger books for each item with details of transactions, quantities involved, dates, and destination. Supervisors (COP, operations manager, logistics manager, ECO, and district coordinators) regularly checked records and conducted physical stock counts to ensure that the actual stock corresponded with records on stock cards and ledger books.

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

Insecticide boxes had district names and codes when dispatched from the central warehouse. At the operation sites, the bottles had SOP codes at the point of daily distribution. Each day, SOPs returned the used and unused insecticide bottles to the stores. OSS performed a thorough cross check to ensure the issued and returned bottles matched. On a weekly basis, logistics assistants moved empty insecticide bottles from the operations site stores to the district stores and subsequently to the provincial stores. At the same time, the AIRS logistics manager distributed insecticide to the districts and operations site stores.

Of the 347,984 bottles of Actellic 300 CS available for the 2017 spray campaign, 222,216 bottles were distributed to the seven districts and 205,223 bottles were used.

4.3.1. E-inventory

Following the success of the use of the e-inventory system in a few AIRS countries, AIRS Mozambique adopted the e-inventory system in 2017. The e-inventory system is a daily inventory management tool based in MS Excel. The project used this tool to monitor the movement of insecticides. Storekeepers sent SMS daily with their current insecticides stock balances to a central phone number. The AIRS logistics manager then retrieved the data and entered it into the e-inventory excel file. From this file, the AIRS logistics manager could analyze the data and predict which operations sites were getting close to the minimum stock level. This information then informed the distribution of insecticides to operations sites.

The major challenge of using this system was non-arrival of some of the SMS or delay in arrival of some SMS due to mobile network compatibility or interruptions. AIRS Mozambique will provide different mobile network sim cards to ensure smooth running of this system in future spray campaigns.

4.3.2. Management of 21,296 bottles from 2016 spray campaign

A total of 21,296 bottles of Actellic 300CS were available from the 2016 spray campaign. The project separated and stored these bottles in a separate warehouse away from the insecticides received for the 2017 campaign. A total of 1,031 of these bottles approached their two-year shelf life in October 2017, and the remaining 20,265 approached their two-year shelf life in November 2017.

Initially, PMI, AIRS, and NMCP agreed to send these bottles to Maputo, where the 2017 Goodbye Malaria and NMCP spray campaign was expected to start in August 2017. On request from the NMCP, the project sent four bottles for testing to confirm that the batches met current Food and Agriculture Organization (FAO)/World Health Organization (WHO) specifications. The test result confirmed efficacy of the samples. Syngenta, the insecticide manufacturer, issued a letter dated September 8, 2017, recertifying the insecticide until August 2018. While testing was underway, the NMCP and Goodbye

Malaria declined the donation since it was not clear whether spraying in Maputo would start in August as initially planned. As a result, the bottles remained in Zambezia for use for the PMI AIRS 2017 spray campaign.

To have better control of the use of this insecticide and to ensure use of all these bottles for the 2017 spray campaign, the project sent the 21,292 bottles to Milange district. Milange was projected to use more than 50,000 bottles of insecticides. It was therefore a good option for Milange to start using these bottles.

By the end of the fourth week of the spray campaign, SOPs had used all 21,292 bottles. The empty bottles are waiting recycling after the spray campaign.

5. Post-Spray Activities

5.1. Closing of IRS Operations

5.1.1. Post-Spray Inspection

The AIRS Mozambique ECO conducted the environmental compliance post-spray inspection by mid-January 2018 in the seven spray districts. The ECO coordinated with the district officers of the Ministries of Agriculture and Environment.

5.1.2. Post-Spray Evaluation Meeting

The 2017 post-spray evaluation meeting took place on January 25, 2018, in Quelimane, Zambezia. Participants included representatives of the NMCP, PDH, each of the spray districts' SDSMASs, MITADER, and MASA, AIRS Mozambique management and technical team, and PMI Mozambique. The major takeaways from the meeting were:

- Site-level training of spray operators and TLs was a great idea and effective compared with the previous method of training all spray operators in one place. There were strong recommendations from all districts to continue this approach in the future
- Districts welcomed separating the spray campaign launch day from the first day of the spray campaign
- Fine tuning the Mpesa payment system to avoid unnecessary delay in payments by, for example, ensuring full Mpesa registration of all job applicants for any positions
- Further collaboration with Derre District to discuss the low spray coverage in 2017 and devise strategies to overcome this in the future.

5.2. Demobilization

The 2017 spray campaign ended on December 13, 2017. All operations sites demobilized immediately after the spraying ended. Demobilization was complete by December 23 in all seven districts.

The teams washed all PPE, including SOP bags, plastic cover sheets, and rinsing barrels. They cleaned the wash areas of the soak pits and covered all soak pits. The teams returned all IRS commodities, including unused insecticides, to the central warehouse in Quelimane. The teams will sort all logistics items into usable and non-usable items and count them. This activity shall guide the 2018 logistics needs assessment, quantification, and procurement. The project also organized transportation of all solid waste items (used face masks, hand gloves, empty Actellic 300 CS bottles, and recovered insecticide) to the central warehouse in Quelimane to await proper and final waste disposal. Disposal will comply with BMP standards and the AIRS Mozambique waste-management plan.

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

5.2.1. Insecticide Stock

AIRS Mozambique began its campaign with 347,971 bottles of insecticide and used 205,223 bottles. After the end of the spray campaign, 142, 748 bottles were left. On request from the NMCP, AIRS transferred 82,800 bottles to Maputo and Cabo Delgado Provinces for their IRS activity. As a result, the current available stock of insecticides is 59,948.

The expiry dates for all remaining insecticide stock is May 2019, as presented in Table 10 below.

TABLE 10: POST SPRAY INSECTICIDE INVENTORY AND EXPIRY DATES

2016 Stock Balance	2017 Insectcide Received	Samples Taken for Testing	Available Stock	Used	Post Spray Campaign Balance	Transfer to Other Provinces	2017 Closing Balance	Expiry Date
21,296	326,688	13	347,971	205,223	142,748	82,800	59,948	May 2019

6. Environmental Compliance

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

6.1. Pre-Season Environmental Assessment

In July 2017, AIRS Mozambique conducted Pre-Spray Environmental Compliance Assessments (PSECAs) in the seven target districts, including Maganja da Costa, a new spray district. The project performed the assessment in 26 sites, including two new operations sites in Maganja da Costa. The project conducted the PSECAs using smartphones pre-programmed with environmental assessment checklists.
The ECO entered data in the e-checklists at operations sites and submitted them to a central database on an automated server at Abt's office in Bethesda. The system auto-generated a work list and then instantly shared it with the COP, operations manager, and the ECO to guide the work plan for the rehabilitation of the operations sites for the 2017 spray campaign.

The ECO identified the new sites by considering criteria such as: (a) location outside of any flood plain or not close to protected areas; (b) adequate space for storage, bearing in mind the type of insecticide and sufficient ventilation; (c) suitability of soak pits and MSP locations used in previous years; and (d) feasibility of safe water crossing for an island in Maganja da Costa.

The 26 operations sites within the seven districts are located in SDSMAS premises. The project did not assess or plan to use the Sabe operation site in Morrumbala district, during the spray campaign due to security concerns. Due to bad road conditions in some areas in Maganja da Costa, it was impossible for trucks to reach certain villages. Consequently, the project used MSPs instead in Cabuir and Ganga localities. In Mopeia district, Posto Campo is located about 100 kilometers from Mopeia Sede, the closest operations site, and its villages are dispersed. This made it an ideal area for MSP use.

Additionally, the AIRS ECO, MITADER, and the PDH conducted a water-crossing assessment in Maganja da Costa in September from the Nante to Vila Valdez Island. The project has not sprayed the island before, although AIRS intended to spray there. According to the SDSMAS, the number of structures was about 1,000. The project included these structures in the original spray target during micro-planning. However, AIRS, PDH and SDSMAS and decided not to spray the island based on the precarious and unreliable means for crossing. Unsafe shallow boats with frequent mechanical problems would make the half-hour crossing dangerous for people and certainly for insecticides.

A detailed description of the rehabilitation and/or improvement of the operations sites and use of MSPs are in Table 11.

TABLE 11: REHABILITATION AND IMPROVEMENTS OF OPERATIONS SITES

District	Operations Sites Rehabilitation
Molumbo 2 operations sites (Molumbo Sede and Corromana)	1 wash area rehabilitated (Corromana) 1 soak pit and wash area expanded (Molumbo Sede) 2 changing rooms segregating female and male personnel rehabilitated (Molumbo Sede) 2 changing rooms rehabilitaded Corromana) 1 operations site fence rehabilitated (Corromana) 1 operations site fence reinforced (Molumbo Sede) 4 MSPs built
Maganja da Costa 2 operations sites (Maganja Sede & Nante)	1 store rehabilitated (Maganja Sede) 1 store rehabilitated (Nante) 1 datacenter/ office rehabilitated (Maganja Sede) 2 wash areas and 2 soakpit built (Maganja Sede) 1 wash area and 1 soakpit built (Nante) 2 changing rooms rehabilitated segregated in female and male (Maganja Sede and Nante) 4 toilets rehabilitated segragated and female and male (Maganja Sede and Nante) 2 operations sites fenced (Maganja Sede and Nante) 5 MSP built
Mocuba 6 operations sites (Mocuba Sede, Munhiba, Namanjavira, Mugeba, Alto Benfica and Muaquia)	3 operations site fences rehabilitated (Munhiba, Namanjavira, and Mugeba) 4 changing rooms rehabilitated (Namanjavira, Mugeba, Muaquiua, and Alto Benfica) 7 MSPs built
Morrumbala 5 operations sites (Morrumbala Sede, Megaza, Chirre, Muandia, and Pinda)	1 wash area and 1 soakpit expanded (Morrumbala Sede) 2 soak pits rehablitated (Muandiua, and Chirre) 3 operations sites fences rehabilitated (Muandiua, Chirre and Megaza) 4 changing rooms rehabilitated / segregated by gender (Muandiua, Chirre, Megaza, and Pinda) 1 store rehabilitated (Megaza) 1 toilet rehabilitated (Megaza) 2 MSPs built
Milange 5 operations sites (Milange Sede, Carrico, Dulanha, Liciro, Dachudua)	1 store rehabilitated (Carico) 1 wash area and 1 soakpit built (Carico) 1 wash area and soak pit expanded (Milange Sede) 2 soakpits rehabilitated (Dachudua and Liciro) 1 toilet segregated by gender built (Carico) 1 changing room segregated by gender built (Carico) 1 operations site fence erected (Carico) 4 operations sites fences rehabilitated (Dachudua, Dulanha, Liciro, and Carico) 2 changing areas segregated by gender rehabilitated (Liciro and Dulanha) 5 MSPs built
Derre 2 operations sites (Derre Sede and Guerissa)	2 stores rehabilitated (Derre Sede and Guerrissa) 1 operations sites repaired (Guerissa) 1changing room segregated by gender repaired (Derre Sede) 1 soakpit rehabilitated (Guerrissa) 6 MSPs built
Mopeia 3 operations sites (Mopiea Sede, Posto Campo, Chimuara)	1 soakpit rehabilitated (Mopeia Sede) 1 wash area and 1 soakpit rehabilitated (Posto Campo) 2 operations site fences rehabilitated (Posto Campo and Chimuara) 2 changing rooms rehabilitated; segregated by gender (Chimuarra and Posto Campo) 1 toilet segregated by gender rehabilitated (Posto Campo) 5 MSPs built

6.2. Safety and Environmental Compliance Before, During, and After the Spray Campaign

6.2.1. Medical Health

All prospective seasonal personnel underwent a general medical check up to ensure that they were capable to participate in the spray campaign.

Table 12 provides details on the number of prospective seasonal personnel who underwent the general medical check and how many passed.

TABLE 12: PRE-SPRAY MEDICAL CHECK UP

District	Total Tested	Total Passed
Mocuba	248	246
Milange	177	177
Morrumbala	352	342
Molumbo	163	160
Maganja da Costa	228	206
Mopeia	85	85
Derre	74	74
Total	**1327**	**1290**

In addition to the general medical checkup, all eligible females took pregnancy tests. A second round of pregnancy testing was conducted on November 18 for all seven districts. Through effort and coordination, sites reassigned as mobilizers all women found pregnant. As shown in Table 13, the total number of women tested reflects the number of women employed at the time the pregnancy tests were administered. A smaller number of women were tested in round two because some women were dismissed or left the program voluntarily.

TABLE 13: PRE-SPRAY & MID-SPRAY PREGNANCY TEST RESULTS

District	Pre-Spray Pregnancy Test Results	Mid-Spray Pregnancy Test Results[7]
Morrumbala: Total number of women	51	61
Total number of women tested	51 (100%)	61 (100%)
Total positive	0	1
Mocuba: Total number of women	124	94
Total number of women tested	124 (100%)	82(100%)
Total positive	10	0
Milange: Total number of women	63	64
Total number of women tested	63(100%)	64 (100%)
Total positive	0	0
Molumbo: Total number of women	61	55

[7] The numbers of tests go up mid-spray as we have to test current workers and, if any fail, we have to test replacement workers.

District	Pre-Spray Pregnancy Test Results	Mid-Spray Pregnancy Test Results[7]
Total number of women tested	61 (100%)	55 (100%)
Total positive	0	1
Maganja da Costa: Total number of women	65	50
Total number of women tested	65 (100%)	50(100%)
Total positive	4	0
Derre: Total number of women	17	16
Total number of women tested	17(100%)	16 (100%)
Total positive	1	0
Mopeia: Total number of women	27	26
Total number of women tested	27(100%)	26 (100%)
Total positive	0	0
Total number of women	396	328
Total number of women tested	396 (100%)	328(100%)
Total positive	15	2

6.2.2. Safety and Environmental Compliance

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

Mitigation measures included:

(a) Provision and use of complete PPE, (coveralls, head and neck protector, gloves, boots, socks, helmets, face shields, and dust masks) throughout the campaign

(b) Training and reinforcement of safety and compliance messages during morning mobilization and in job aids. For example, SOPs underwent training on proper handling and mixing of insecticide and the consistent use of PPE

(c) The project transported insecticide from the central warehouse to the district stores and to the operations site with trucks covered with tarpaulins to ensure insecticide did not fall out on the way. The project equipped each vehicle with spill kits, a first aid kit, material safety data sheets, accident/emergency procedures sheets, and a fire extinguisher

(d) The project transported SOPs from the operations sites to the field using trucks retrofitted with railings and seating benches. Before the contracting for the vehicles, the project inspected them in line with PMI BMSs for IRS to ensure compliance with safety and environmental requirements. The ECO then certified vehicles, and the project inspected them throughout the spray campaign. To guarantee safety during the transportation of SOPs, the project modified all trucks by installing hand rails

(e) The ECO monitored fixed and mobile soak pits throughout the campaign. Teams used plastic sheeting at the wash areas to ensure insecticide-contaminated effluent did not pollute the environment. The team replaced the sheeting where and when the ECO deemed it necessary. The project installed fences and gates around the perimeter of the operations site to prevent unauthorized access to the fixed soak pits and wash areas. The project implemented a progressive rinsing methodology, consisting of introducing pressure into the spray pump and discharging through

the hose and lance from buckets 3, 5, and 7. The project implemented this approach during the national, provincial, and district training and subsequently during the spray campaign to ensure that proper washing of spray pumps. The project implemented this approach during the national, provincial, and district training and subsequently during the spray campaign to ensure that proper washing of spray pumps.

(f) Trained washers washed overalls in the soak pits at the end of each spray day. Each day SOPs received clean PPE at the fixed operations sites.

(g) The project provided wash facilities at each of the operations sites. This enables SOPs and other personnel who handle insecticide to wash up at the end of the spray day

(h) Where a site used an MSP, the team pulled it out after use. The team then filled the pit with natural soils to avoid accidents and to return the site to its original status. The SOPs received clean PPE from the fixed operations site to ensure all members complied with best practices. After use, the team transported MSPs to the central warehouse to wait for capacity testing to determine if they were suitable for use in next year's spray campaign. The ECO conducted mid-spray environmental compliance inspections during the campaign in all 26 operations sites and all places using MSPs. The purpose was to monitor compliance with procedures for disposing of liquid waste and ensure adherence to mitigation measures to avoid seasonal worker exposure to pesticide.

(i) During the campaign, AIRS supervisory team systematically and consistently inspected operations sites and spray personnel. The team inspected operation sites to assess the accuracy and timeliness of store recordkeeping, proper warehousing of insecticide and other spray materials and supplies, and appropriate storage and handling of different waste. In addition, inspections ensured that stores had first aid kits, spill kits, and fire extinguishers to respond to an emergency.

(j) Regular spray team supervision ensured correct spray technique, consistent use of full PPE, adequate preparation of households for spraying, correct handling of insecticide, and accurate reconciliation of full and empty bottles of insecticide to prevent and identify any theft of insecticide.

6.3. Management of Insecticide Adverse Effects

Each district had a resource team responsible for handling adverse effects. The team comprised a coordinator, a doctor based at the district hospital, and nurses based at each health center affiliated with an operations site. These teams were responsible for conducting pregnancy tests and medical checks of all candidates and addressing any adverse effects seasonal workers or community members experienced during spray operations. Before the start of the spray campaign, teams received training in Mocuba on management of adverse IRS effects. The government provided antidotes (atropine) to all heath centers adjacent to operations sites for use in case of human exposure or contamination at a high level. During 2017, there were no reported issues regarding human exposure to insecticide.

6.4. Solid Waste Management

The storekeeper separates and repacks solid waste at each operation site. Hired vehicles routinely collect waste from operation sites to district warehouses and from district warehouses to central warehouse in Quelimane. Waste from operation site is consolidated at the district warehouses before transport to central warehouse. At the central warehouse, warehouse staff separate, count and re-pack the solid waste.

In February 2018, the Ceramica Okanga incinerator in Nicoadala District, Zambezia Province incinerated all the solid waste. Ceramica Okanga has certification from MITADER, the government organization responsible for ensuring that Ceramica Okanga operates in accordance with established environmental standards. The incinerator conducted the operation in coordination with the MITADER provincial environmental officer.

During the campaign, SOPs triple rinse empty insecticide bottles. At the central warehouse, to prepare empty bottles for recycling, Washers removes all labels and re-washes the bottles to ensure there is no insecticide residue. AIRS Mozambique continues to work with Incala (Zambezia) and with Topack (Maputo) on recycling insecticide bottles. They grind up the bottles. The AIRS ECO supervises the process in coordination with MITADER Zambezia to ensure Incala follows all environment procedures and best practices in the memorandum of understanding (MOU) with both Incala and Topak.

6.5. Incident Reports

Table 14 shows the incidents reported during the 2017 campaign. There was a decline in the number of incidents from 11 in 2016 to 7 in 2017.

TABLE 14: INCIDENT AND EXPOSURE REPORTS

Operations Site	Date	Incident Report Number and Brief Description	Insecticide Loss	Corrective Action Taken
Zambezia Central Medical Stores	February 6, 2017	IR 2017-001; Insectary Loss caused by fire in the Zambezia Central Medical Stores. The AIRS Moz Insectary is located in government property, with the Zambezia Central Medical Stores in Quelimane. Total loss of susceptible colony, equipment, materials, historical data (2012-2016), ento data collection forms (raw data), reference materials, and specimens	n/a	Data entry and storage reinforced
October 20, 2017	Mocuba	IR 2017-002; A vehicle transporting 10 SOPs, 2 TLs, 1 pump technician, and 1 BS ran into a tree trunk lying across the road hidden by the overgrown grass. All were taken to the nearest facility, Namanjavira hospital, where the 7 injured people were treated and released to go home. The vehicle was retrofitted with side railing and benches per AIRS vehicle safety policy, had functioning brakes, was not speeding, and had been inspected and approved to be part of the campaign. The driver and two passengers in the vehicle cabin were wearing seat belts.	n/a	AIRS has re-emphasized safe driving habits, including safe driving in poor road conditions and on bushy roads during morning mobilization. In addition, AIRS is sending out a letter to all vehicle contractors with a reminder about safe driving.

Operations Site	Date	Incident Report Number and Brief Description	Insecticide Loss	Corrective Action Taken
Muaquia, Mocuba	October 26, 2017	2017-003; Two SOPs were found to have falsified data in a bid to hide theft and waste of insecticide. The AIRS M&E manager was conducting field supervision and met these SOPs. He requested to review their SOPs forms and became suspicious of the number of structures claimed as sprayed and number of insecticide bottles used. Both SOPs were fired immediately and were not paid for the day. The SOPs were taken to the local police by the village leader. The data for the 19 structures was not entered as the structures could not be found.	The equivalent of nine (9) bottles of insecticide shall have to be disposed of, namely four (4) bottles in the domestic jug and five (5) bottles poured into the ground and collected in the contaminated soil.	Further emphasis to the TLs and BSs to work very closely with each of the SOPs and monitor their movements and actions at all times without exception. AIRS will continue random reviews of SOP forms for data quality and integrity and continue solid field supervision. Emphasize negative impact of the misuse of insecticide on the environment and human health. Continue to rely on police and other authorities' presence in morning mobilization to deter theft and increase awareness of zero tolerance policy on theft and fraud
Muandiua, Morrumbala	October 28, 2017	IR 2017-004; A 4x4 truck rented for field supervision hit a bridge post while swerving away from a child who ran across the road. Two M&E assistants received minor injuries, were taken to nearby hospital, were treated and discharged. Child was not hit	n/a	AIRS continues to re-emphasize safe driving habits, including safe driving and within the speed limit at all times during morning mobilization. (All drivers, including those driving supervision vehicles, attend morning mobilization.) AIRS shall add a further reminder to drivers to remember that vehicles are travelling within communities and are likely to encounter children and animals crossing the road. To support the morning mobilization messages, AIRS developed and issued daily reminders to drivers and vehicle owners on safe driving through an SMS job aid. The job aid was issued twice a day and was issued from November 3, 2017, until the end of the spray campaign

Operations Site	Date	Incident Report Number and Brief Description	Insecticide Loss	Corrective Action Taken
Chirre, Morrumbala	November 4, 2017	IR 2017-005; The OSS for Chire Operations site, Morrumbala district, came upon a home where two SOPs were attempting to steal insecticide for personal use. OSS called the AIRS district coordinator and together they recovered the insecticide in a domestic container and half empty actellic bottle and took it to Morrumbala District warehouse. The insecticide in the domestic container shall be transported to central warehouse in Quelimane for proper disposal.	Approximatley 2.5 liters	Further emphasis to the TLs and BSs to work very closely with each of the SOPs and monitor their movements and actions at all times without exception. AIRS will continue random reviews of SOP forms for data quality and integrity and continue solid field supervision. Emphasize negative impact of the misuse of insecticide on the environment and human health. Continue to rely on police and other authorities' presence in morning mobilization to deter theft and increase awareness of zero tolerance policy on theft and fraud.
Liciro, Milange	November 5, 2017	IR 2017-006; A vehicle rented by Abt and driven by an employee of the car rental company to carry insecticide and other materials from the district warehouse to site store was involved in a pedestrian accident. Unfortunately, the pedestrian died at the scene.	n/a	AIRS continues to re-emphasize safe driving habits, including safe driving and within the speed limit at all times daily during morning mobilization. AIRS shall continue to remind drivers to remember that vehicles are travelling within communities and are likely to encounter children and animals crossing the road.
Nicoadala, Zambezia	November 16, 2017	IR 2017-007; A vehicle under contract with Abt for insecticide and materials transportation, driven by the owner, traveling from Quelimane (Central warehouse) to Morrumbala and Derre Districts was involved in an accident in which two persons standing on the side of the road were struck and lost their lives.	n/a	AIRS continued to re-emphasize safe driving habits, including driving under the speed limit at all times during daily morning mobilization, in a variety of ways such as sms broadcasts to all vehicle owners and drivers.[8]

[8] Abt is working on project-wide standardization of driver training and plans to include lessons to deal with vehicle accidents.

6.6. Mitigation of Incidents

AIRS Mozambique incorporated into 2017 training the lessons learned and recommendations from the previous year.

- District-level environmental and agricultural technicians will continue to be 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. It gives the ECO and other senior members of the AIRS team timely knowledge of issues in the field and enables them to take rapid corrective action and/or mitigation measures
- In-depth discussions took place during the environmental compliance training on the possible, immediate, and long-term impacts of insecticide on human health and the environment. The discussions helped SOPs and other spray team members understand the importance of managing, mixing, and correctly applying insecticide
- Communications by radio, television, mobilizers, and community meetings contributed to achievement of the goals of the Mozambique Environmental Mitigation and Monitoring Plan. AIRS Mozambique will continue working to reduce possible negative health and environmental impacts of IRS.

6.7. Post-Spray Inspections

The project conducted post inspections in 23 operations sites from January 9-17, 2018. Because of the rainy season, it was impossible to conduct post-spray inspection in two operations sites: Carico (Milange district) and Posto Campo (Mopeia district). Both sites are scheduled for inspection the first week of April 2018. The IRS ECO conducted the inspections in coordination with government departments of Environmental and Agriculture.

Of 23 operations sites inspected, 19 passed and four initially failed. Of the 19 that passed, inspectors recommended that two move the warehouse to another place to meet minimum requirements. Mocuba Sede was located in close proximity to houses, roads, hospitals, and other infrastructure. Muaquiua warehouse was initially located away from houses, but some population moved in during the spray campaign. Megaza and Muandia (Morrumbala) failed as the stores had not yet been decontaminated. Munhiba (Mocuba) failed as the store, wash area, and soak pit were not cleaned. Nante (Maganja da Costa) failed because the wash area and soak pit were not cleaned. The project later remedied all deficiencies and on re-inspection, the sites were passed.

6.8. Technical Assistance to Nampula Province

As part of AIRS technical support to Nampula province for its own spray campaign the MOH implemented, the project conducted PSECAs on proposed operations sites for Nampula. After this assessment, the project produced a report with recommendations based on AIRS BMPs. AIRS found that the operations sites, warehouses, wash areas, soak pits, and other infrastructure did not comply with BMPs.

Additionally, AIRS Mozambique invited the provincial malaria focal point person from Nampula and three SDSMAS malaria focal points--one each from Nampula, Meconta and Monapo districts--to participate in the national ToT on how to manage IRS operations. Following the training, AIRS provided materials and supplies and oversaw construction of 10 MSPs as a response to an overcrowding problem at operations sites and to reduce the distance and time for travel for SOPs.

7. ENTOMOLOGY

In 2017, the AIRS Mozambique program continued its collaboration with the NMCP, PDH, and SDSMASs in the implementation of IRS in seven targeted districts in Zambezia Province.

7.1. QUALITY ASSURANCE OF IRS PROGRAM

The spray quality assessment the project performed in five of the seven spray districts (Milange, Morrumbala, Mocuba, Maganja da Costa, and Mopeia) is critical for evaluating spray quality on sprayed surfaces. We used the standard WHO cone bioassay test, including airborne effect test, within the first two weeks of the 2017 spray campaign. As shown in Table 15, results showed high quality of spray in all districts, with a mortality rate varying from 99.5% to 100% after the 24-hour holding period.

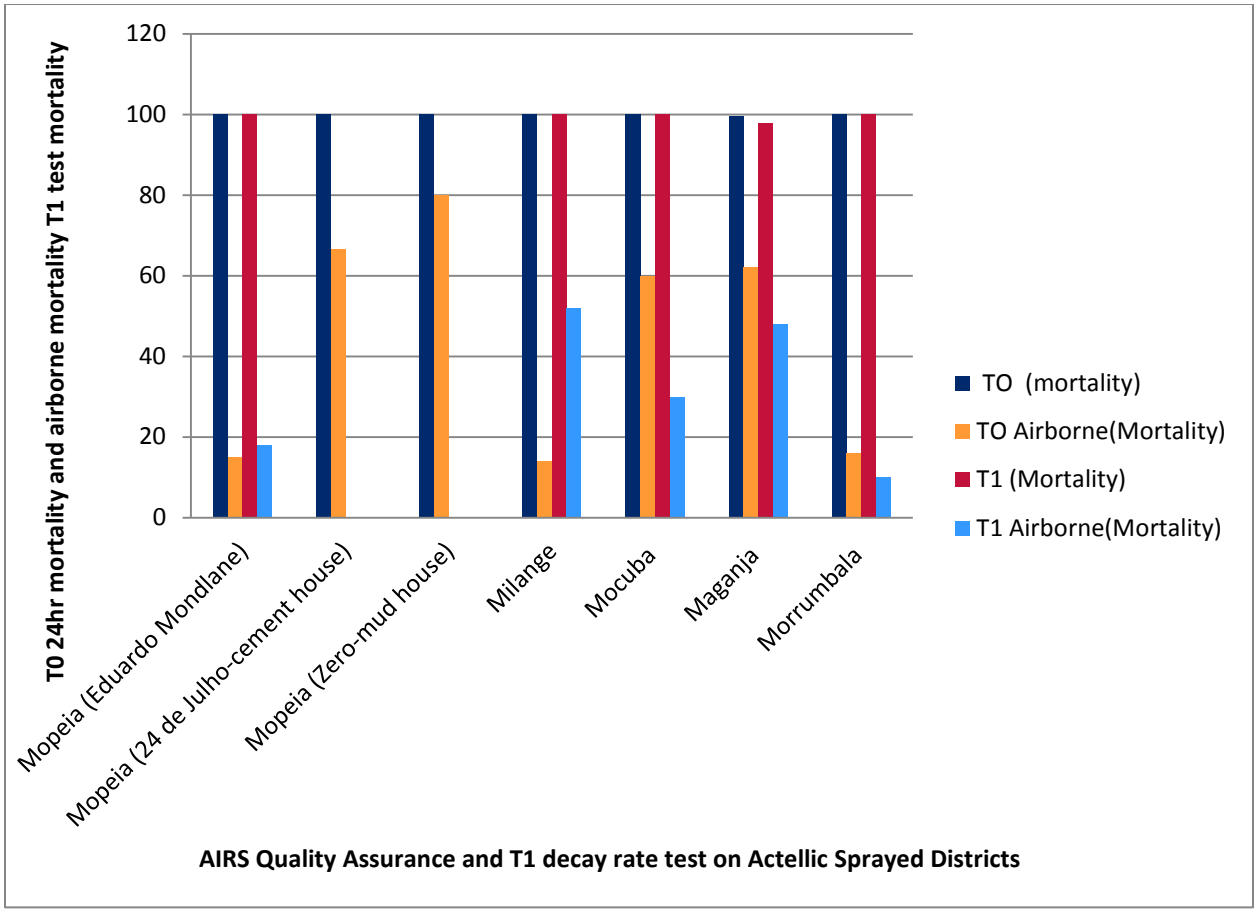
TABLE 15: CONE WALL BIOASSAY TEST RESULTS SUMMARY

District	Sentinel site	# Houses	# Mosquitoes exposed	30 Minutes knockdown (KD)	% Exposure mortality after 24 Hrs	% Control mortality after 24 hrs
Mopeia	Eduardo Mondlane (Mud & Cement)	4	160	22.5	100	5
Mopeia	24 de Julho (cement)	6	240	49.58	100	0
Mopeia	Zero (Mud)	5	200	31	100	0
Milange	Tenga (Mud)	5	200	37.78	100	0
Mocuba	Mugeba(Mud)	5	200	20.5	100	0
Maganja	Niquide (cement & Mud)	5	200	24.5	99.5	0
Morrumbala	Marrundo	5	200	23	100	0

7.2. RESIDUAL EFFICACY OF ACTELLIC 300 CS

We measured the residual efficacy of the Actellic® 300 CS based on quality-assurance testing at T1 (one month after spraying) in Mopeia (Eduardo Mondlane), Milange, Mocuba, Maganja da Costa and Morrumbala. The results remained acceptable, with mortality rates varying from 97.78% in Maganja da Costa to 100% in the other districts, as shown in Figure 4. We will measure the residual life of this insecticide monthly until mortality reaches below the standard cut-off point of 80% for two consecutive months. In Figure 4, there is no T1 data available yet for Mopeia (Zero) and (24 de Julho) villages because we conducted the tests later.

FIGURE 4: CONE WALL BIOASSAY QUALITY ASSURANCE SUMMARY AND TI RESULTS



8. Monitoring and Evaluation

8.1. Key Objectives and Approach

For the 2017 spray campaign's M&E, AIRS Mozambique closely followed the processes in the approved work plan. The main objectives of the M&E activities were to:

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

8.2. Data Collection and Management

AIRS Mozambique used standardized data collection forms designed to capture all core PMI indicators. All data collection followed training on data capture and data quality. During the pre-IEC campaign, mobilizers collected household-level data. IEC assistants used the supervision form tool to guide and support mobilizers to ensure good data quality. During the spray campaign, SOPs collected all household data, which was verified through data-quality assessment processes. To ensure data integrity, improve supervision, and, ultimately, enhance quality of data collection and data entry, AIRS Mozambique used quality-assurance and control tools (i.e., The Error Eliminator [EE] and the Data Collection Verification [DCV] form). Annex B describes all of the 2017 data-collection and quality-assurance tools, their purposes, and intended users.

The project converted DCV from a paper form into a digital form platform within the mobile supervisory form suite. This made it possible to increase the number of DCV forms we completed and analyzed during the campaign. Tables 16 and 17 show the numbers of households we interviewed using the DCV form and issues observed and resolved, respectively. Table 17 shows a comparison of spray coverage based on structures SOPs found and structures visited using DCV. Overall, there was a difference of 14% between the DCV data and the SOP data-collection forms. Derre, Mocuba, and Morrumbala showed the largest differences: 26%, 26%, and 20% respectively. The remaining districts (Maganja da Costa, Milange, Molumbo, and Mopeia) showed minor differences (below 10%) between data-collection forms and the DCV. The largest difference in these three districts was due to SOPs failing to record some closed structures in the first three weeks of the campaign. But the teams resolved this issue with mop up.

TABLE 16: NUMBER OF STRUCTURES VISITED USING THE DCV FORM[9]

District	No. of Structures Visited
Derre	1,006
Milange	779
Mocuba	498
Molumbo	400
Mopeia	534
Morrumbala	630
Maganja da Costa	512
Grand Total	**4,359**

TABLE 17: USE OF DCV: COMMON ISSUES FOUND AND CORRECTIVE ACTIONS TAKEN

Errors/Issues Observed	Corrective Actions Taken
Names of head of households are not completed for non-sprayed houses	Issues were addressed with BSs, TLs, and SOPs daily at morning assemblies
When households removed household stickers given by mobilizers, new IRS household stickers were not issued to non-sprayed houses.	Issues were discussed with spray teams and SOPs during the morning assemblies, SOPs were reminded to distribute new stickers when sticker is missing and record the 2017 spray data for all eligible structures found (sprayed or not sprayed).
Difference between the 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.	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.
SOPs did not write in 2017 column on the stickers that were placed in the doors of the households by the mobilizers.	Issue was discussed with spray teams and SOPs during the morning assemblies, and SOPs were reminded to fill in all the stickers and record all eligible structures found.
All eligible structures encountered by SOPs were not appropriately registered, particularly non-sprayed eligible structures.	Issue was discussed with spray teams and SOPs during the morning assemblies, and SOPs were reminded to mark and record all eligible structures found, sprayed or not sprayed. SOPs used the mop-up period to register eligible structures that were not previously registered.
SOPs were not consistently marking structures with chalk as the PMI AIRS Project's standard guidelines require.	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 BSs 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 so that such areas would be included in mop-up/revisit plans.

[9] Only structures cross referenced with the Access database

TABLE 18 DATA COLLECTION VERIFICATION BASED ON DCV BY DISTRICT

Districts	Structures Visited	Structures Sprayed	Structures not Sprayed	Coverage Based on DCV	Difference in Coverage between SOP and DCV
Derre	1,006	489	517	49%	27%
Milange	779	739	40	95%	-6%
Mocuba	498	301	197	60%	26%
Molumbo	400	353	47	88%	1%
Mopeia	534	454	80	85%	0%
Morrumbala	630	444	186	70%	20%
Maganja da Costa	512	459	53	90%	-4%
Total	**4,359**	**3,239**	**1,120**	74%	14%

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. The project bought additional laptops to replace older, unusable computers, adding to the stock of DEC laptops available from previous years. The project contracted 39 DECs to staff 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 2017 AIRS Mozambique database on 45 computers, and the web-based DOS database worked on all the computers.

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

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

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

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

8.4. Data Storage

The project stores paper data forms in two-ring binders. We file spray data by district, date, and operations site name. At the end of every day, we back up all data electronically. We perform back-up 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

Daily regular district-level reporting for both internal planning purposes and external reporting used the automated reports in the AIRS Cleaning/Reporting Tool and daily mobile data/PMT SMS reports.

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

8.6. Mobilization Data

AIRS Mozambique conducted D2D mobilization in the seven target districts on an average of eight days per district before the campaign. Mobilizers registered an estimated 205,146 structures, less than 50% of the total spray target. This low percentage could be the result of a combination of factors as discussed in sections 3.2.1 and 9. During the 2017 spray campaign, SOPs reported having found 435,395 structures or about 53% more than the total number mobilizers registered. The mobilizers sensitized 199,680 structures, representing 97% sensitization of structures mobilizers found and registered. The total population reached was 611,049, with 199,009 people reported to have accepted spraying. Table 18 provides a summary of mobilization data.

8.7. Spray Operations Data

During the 2017 spray campaign, SOPs found 435,511 eligible structures and sprayed 381,533, representing 88% spray coverage. The total population protected by IRS (all ages) was 1,711,518. This included 253,962 children under five years of age and 103,302 pregnant women. Table 19 and 20 below provide a summary of spray results. At the end of the spray campaign, SOPs had found 53,978 non-sprayed structures. Several factors led to non-sprayed structures, according Table 22. Annex G also provides detailed results on other project indicators.

TABLE 19: TOTAL MOBILIZATION DATA BY DISTRICT

District	Structures Found by Mobilizers	Structures Sensitized	Structures not Sensitized	% Structures Sensitized	Population Reached						Mobilizers Worked	Structures per Mobilizers
					Total Population	Males	Females	Accepted	Not Accepted	% of Population Accepted		
Derre	8,271	8,233	38	100%	25,797	12,520	13,277	8,219	52	32%	682	12
Maganja da Costa	34,159	33,685	474	99%	95,524	44,545	50,979	33,626	533	35%	2,083	16
Milange	52,537	50,179	2,358	96%	149,392	70,235	79,157	50,056	2,481	34%	3,546	15
Mocuba	39,707	38,992	715	98%	146,028	71,237	74,791	38,810	897	27%	1,707	23
Molumbo	23,260	21,598	1,662	93%	74,696	37,113	37,583	21,402	1,858	29%	1,195	19
Mopeia	10,052	10,034	18	100%	23,220	10,864	12,356	10,017	35	43%	556	18
Morrumbala	37,160	36,959	201	99%	96,392	46,106	50,286	36,879	281	38%	1,612	23
Total	**205,146**	**199,680**	**5,466**	**97%**	**611,049**	**292,620**	**318,429**	**199,009**	**6,137**	**33%**	**11,381**	**18**

TABLE 20: 2017 SPRAY RESULTS SUMMARY BY DISTRICT

District	Structures Found by SOPs	Structures Sprayed	Spray Coverage	Total Population Found	Population Protected					
					Total Population	Males	Females	Pregnant Women	Children <5 Years	% of Population Found
Derre	23,930	18,231	76%	98,298	76,370	38,449	37,921	4,840	11,581	78%
Maganja da Costa	49,182	42,402	86%	216,337	190,194	95,492	94,702	9,588	25,173	88%
Milange	105,873	94,741	89%	496,863	450,949	222,479	228,470	26,260	67,023	91%
Mocuba	66,838	57,271	86%	335,477	291,378	145,630	145,748	18,644	42,017	87%
Molumbo	59,730	53,392	89%	251,318	225,199	115,022	110,177	12,184	35,651	90%
Mopeia	19,950	16,936	85%	83,452	70,988	35,456	35,532	2,759	10,738	85%
Morrumbala	110,008	98,560	90%	451,739	406,440	192,463	213,977	29,027	61,779	90%
Total	**435,511**	**381,533**	**88%**	**1,933,484**	**1,711,518**	**844,991**	**866,527**	**103,302**	**253,962**	**89%**

TABLE 21: 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	23,930	18,231	11,340	3,501	7,839	0	2,142	8.5	3.7	2.3
Maganja da Costa	49,182	42,402	22,692	3,092	19,600	0	5,592	7.6	3.5	2.2
Milange	105,873	94,741	66,784	12,462	54,322	0	9,187	10.3	5.9	1.7
Mocuba	66,838	57,271	46,476	5,447	41,029	0	7,276	7.9	5.6	1.4
Molumbo	59,730	53,392	26,232	1,794	24,438	0	5,378	9.9	4.5	2.2
Mopeia	19,950	16,936	17,316	2,683	14,633	0	2,039	8.3	7.2	1.2
Morrumbala	110,008	98,560	52,668	9,306	43,362	0	9,654	10.2	4.5	2.3
Grand Total	**435,511**	**381,533**	**243,508**	**38,285**	**205,223**	**0**	**41,268**	**9.2**	**5.0**	**1.9**

TABLE 22: REASONS FOR NON-SPRAYING

Districts	Reason of not Sprayed					Grand Total
	Closed	Refusal	Sick	Funeral	Other	
Derre	1,547	3,587	309	30	226	5,699
Maganja da Costa	2,826	2,729	541	39	645	6,780
Milange	3,705	5,643	1,039	127	618	11,132
Mocuba	2,170	4,744	1,419	174	1,060	9,567
Molumbo	810	4,282	556	23	667	6,338
Mopeia	1,182	1,186	111	17	518	3,014
Morrumbala	3,376	6,826	518	56	672	11,448
Grand Total	15,616	28,997	4,493	466	4,406	53,978

8.8. Mobile Data Collection, Messaging, and Reporting

In 2017, AIRS Mozambique implemented mobile phone data collection, messaging, reporting, and supervision tools using the Open Data Kit (ODK) and CommCare platforms. We implemented these tools in conjunction with the AIRS subcontractor, Dimagi LLC. The mHealth tools were:

- Bulk SMS Short Message Service (SMS) job aids;
- Performance Monitoring Tracker (PMT); and
- Mobile-based supervisory forms.

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

8.8.1. Bulk SMS Job Aids

Bulk SMS job aids remind spray teams and supervisors of standard operating protocols and key environmental compliance issues. They also reinforce the need to create a work environment without discrimination against individuals based on their gender, religion, or ethnicity. Through the bulk SMS job aids, 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 biggest challenge in 2017 was delayed arrival of messages due to slow network connectivity around some operations sites, compounded by the sending of many messages simultaneously from one central phone. To mitigate this, AIRS Mozambique also used the *WhatsApp* application to communicate directly with district coordinators when immediate action was required. Communication via *WhatsApp* also enabled the AIRS team to provide technical support to users of the CommCare application and smartphones.

8.8.2. PMT

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

- Number of structures found
- Number of structures sprayed

- Number of insecticide bottles used
- Number of SOPs who worked that day

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

8.8.3. Mobile-Based Supervisory Forms

AIRS Mozambique continued to implement the mobile-based supervisory applications rolled out in 2016. The supervisory tools were on two different platforms: ODK and CommCare. 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) AIRS uses while 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 used Android-based smartphones. The project used the tools before, during, and after the spray campaign. The supervisors (AIRS team and government stakeholders) used the mobile-based systems to supervise all aspects of spray operations.

Each day, after supervisors submitted data to a cloud server, an email was sent to specific recipients including the COP, operations manager, ECO, M&E manager, database manager, and communications coordinator. All persons or staff who used the mobile supervision and reporting systems received training during the ToT. The Dimagi representative responsible for the AIRS Mozambique team 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.

9. Challenges

9.1. Homeowner Refusals/Closed Structures

Spray coverage was low in some areas due to lack of access to some eligible structures because they were closed or the owners refused to open their homes. The number of and reasons for non-spray are in Table 21. Historically, refusals have been attributed to ineffective community mobilization. In 2017 AIRS Mozambique made some changes in the mobilization strategy to improve spray coverage yet, there were still cases of refusal in some areas.

The challenges in Mopeia and Derre highlight the extra effort needed in community mobilization to increase coverage.

In Mopeia, spray coverage was less than the recommended 85% from the beginning of the spray campaign. The main reason for the low spray coverage was refusal and locked structures. The primary reason for the refusals was the lack of LLINs from a prior unrelated bed net campaign. AIRS Mozambique worked with the SDSMAS to distribute some LLINs along with engaging community-level leadership to reduce refusals and improve spray coverage. In the end, some households that had initially refused to spray gave access for spraying upon receipt of LLINs. Mopeia ended the spray campaign with spray coverage of more than 85%.

In Derre, refusal rates were as high as in Mopeia. Unlike Mopeia, it was not clear what the causes of the refusals were since the majority of the households gave no reasons at all. We have provided anecdotal observations based on the blood suckers myth (see section 9.5). AIRS engaged SDSMAS, community, and political party leadership, but there was no significant improvement. By the end of the spray campaign, the spray coverage for Derre remained at 75%.

Solution: During the end of spray meeting, AIRS Mozambique discussed the low spray coverage in Derre. It was resolved that AIRS should reach out to the district to discuss further. In addition, under VectorLink, Abt plans to work with PSI, its social and behavior change partner, to investigate the

strategies.

9.2. Non-recording of Unsprayed Structures

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

Solution: In the daily morning assemblies, operations site supervisor reminded TLs and BSs to track the practice in the field and ensure that SOPs registered all eligible structures reached (sprayed or unsprayed). Though the extension period of the spray campaign was to improve spray coverage, it also was an opportunity to revisit some communities to ensure registration of all eligible structures. In the future, SOPs will receive training on how to proceed and issue a unique structure code for structures where the owners refuse IRS or refuse to allow any mark/ sticker on their house. SOPs also will receive additional data collection forms to ensure that they have enough space to record all eligible structures that they encounter.

9.3. Data Integrity

Field supervision and DCV revealed SOPs forging spray data. AIRS reported a single incident of data falsification this year. This data falsification is related to Incident Report 2017-003.

Solution: The project terminated the SOPs involved on the spot without pay. Increased field supervision and DCV continued.

9.4. Insecticide Theft and Waste

The project caught some seasonal workers (especially SOPs) attempting to steal insecticide by emptying the insecticide into other domestic containers or wasting insecticide by attempting to dump it into ant hills. AIRS reported the two incidents (IR 20017-003 and 2017-005) during this campaign.

Solution: The project terminated the contracts of the individuals involved on the spot without pay and reported them to the police for further investigation and action. In each case, we retrieved insecticides in the plastic bottles or contaminated soil and sent them back to the operations site for proper disposal.

9.5. Myth of Blood Suckers

A few weeks before the start of the house to house mobilization activity, there was a large number of reports across all districts that blood suckers were going around and sucking people's blood. Misinformation was circulating that houses would be registered and marks put on them, which would make the houses a target for the blood suckers. This greatly affected the D2D mobilization process and spray activities in districts where the majority of households removed household stickers from their doors and erased marks that suggested links to any form of mobilization. Some mobilizers worked in fear as there were unsubstantiated reports of people being lynched.

Solution: The project discussed this issue with the PDH, SDSMASs and community leaders. The SDSMASs launched a campaign in their districts to address the issue and assure households that blood suckers are just a myth. The myth calmed down by the end of the spray campaign. However, it may have contributed to low coverage in some communities.

9.6. Rains

Heavy rains affected the daily output of SOPs and contributed to locked structures. At one point, it rained for at least two to three days without break.

Solution: The spray campaign was extended between two to five days based on the level of outstanding work.

9.7. Poor Community Mobilization

Some mobilizers either did not mobilize or partially mobilized their communities two days ahead of the arrival of the spray teams as planned. There were also times that the spray teams did not meet the community mobilizer upon arrival in the community, making moving within the community relatively difficult. This is because some mobilizers had a poor working attitude or were engaged in other personal activities that limited their time on IRS mobilization. Also, poor mobile network and lack of mobile phones among mobilizers prevented good communication between the IEC assistants and mobilizers. Consequently, changes in the mobilization calendar due to unforeseen circumstances were not communicated in time for action.

Solution: To compensate for mobilizers who had a poor work attitude or were engaged in other activities, the project contacted community leaders and or influential persons to help with community

mobilization. For mobilizers with no mobile phone or poor mobile network, IEC assistants traveled to communities to provide mobilizers with the needed information. The project provided fuel for their motorcycles. To address poor work attitude in the future, in consultation with PDH and SDSMAS, Abt shall consider performance-based targets for mobilizers and implement ways to make mobilizers more accountable.

9.8. M&E PLANNING

Following M&E training by Dimagi, the M&E team received a clear list of to-do activities with associated timelines to ensure M&E readiness. However, in the final weeks before the campaign, the M&E team scrambled to gather and provide information to set up broadcast messages and supervisory phones, to ensure that data centers were set up and furnished, and to hire M&E assistants in a timely manner and not at the last minute before training.

Solution: Traditionally, M&E milestones are not included in the Race to the Starting line tool. In 2018, for Mozambique, The project will include key milestones to keep track of progress since M&E is an integral component of an IRS campaign.

10. RECOMMENDATIONS

Following are a few recommendations for the next spray campaign:

1. **Seasonal Worker Recruitment:**

   AIRS Mozambique should continue to lead recruitment and contracting of OSSs, BSs, M&E support functions, storekeepers, logistics assistants and IEC assistants. In addition, the project should discuss the recruitment of SOPs and community mobilizers with SDSMAS and community leaders with a focus on the challenges faced with some SOPs, especially stealing and misuse of insecticides, and improper mobilization activities by some community-based mobilizers. The list of all those involved in improper behavior should be shared with the SDSMASs to prevent reconsidering them in future spray campaigns.

2. **Community Mobilizers and Mobilization:**

   The idea of having community-based mobilizers is great. However, the recommendation is for the project to start the recruitment process early to allow time for vetting community mobilizer to ensure that they will be available to perform the required duties.

   Also, once the project obtains the list of mobilizers, it should divide the list into two groups: mobilizers reachable on mobile phones and those who are not. The divided list can help plan the movement of IEC assistants and improve communication between IEC assistants and community mobilizers.

   The two-day mobilization lead is good and should be the standard in future campaigns.

3. **Trainings: ToT and SOPs Training:**

   In 2017, the project decentralized SOPs training to operations sites. This strategy ensured effective training and mastery of the spray technique. However, it requires the dispatch of more trainers to training sites. Though the project had anticipated a need for more trainers and included some BSs, during the SOP training, the project needed additional BSs who were not part of the ToT to serve as trainers.

   The recommendation is for the project to include all BSs in the ToT. This will mean more than 120 participants at the ToT. Therefore, a second recommendation is to have the ToT in two sessions of about 60 participants each to avoid overcrowding and to ensure effectiveness and mastery of training skills.

   Another recommendation is dedication of a full day to training on the use of supervisory tools with the smart phone. The M&E team should handle the general training on how to use a smart phone and its care and maintenance. But the AIRS ECO and operations manager should lead the training on the actual use of the supervisory tools.

4. **Operations site rehabilitation and relocation:**

   The project identified some operations sites such as the Mocuba Sede operations site for possible relocation during the 2017 PSECA. However, due to time constraints, those sites could not be relocated. It is recommended that the project use the post-spray period to begin the process of relocating those sites in time to ensure that these sites will be ready for future spray campaigns.

5. **Addition of key M&E milestones in the Race to Starting Line tool:**

   Unlike key activities under technical areas such as environmental compliance, operations, procurement, and logistics management, the RSL did not include most of M&E-related activities. Even though there were separate weekly meetings to address M&E related issues, the meetings were isolated and lacked rigorous follow up compared with the activities on the RSL. It is recommended to update the RSL to reflect key M&E milestones.

Annex A: International and Local Procurement

Line Items	Quantity Procured
International Procurement	
Visor with Connector	1,500
Thermometers (insecticide storage facilities)	11
Dust Masks	85,000
CFVs	1,500
Standard SOP Gloves (Long)	2,000
Washer Gloves (Arm Length)	500
Washer Aprons	300
Spare Part Kits	10
Seals	1,000
Activated Charcoal (MSP) Kgs	2000
Spare Part Kits for Hudson spray pump	30
803-311 / 100-lb. Pressure Gauge	100
154-007 / Cup Leather Only	1,000
123-950 / Polyethylene Nozzle Gasket	1,000
Local Procurement	
Printing Services	
IRS Household Stickers	573,108
SOP Data Form (Front & Back)	55,683
Team Leader/DOS Form (front and back)	11,137
IEC Assistant Form (supervision)	181
Mobilizer Form	16,118
Standard EE Forms	21,368
SOP Data Form (Front & Back) for Mopeia	2,013
Stock Cards	5,100
Stock Requisition book	84
Goods Receipt Note	125
Daily Insecticide Control Form	120
Weekly Insecticide Tracking Form	85
Ledger Books	42
Emergency and Spill Procedures Posters	400
IRS Poster (Zambezia & Nampula)	5,000
Job aid Mob training	3,000
Vehicle Identification Poster	300
Vehicle Inspection Stickers	250

Line Items	Quantity Procured
T-shirts (Zambezia & Nampula)	2000
Hats (Zambezia & Nampula)	3,500
Performance tracking Sheet (Boards)	30
Sexual Harassment Guidelines Poster	70
PPE & Other Materials	
Pregnancy Tests	1,750
First Aid Kits Contents:	
Adhesive (for gauze)	150
Aspirin	150
Antibiotic Cream	1,000
Eyewash (pomade)	150
Hydrocortisone Cream or Calamine Lotion	150
Surgical/exam gloves	150
Atropine Sulfate	150
Sterile Instant Cold Compress	100
Blood Glucose Test	150
Blood Lancets	7
Blood glucose Strips	2,000
Menstrual Hygiene (Sanitary pads)	2,000
Eye Was (ocular wash)	900
Consumables	
Powder Soap 100g (boxes)	7,500
Materials	
Megaphones	100
Flashlights	1,500
Flashlight Batteries D	16,000
PPE	
Backpack	1200
Socks	4,000
Towels	2,500
Head Shoulder Protector	2,400
Toothbrushes	1,500
Visor with Connectors (additional)	1,250
Gloves (addiional)	1420
Other Material	
Filter Cloth /Sieves	1,750
Pump Lubricant oil	46
Thermometer Batteries	60
Clipboards	750
Pens	7,500
Permanent Markers	3,495
Chalk	1,473

Line Items	Quantity Procured
Measuring Jugs 1 liter capacity	795
Plastic Sheeting 4,5 meter for SOP	153
Plastic water container with Lids (50lts)	35
Plastic basins (90 liters)	50
Plastic basins (50 liters)	90
Plastic Basins (50 liters+) PPE washing	120
Plastic bucket (100 liters)with lids	240
Plastic bucket (20-30 liters)	120
Generator	3
Fire Extinguisher	10
Warmer/ for weeding	30
Cutlass	60
Rake	50
Hoe	60
Shovel	50
Nylon rope (100 m)	100
Spray pump tools kit	90
Wheelbarrow	20
Waste plastic bags (100L)	50
Measuring Jugs 0.5 liter capacity	1,000
Masking tape (roll)	90
Mosquito Screen net	2
Mattress foam (5 or 2 inch cm thick)	20
Tarpaulin Sheeting 4x3 meter for mobile soak pit	49
Bucket for mobile soak pit (100 ltr)	27
Bucket for mobile soak pit (10 ltr)	27
Water Containers (5,000 Ltr)	2

Annex B: Data Collection & Quality Assurance Tools

Tool	Purpose	Users	Frequency Used
Mobilizer Form	Capture structures found and mobilized for spraying; population reached, acceptance of IRS	Primary: Mobilizer Secondary: IEC Assistant	Daily, during door to door mobilization, about 30 days prior to spraying, for a period of about eight days
Mobilization Supervision Form	Summarize daily performance of mobilizers, including structures found and mobilized for spraying; population reached, acceptance of IRS	Primary: IEC Assistants Secondary: IEC Supervisor from SDSMAS & AIRS District Coordinators	Daily, during door to door mobilization, about 30 days prior to spraying, for a period of up to eight days
Daily SOP Form	Capture structures found, structures sprayed, structures not sprayed, population protected, population not protected	Primary: SOPs Secondary: Team Leaders	Daily
Daily Team Leader Form	Summarize daily performance of spray team, including structures found, structures sprayed, structures not sprayed, population protected, population not protected, and bottles of insecticide received, used and returned, empty and/or full	Primary: Team leaders Secondary: Brigade Supervisors	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, Operations Manager, Database Manager, M&E Manager	Daily
DCV	Check data accuracy during randomized household visits; ensure data collected by SOPs matches information reported by households	Primary: M&E assistants, Database Coordinator, Database Manager, M&E Manager	Every 2 to 3 days during the spray campaign

ANNEX C: SPRAY CAMPAIGN SUPERVISORY TOOLS

Tool	Purpose and Person Responsible
Spray Operator Morning Mobilization and Vehicle Inspections	Purpose: To ensure spray teams leave for the day with the correctly accounted for personal protective equipment (PPE), equipment, insecticide, and supplies, and are safely transported to the spray site. Person responsible for completing this checklist: Operations Site Supervsior, Field Supervisor, ECO, and District Coordinator
End-of-Day Cleanup	*Purpose:* To ensure spray teams correctly follow environmental compliance procedures for cleaning pumps and PPE, account for insecticide stocks, and store equipment for the next day. Person responsible for completing this checklist: Operations Site Supervisor, ECO, visiting HQ staff, and District Coordinator (when visiting an operations site)
Home Owner Preparations and Spray Operator Performance	*Purpose:* To ensure that SOPs spray houses (structures) that have been correctly prepared for spraying (inside and out) and use correct spray and insecticide handling techniques. In addition, to ensure that IEC messaging has been performed and understood by the homeowner. Person responsible for completing this checklist: Field Supervisors, IEC/ Coordinator, ECO, Operations Manager, and District Coordinator (when visiting the field for supervision)
Storekeeper Performance	*Purpose:* To ensure that Site Storekeepers are following best warehousing practices and accounting for stocks and equipment. Person responsible for completing this checklist: Operations Site Supervisor, District Coordinator, Logistics Assistant, Logistics Manager, Operations Manager, COP, and visiting HQ staff
Directly Observed Spraying	*Purpose:* To ensure proper application of insecticides by correctly aplying the spray techniques. Person responsible for completing this checklist: Brigade Supervisor, and Team Leaders

ANNEX D: POST SPRAY CAMPAIGN INVENTORY

	Initial Stock	Procured in 2017	Total Stock	Used	Damaged/ Unusable	Stock Balance
Insecticide (Actellic CS) Bottles	21,296	326,688	347,984	288,036	0	59,948
Insecticide (*Deltamethrin*) Pali Sachets[10]	71,246	0	71,246	106	0	71,140
Permanent Markers	1,152	3,555	4,707	1,527	0	3,180
Adhesive tape	0	90	90	69	0	21
Calculators	242	95	337	337	292	45
Clipboards	928	750	1,678	1,405	1,405	273
First Aid Kit boxes	157	0	157	126	0	157
Pregnancy tests	72	1,750	1,822	1,303	1,303	519
Blood sugar measuring machine (glycaemia machine)	7	7	14	7	9	5
Blood sugar measuring strips	0	2,000	2,000	1,250	1,250	750
Blood pricking lancets for blood sugar	270	2,000	2,270	1,246	1,246	1,024
Powder Detergent soap (150g, 250g)	2,520	7,500	10,020	7,140	7,140	2,880
Bar soap	27,620	0	27,620	7,013	7,013	20,607
Megaphones (using battery size D)	86	100	186	69	100	86
Megaphones (Using battery size C)	6	0	6	0	0	6
Batteries for Megaphones size C	2,006	0	2,006	0	0	2,006
Batteries for megaphones and Flashlights size D	72	18,500	18,572	16,526	16,526	2,046

[10] AIRS plans to incinerate the sachets once an incinerator which meets environmental requirements is available. We are waiting to hear from Nampula General Hospital.

	Initial Stock	Procured in 2017	Total Stock	Used	Damaged/ Unusable	Stock Balance
Batteries for thermometer size AAA	0	60	60	60	60	0
Wall Thermometer	31	23	54	42	34	20
Flashlights	5	2,000	2,005	1,747	1,747	258
Metal Strainers (large)	122	1,041	1,163	1,163	831	332
Small towels for Pump cleaning/SOPs	658	2,500	3,158	1,328	1,328	1,830
Gum Boots (pairs)	2,040	0	2,040	1759	281	1,759
SOP Uniform 2-piece	2,951	0	2,951	2,951	1,131	1,820
SOP Uniform 2-piece (Shirts only)	70	0	70	0	0	70
SOP Uniform 1 piece	1,127	0	1,127	295	249	878
Head/Shoulder Protector	1,171	1,000	2,171	2171	839	1,332
Socks for spray operators	2,349	4,000	6,349	4,336	4,336	2,013
Team Leader Lime green Vests	439	0	439	183	45	394
Base Supervisor red/deep orange vests	126	0	126	98	5	121
Nose and mouth Masks	6,738	85,080	91,818	70,218	70,218	21,600
Rubber Gloves (Spray operator Nitrile)	0	4,516	4,516	3,633	3,633	883
Rubber Gloves (long) for washing	35	504	539	196	196	343
SOP Bags simple beige color	892	0	892	406	406	486
SOP carrier bag (school back pack)	854	1,200	2,054	1,954	1,954	100
SOP carrier bag (Actellic/Syngenta)	363	0	363	363	363	0
Bracket Metal	1,277	0	1,277	1277	272	1,005
Bracket Plastic	1,606	1,230	2,836	1,889	1,839	997
Face shields	80	2,730	2,810	2,616	2,285	525
Helmets	1,736	0	1,736	1,736	0	1,736

	Initial Stock	Procured in 2017	Total Stock	Used	Damaged/ Unusable	Stock Balance
Washer Aprons	74	320	394	134	134	260
T shirts- Mobilizer	19	3,494	3,513	2,831	2,831	682
Mobilizer hat	30	3,500	3,530	2,839	2,839	691
Grass/Weed Cutter (handheld)	16	30	46	32	12	34
Machetes	14	40	54	40	14	40
Rakes	7	35	42	30	12	30
Hoes	11	35	46	30	14	32
Shovel	32	35	67	34	3	64
Rope 100m	1	75	76	76	76	0
Pipe Wrenches/ plastic gardening hose	6	0	6	5	5	1
Screwdriver (Flat)	16	17	33	33	0	33
Screwdriver (star)	10	37	47	30	0	47
Hammers	17	10	27	27	8	19
Pliers	17	17	34	20	14	20
Brushes (size 10/11)	25	17	42	42	17	25
10L Hudson Spray Pumps (in good condition)	1,382	0	1,382	1,229	89	1,293
10L iK New Spray Pumps (Plastics)	0	10	10	10	0	10
10L Hudson Spray Pumps (requiring spare parts)	395	0	395	0	0	395
10L Hudson spray pumps 10L for welding of parts	359	0	359	0	0	359
10L Hudson spray pumps; to be discarded	362	0	362	0	0	362
8L Hudson Spray Pumps missing parts	627	0	627	0	0	627
Unopened kits for pump spares	0	30	30	3	3	27
Tool boxes (simple for sprayers)	10	0	10	10	10	0

	Initial Stock	Procured in 2017	Total Stock	Used	Damaged/ Unusable	Stock Balance
Lubricating oil	8	42	50	47	50	0
Spray pump Manometers	0	100	100	0	0	100
Spray pump filters	1,600	0	1,600	400	400	1,200
Plastic Nozzle washers	1,685	0	1,685	1229	1229	456
Cup leather (Hudson pump)	903	1,000	1,903	1,063	1,063	840
Clamp machine	3	0	3	0	0	3
8002E Spray Pump Nozzle (metallic)	3,641	0	3,641	1229	1229	2,412
8001 Spray Pump Nozzle (metallic)	500	0	500	0	0	500
8002E Spray Pump plastic Nozzle (enamel)	1,445	0	1,445	0	0	1,445
CFV	1,383	1,500	2,883	1,960	0	2,883
Tooth Brushes	335	1,500	1,835	1,174	1,174	661
Water jugs 1 L (progressive rinse)	184	0	184	80	80	104
Metal buckets 15 L	123	0	123	123	21	102
Plastic Buckets 80 L	181	256	437	437	75	362
Plastic Buckets 50 L	13	120	133	133	36	97
Plastic basins 20 L	165	0	165	165	128	37
Plastic basins 50 L	42	220	262	262	69	193
Plastic basins 80 Liters / 100 L	85	125	210	210	79	131
Plastic Buckets 20 L	133	15	148	148	53	95
Plastic waste buckets	5	42	47	47	0	47
Staplers	32	62	94	94	67	27
Pencil sharpener	392	0	392	0	0	392
Pencils	55	0	55	55	55	0

	Initial Stock	Procured in 2017	Total Stock	Used	Damaged/ Unusable	Stock Balance
Paper puncher	58	55	113	113	113	0
Scissors	0	20	20	20	20	0
School chalk (pieces)	1,000	30,480	31,480	21,480	21,480	10,000
Blue pens	110	11,379	11,489	9,239	9,239	2,250
Sleeping bags	103	0	103	7	7	96
Cushions (for data centre chairs)	35	65	100	100	79	21
Wheel barrow	19	20	39	36	4	35
Binder files	74	471	545	435	435	110
Padlocks	0	21	21	21	21	0
Rubbish bags	0	50	50	46	46	4
Plastic rolls	0	103	103	103	103	0
Stock control Forms (A4)	130	5,100	5,230	2,966	2,966	2,264
Stock control Forms (A5)	64	0	64	64	64	0
Note books	382	2,400	2,782	2,782	2,782	0
Plastic paper files/folders	444	2,400	2,844	2,394	2,394	450
Flips Charts	40	0	40	10	10	30
Generator	4	3	7	2	0	7
Fire Extinguishers (1kg)	2	0	2	2	0	2
Fire extinguishers (2kg)	20	0	20	20	0	20
Fire extinguishers (2.5kg)	13	0	13	13	0	13
Fire extinguishers (4kg)	1	0	1	1	0	1
Fire extinguishers (4.5kg)	0	10	10	10	0	10
Fire extinguishers (6kg)	11	0	11	11	0	11

	Initial Stock	Procured in 2017	Total Stock	Used	Damaged/ Unusable	Stock Balance
Fire extinguishers (10kg)	0	10	10	10	0	10
Large towels	9	0	9	0	0	9
Activated charcoal (Kg)	2	154	156	24	24	132
Storekeeper pocket guide	113	153	266	70	70	196
Team leader guide	73	30	103	66	66	37
Spray operator pocket manual	1,100	0	1,100	0	0	1,100
Request book	0	84	84	39	39	45
Paper tray	5	0	5	0	0	5
Ledger book size A3	25	42	67	66	67	0
Danger warning signs	72	0	72	72	21	51
No Eating warning signs	22	50	72	72	8	64
No Smoking warning signs	27	50	77	77	8	69
Other danger warning signs	29	50	79	79	14	65
Spill response procedures	7	400	407	227	227	180
Wooden chairs	5	0	5	3	3	2
Wooden tables	3	0	3	2	2	1
Plastic tanks (1500 L)	12	4	16	16	3	13
Plastic tanks (2000 L)	1	0	1	1	1	0
Plastic tanks (2500 L)	1	0	1	1	1	0
Plastic tanks (50 L)	0	4	4	4	2	2
Plastic tank (200 L)	2	0	2	2	0	2
Plastic tanks (5000 L)	0	2	2	2	2	0
Mosquito net (window mesh)- rolls	2	1	3	3	3	0

	Initial Stock	Procured in 2017	Total Stock	Used	Damaged/ Unusable	Stock Balance
Insecticide control books	22	121	143	92	114	29
Jars 1 L	606	795	1,401	238	238	1,163
Jars 500 Mil	0	256	256	256	0	256
Spray Operators measuring cup (500ml)	651	1,006	1,657	1657	687	970
Measuring tape	2	7	9	7	0	9
Timing clock	4	28	32	32	11	21
Disposable Cooler boxes	29	0	29	18	18	11
Fumigation Pumps (Provincial Directorate of Health property)	6	0	6	0	0	6

Annex E: Environmental Mitigation and Monitoring Report (EMMR)

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
1a. Pre-contract inspection and certification of vehicles used for pesticide or spray team transport.	AIRS ECO and Logistics Coordinator inspected 84 trucks for SOP transportations	Not all SOP transportation vehicles had the required safety requirements at the start of the spray campaign. To ensure that all vehicles were properly equipped, AIRS made arrangement to retrofit the vehicles within a specified period. All SOP transport vehicles were retrofitted by November 8, 2017	
1b. Driver training	93 drivers trained; 2 female and 91males were trained on safety issues while transporting seasonal personnel, and insecticide.	No issues identified during the inspections	
1c. 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 operations sites. During the inspections were encouted 429 compliances and 8 non compliances.		We are planning to set aside time to walk through and familiarise BS and OSS with the use of the cell phone and content of each form to reduce the number of erroroneous red flags
1d. Initial and 30-day pregnancy testing for female candidates for jobs with potential pesticide contact.	All Females seasonal diagnosed as pregnant assigned to roles of mobilizers. The first round of pregnancy test was prior to training in all seven districts on September 30. The second round was November 18 respectively.	No issues identified during the inspections	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
1e. Health fitness testing for all operators	All districts comply with requirements by submitting all seasonal workers to medical check up	No issues identifyed durig the inspections	
1f. Procurement of, distribution to, and training on the use of PPE for all workers with potential pesticide contact.	All districts received enough PPE to ensure all worker have at least two pairs of PPE. Dress rehearsal was conducted during training for seasonal workers to try their PPE to ensure proper fitting. 8 non compliances were found from 420 inspections	Noncompliance was related to non working flashlights	
1g. Training on mixing pesticides and the proper use and maintenance of spray pumps.	SOPs were trained on mixing insecticides before spraying. There were 8,537 inspections and 41 red flags.	There were several red flags reporting leaking pumps. On investigations, it was found that the problem was that SOPs did not always close the spray pump correctly prior to pressurization. Reinforcing mixing techniques and proper handling of the pumps during training and operations, will be priority for next spray round to reduce the number of red flags.	
1h. 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 488 inspections; all compliant		
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. Also in places using MSP were prvided barrels for progressive rinsing a end of day clean-up	Each of the operations sites contained the required seven water barrels for progressive rinsing	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
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 had not received the information ahead of time. There were 11 red flags from 8,567 inspections. Red flags reflect homeowner not being informed by SOP. The supervisor should remind the SOPs to provide homeownders with necessary information.		ECO issued daily reminders to the AIRS team to reinforce all red flags found during supervision and/or inspection; issues were addressed during morning mobilizations and re-emphasized as part of supervision. Continued emphasis in supportive supervision by the BS and TL to SOPs in the field.
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 42 red flags identified out of 8,368 inspections.	During the inspections, it was found that some houses not well prepared prior spraying. In such cases SOPs were stopped from starting or continuing to spray, and instructed to prepare the house accordingly.	Safety of homeowners is very important and is a top priority during and post spraying
2c. Two-hour exclusion from house after spraying	All homeholders were instructed to stay out of the house for two hours after house was sprayed. All homeholders were instructed to open and air their homes for 30 minutes before entering. There were 8,567 inspections and 11 non compliances regarding homeowners claiming the SOP had not informed them. In these cases, supervisors instructed the residents immediately. Also SOP was reminded in time the importance to give safety procedures to the family		Morning mobilization was used to emphasize and remind spray teams about the importance of safety procedures to the family. Also, TL and BS was instructed to provide support to SOPs in providing this information to homeowners.

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. 36 flags identified fron 8,542 inspections. Some SOPs were not providing the accurate information to homeowners. In these cases, supervisors conducting supervision visits and/or inspection and instructed the homeowner accordingly. 36 red flags were found within 8,542 inspections.		Morning mobilization was used to emphasize and remind spray teams about the importance of safety procedures to the family. Also TL leaders and BS were instruted to provide support to SOPs
3a. Indoor spraying only	Spraying was conducted inside the structure, and eaves only. There were 37 red flags recorded out of the 8,541 inspections.		Morning mobilization was used to remind SOPs, TLs and BSs of eligible surfaces.
3b. Training on proper spray technique	Spray techniques were included in SOP and all supervsors training; however, some SOPs were not following accurate spray techniques, resulting in 34 red flags from 8,544 inspections regarding spraying speed and wall coverage		Some SOPs were either too fast or slow compared to the standard speed for spraying a 2 meter wall. These SOPs were offered on the spot refresher on the spray techniques. and proper spray pump pressurazation by brigade sepervisors, team leaders and other supervsors as avaialble.
3c. Maintenance of pumps	Pump repairs and calibration was done before spray campaign, and during the operations. Spray pump technicians handled all issues at the field level. Out of 8,178 inspections, 400 red flags regarding pumps leaking were identified	There was confusion about pump leaks. Pump leaks were observered and reported when the pump was not closed properly during pressurization	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
4a. Choose sites for disposal of liquid wastes, including mobile soak pit sites, according to PMI BMPs.	All contaminated liquid wastes were disposed in the fixed soak pits and MSPs. There were 400 inspections and no non compliance reported One operations site, Mocuba Sede, is located within the town, close to residence area. Mocuba Sede site will be reviewed and reconsidered with PMI in the offseason to relocate the site and stop spraying within this urban area.		
4b. Construct fixed and mobile soak pits with charcoal to adsorb pesticide from rinse water	AIRS ECO constructed 35 MPS as well as supervised building of 7 fixed soakpits and rehabilitation of 4 fixed soak pits in in coordination with the relevant district environmental officials		
4c. Maintain soak pits as necessary during season	Cleaning of soak pits was required of four operations sites during the spray campaign, namely Nante and Maganja sede, Chire and Mopeia sede	Soakpit was not absorbent of all efluentes adequately	
4d. Inspection and certification of solid waste disposal sites before spray campaign	Inspection and certification conducted by AIRS ECO and MITADER.	No issues identified	
4e. Monitoring waste storage and management during campaign	All wastes from the operations site stores were properly stored in district stores prior to transporting to the provincial level, and ultimately to the central warehouse for disposal post campaign. There were 142 inspections and 1 red flag regarding storage of contaminated and non contaminated waste in same place.		
4f. Monitoring disposal procedures post-campaign	The AIRS ECO will conduct and supervise all IRS waste to disposal.		

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
5a. Maintain records of all pesticide receipts, issuance, and return of empty bottles	Proper stock records were maintained and checked. There were 143 inspections and 0 red flags		
5b. Reconciliation of number of houses sprayed vs. number of bottles used	381,463 structures sprayed; 205,223 bottles used		
5c. Visual examination of houses sprayed to confirm pesticide application	Supervisors examined houses sprayed to ensure SOPs sprayed according to the established spray techniques. Team Leaders reported a total of 5,978 DOS inspections. 773 (13%) inspections raised red flags. DOS showed that about 23% of the 773 red flags were incomplete use of PPE and leaking. On further investigation, there was no leaking. Rather, CFVs were clogged.		Team Leaders were retrained to identify different types of issues that would affect pesticide application and to report them correctly.

Annex F: Solid Waste Management Plan

Category	Quantity	Procedure	Completion Date
Actellic CS Bottles	205,223 Actellic empty bottles	Empty bottles were triple rinsed at time of insecticide mix. Empty bottles are kept at the operations site stores in their original boxes, inventoried and picked up weekly and transported to the district level stores for consolidation. The bottles are transported to the Central Warehouse for final counting, and prepared for recycling. To ensure that there is no insecticide residue, bottles go through a final wash with liquid soap, label removal and are cut into half vertically. (vertifically). 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, Triple Rinsing Buckets, chairs, jugs and MSPs buckets.	March 27, 2018
Cardboard Boxes	15,328	Empty contaminated insecticide cardboard boxes of Actellic CS were incinerated at Ceramica Okanga located in Nicoadala District.	Completed
Rubber Gloves	3,829	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.	Completed
Gum Boots	281	Damaged but usable boots are thoroughly washed with water and soap and will be donated to SOPs as appropriate with the appropriate warning that the boots cannot be used in chemical environments. AIRS Mozambique is still 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.	March 27, 2018
Dust Masks	70,218	Dust masks are used once only in accordance with established standards for IRS. Used masks are kept in containers in the insecticide storage room at the operations sites, transported to the district level where they are consolidated and transported to the central warehousefor final counting, and subsequently incinerated.	Completed

Category	Quantity	Procedure	Completion Date
2-piece Uniform, SOP bags, clipboards,socks and towels		Damaged and unusable overalls and towels were washed and incinerated as SOP haversacks and clipboards are also incenerated. 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 contamined.	Completed
Charcoal & Saw Dust	160kg	Based on pre-spray assessment of all operations sites in the 7districts, 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 operations sites and designated as Solid Waste. Later, the waste was transported to the central warehouse, and sent for incineration.	Completed
Insecticide (Actellic) Contaminated soil (2016)	70kg	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.	Completed
Insecticide (Actellic) poured into domestic bottles	9.5 bottles	Actellic (equivalent to 9 bottles reported in Incident # 3 and 0.5 bottles reported in Incident #5) was poured into domestic containers. 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
Damaged and unusable visors and toothbrushes		Washed and cut into pieces before disposal in landfill. sent to Cerramic Okang Landfill, District of Quelimane.	Completed
Used MSPs	32	MSPs were all transported to the central warehouse; MSP will be tested, within 3 to 6 months post use.	

Annex G: Monitoring and Evaluation Indicator Matrix

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggre-gate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
Component 1: Establish Cost-Effective Supply Chain Mechanisms and Execute Logistical Plans								
1.1 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	Data source: Project records – insecticide procurements Reporting frequency: Each spray campaign	By Spray Campaign	1; 100%	1	n/a	n/a	0n/a	n/a
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	Data source: Project records – international procurements Reporting frequency: Each spray campaign	By Spray Campaign	1; 100%	1	n/a[11]	n/a	n/a	n/a

[11] GF procured insecticide was delivered in Quelimane 2 weeks prior to the onset of the 2016 spray campaign

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggre-gate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
1.1.3 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	Data source: Project records Reporting frequency: Each spray campaign	By Spray Campaign	1; 100%	2	1; 100%	0[12]	1;100%	1: 100%
1.1.4 Number and percentage of local procurements for PPE delivered 14 days before the start of spray operations	Data source: Project records Reporting frequency: Each spray campaign	By Spray Campaign	1; 100%	2	1; 100%	0[13]	1;100%	1; 100% Completed
1.1.5 Successfully completed spray operations without an insecticide stock-out	Data source: Project records Reporting frequency: Each spray campaign	Completed	1; 100%	Completed	1; 100%	Completed	Completed	Completed
1.1.6 Complete exemption and clearance process within the minimum 2 weeks	Data source: Project records Reporting frequency: Each spray campaign	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	Completed
1.2 In-country logistics, warehousing, and training								
1.2.1 Number and percentage of logistics and warehouse managers trained in IRS supply chain management	Data source: Training records Reporting frequency: 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	35 30 Men 5 Women	27 21 Men 6 Women 22% Women

[12] International procurement was not delivered at least 30 days prior to the onset of the spray campaign, due to delays in procurement and delivery
[13] Some of the PPE and other materials were delivered the week prior to the onset of spraying and during the first week.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggre-gate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
1.2.2 Number and percentage of base stores where physical inventories are verified by up-to-date stock records	Data source: Project records Reporting frequency: Each spray campaign	By Spray Campaign	21; 100%	23; 100%[14]	25; 100%	25;100%	30: 100%	30; 100%
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	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	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[15]	5%	6.5%	5%	5%

[14] 2015/16 Approved work plan included rehabilitation of the 21 operations sites; two new sites were built (one in Quelimane and one in Molumbo)
[15] Given the additional costs incurred due to the campaign's interruption, cost reduction was not measured.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggre-gate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
2.2 Support of safety and health best practices and compliance with United States Agency for International Development 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	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[16] 1,281 Men, 605 Women	1,769 1,150 Men 619 Women	2,545 1,766 Men 779 Women	1,769 1,000 Men 719 Women	1,723 1219 Men 504 Women
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;[17] 3%	30 26 Men 1 Women 3%	23 21 Men 2 Women; 9%
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	0	0

[16] This number includes ToT training, SOP training, storekeepers, Washers, and EC training.
[17] HFs have fewer female health technicians on staff

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggre-gate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
2.2.5 Number and percentage of soak pits and storehouses inspected and approved prior to spraying	Data source: Project records – Reports submitted by district environmental officers Reporting frequency: Each spray season	By Spray Campaign By Soak Pit By Storehouse	21 23	23; 100%[18] 23; 100%	25 25	44 Soak pits (25 fixed and 19 mobile) 27 Storehouses (1 central; 7 district; 19 Sites)	30 Fixed 20 MSP 30 Storehouses & 1 Central Warehouse	60 Soak Pits (30 fixed and 30 mobile) 33 Storehouse (1 Central; 7 districts; 25 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	1500	4500 radio spots 125 Debates 125 radio talk shows interview shared
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[19] 200 Posters 27 Banners 750 T-shirts 600 Hats	1 IEC Community Guide (5,000 copies) 500 Posters 4 Roll Ups 2000 T-shirts 2000 Caps 35 Banners	250 Religious Leader Guide produced; 118 IEC Assistant Sup Forms 3000 Job aids

[18] Approved work plan included rehabilitation of the 21 operations sites; two new sites were built (1 in Quelimane and 1 in Molumbo)
[19] 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	Disaggre-gate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
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	1,953,162	611,049
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	440,063	435,395
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	374,054	381,463
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%	85%	88%

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggre-gate	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 Reporting frequency: Daily per spray campaign	By Spray Campaign	2,177,912	1,631,058	1,910,109[20]	1,929,654	1,953,162	1,711,158
		By Gender		810,659 Men, 820,399 Women		962,879 Men 966,775 Women		844,527 Men 866,527 Women
		By pregnant women		105,400 Pregnant Women		115,639 Pregnant Women		103,302 Pregnant Women
		By children <5 years old		287,813 Children <5		284,468 Children <5		253,962 Children under 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	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	N/A	N/A

[20] Population residing in structures found by SOPs in 2015.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggre-gate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
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	10 3 EC 5 Spray Operations 2 M&E	10 3 EC, 5 Spray Operations, 2 M&E
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%	1 Entomology	0
4.3 Number of best practice presentations given at national/regional/ international workshops and conferences	Data source: Project records – activity reports Reporting frequency: Semi-annually	By Spray Campaign By IRS Technical Area	0	0	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	2	2[21]

[21] Incala & Topack

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggre-gate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
Component 5: Contribute to the Collection and Analysis of Routine Entomological and Epidemiological Data								
5.1 Support entomological monitoring activities and insecticide resistance strategies								
5.1.1 Number of entomological sentinel sites supported by the PMI AIRS Project established to monitor vector bionomics and behavior (vector species, distribution, seasonality, feeding time, and location)	Data source: Entomological reports Reporting frequency: Annually	By Spray Campaign	4	4	4	5	9	9
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%	9; 100% 6 Zambezia 3 Nampula	9; 100% 6 Zambezia 3 Nampula –
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[22]	9; 100% 6 Zambezia 3 Nampula	6; 67%[23]
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%	11; 100% 8 Zambezia 3 Nampula	10; 91%[24]

[22] Secondary PMI indicator testing conducted in Milange, Mocuba, Morrumbala and Maganja da Costa using CDC light trap samples
[23] Due to inordinate delays at WITS, with PMI concurrence, we have sent samples to Walter Reed in the US for analysis.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggre-gate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
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[25]	45 35 Zambezia 10 Nampula	50; 100%
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	295 175 Zambezia 120 Nampula	80; 27% in progress
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[26]; (3 sites, two of them tested for all four classes and two repetitions)	18 (3 sites, each testing all 4 classes of insecticide)	27 (3 sites each testing 6 insecticides using WHO methodology and 9 bottle assay testing)	50 25 each Zambezia Nampula (5 pirimiphos-methyl; 5 permethrin, 5 DDT; 5 bendiocarb, and 5 alpha-cyper-methrin)	52; (7 sites, all in Zambezia, for alphacyper-methrin, permethrin, lambda-cyhalothrin, pirimiphos-methyl, DDT, bendiocarb

[24] Conducted IR testing in September 2016 in 3 districts (Maganja da Costa, Derre and Molumbo), remaining districts (5) will be conducted in January and February 2017, in Mopeia, Larvae collection was unsuccessful because the potential breeding areas were crocodile infested and the potential breeding are associated with crocodile occurrence.

[25] 30 tests conducted in 30 houses in 5 targeted districts; in Mopeia it was conducted in 2 different villages

[26] 17 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	Disaggre-gate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
5.2 Support epidemiological malaria data collection and analysis								
5.2.1 Collect routine epidemiological data	Data source: Project Reports Reporting Frequency: Annually	By Spray Campaign	Completed	Completed	N/A	N/A	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	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	1,408	1,746	1,769	2,457	1,838	1,697[27]
		By Gender	563 women	1,239 Men, 507 Women;	1,150 Men 619 Women	1,705 Men 752 Women	1,286 Men 552 Women	1,241 Men 456 Women
		Percentage of Women Trained	40%	29%		31%	30%	27%

[27] 1697 people trained are made up of ToT(MoH 29, AIRS 7, Site Supervisors 26, Brigade Supervisors 28), Spray operation training (MoH 67, SOPs 1,517) and poison management for health clinicians 23

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggre-gate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
6.1.2 Total number of people trained to support IRS in target districts	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign	1,774	2,117	2,087	2,504	1,882	4,328
		By Gender	710 women	1,494 Men, 623 Women;	1,357 Men 730 women	1,748 Men 756 Women	1,280 Men 602 Women	3,359 Men 969 Women
		Percentage of women trained	40%	29%	35%	30%	32%	22%
6.1.3 Number of women recruited for IRS employment	Data source: Project records – Recruitment reports Reporting frequency: Semi-annually	By Country	33%	627 or 35%	750 or 45%	880 or 37%	630	943
		By Percentage of women recruited					37%	26%
6.1.4 Number of people trained as IRS ToT	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign	34	41	64	60	114	90
		By Gender	29 men 5 women	32 Men 9 Women	49 men; 15 Women	52 Men 8 Women	95 men 19 Women	82 Men 8 Women
		Percentage of women trained	15%	22%	23%	13%	17%	9%
6.1.5 Total number of people hired to support IRS in target districts	Data source: Project records – Contracts signed Reporting frequency: Semi-annually	By Spray Campaign	1,419	1,772	1,548	2,457	1,705	3,705
		Gender	568 women	1,145 Men, 627 Women;	929 Men 619 Women	1,677 Men 760 Women	1,075 Men 630 Women	2,762 Men 943 Women
		Percentage of women hired	40%	35%	40%	31%	37%	26%

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggre-gate	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: Semi-annually	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	325 234 Men 91 Women 28%	346 244 Men 102 Women 29%
6.1.7 Number of staff (permanent and seasonal) who have completed gender awareness training	Data source: Project records – Training reports Reporting frequency: Semi-annually	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 1,918 Men 911 Women 32% Women	1,789 1,163 Men 626 Women or 35%	1,898 1,368 Men 530 Women or 28%
6.2 Capacity building								
6.2.1 Number of government officials trained in IRS oversight	Data source: Project records – Training reports Reporting frequency: Semi-annually	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	80 65 Men 15 Women 19 % Women	82 82 Men 24 Women 26% Women
6.2. Implement all activities outlined in their yearly Capacity Building Action Plan	Data source: Project records – Capacity assessment reports Reporting frequency: Semi-annually	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	Completed

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggre-gate	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	SDSMASs handled all seasonal personnel recruitment; and community mobilization [28]	Completed	Completed	Completed	Completed[29]

[28] SDSMASs led seasonal personnel recruitment in collaboration with community leaders in the seven districts; community mobilization was conducted by the PDH and the SDSMASs.

[29] SDSMASs led seasonal personnel recruitment in collaboration with community leaders in the seven districts; community mobilization was conducted by the PDH and the SDSMASs.