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Indoor Residual Spraying (IRS 2) Task Order Six

ZIMBABWE
END OF SPRAY REPORT
2016

SPRAY CAMPAIGN:
OCTOBER 24 – DECEMBER 21, 2016

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ACRONYMS

AIRS	Africa Indoor Residual Spraying
BMP	PMI's Best Management Practices Manual
CDC	U.S. Centers for Disease Control and Prevention
COP	Chief of Party
CS	Capsule Suspension
DDMS	Disease Data Management System
DEHO	District Environmental Health Officer
DHIS2	District Health Information System 2
EC	Environmental Compliance
ECO	Environmental Compliance Officer
ECA	Environmental Compliance Assistant
EHT	Environmental Health Technician
HLC	Human Landing Catch
IRS	Indoor Residual Spraying
ITN	Insecticide-treated Net
MOHCC	Ministry of Health and Child Care
M&E	Monitoring and Evaluation
NIHR	National Institute for Health Research
NMCP	National Malaria Control Program
OP	Organophosphate
PEHO	Provincial Environmental Health Officer
PFO	Provincial Field Officer
PMD	Provincial Medical Director
PMI	President's Malaria Initiative
PPE	Personal Protective Equipment
PSECA	Pre-Spray Environmental Compliance Assessment
SBCC	Social and Behavior Change Communication
SOP	Spray Operator
TOT	Training of Trainers
USAID	United States Agency for International Development
ZAPIM	Zimbabwe Assistance Program in Malaria

EXECUTIVE SUMMARY

The President’s Malaria Initiative (PMI) has supported indoor residual spraying (IRS) in Zimbabwe since August 2011. Abt Associates first implemented the PMI-supported IRS through the three-year Africa Indoor Residual Spraying project (AIRS), IRS 2 Task Order 4, and now is doing so through another three-year task order, the PMI AIRS project (or “the project”) launched in October 2014 as IRS 2 Task Order 6. Both projects are funded by the United States Agency for International Development (USAID) with technical assistance from USAID and the U.S. Centers for Disease Control and Prevention (CDC).

The major focus of the AIRS Zimbabwe program under Task Order 6 is to continue to implement safe and effective IRS, improve the environmental compliance (EC) and safety of the country’s own IRS operations, and conduct and build capacity in entomological surveillance.

In 2016, the PMI AIRS project in Zimbabwe continued working with provincial and district health officials in Manicaland province to lead, implement, and manage the IRS campaign in the same four districts. Following the adoption of the blanket spraying approach, additional wards, not sprayed in 2015, were added in Chimanimani, Mutare, and Nyanga districts; a few villages in Mutasa district were also added. AIRS Zimbabwe also continued nationwide entomological surveillance in 20 sites and supplied entomological equipment to 17 of these sites. Additionally, the program provided assistance to various national-level IRS campaign issues when requested, including technical assistance in the development of the National Insecticide Resistance Management Plan and the development of guidelines for pre-elimination and elimination districts. The project recruited and trained seasonal staff for the spray operations before the start of the campaign; procured insecticide, personal protective equipment (PPE), and IRS equipment; made logistical arrangements; and did EC preparation and monitoring before, during, and after the IRS campaign to ensure that the standard operating procedures and protocols from the Best Management Practices (BMP) Manual were consistently adhered to. The project held stakeholder and partner planning meetings, as well as community sensitizations in order to create the necessary awareness and service demand by the beneficiaries for successful spray operations. Key results are presented in Table ES I.

TABLE ES I. 2015 AIRS ZIMBABWE AT A GLANCE

Number of districts covered by PMI-supported IRS in 2016	4 districts: Chimanimani, Mutare, Mutasa, Nyanga
Insecticide	Organophosphate (Actellic 300 CS)
Number of structures targeted by PMI-supported IRS	256,527
Number of structures found by spray operators during PMI-supported IRS spray season	240,044
Number of structures sprayed by PMI-supported IRS	229,377
Spray coverage	95.6%
Population protected by PMI-supported IRS	550,475 (including 17,325 pregnant women and 95,787 children under 5 years old)
Dates of PMI-supported IRS campaign	October 24 to December 21, 2016
Length of campaign	32 days
Number of people trained with U.S. Government funds to deliver IRS*	687 (600 men, 87 women)

*Table Based on the PMI indicator definition. It includes only spray personnel such as spray operators, team leaders, supervisors, data managers, warners, IRS coordinators, provincial/district environmental health officers, provincial field officer, logistics assistant/transport officer, washers, storekeepers, guards, pump technicians, drivers, and clinicians.

For the 2016 campaign, AIRS Zimbabwe used pirimiphos-methyl capsule suspension (CS) formulation (Actellic 300CS), an organophosphate (OP) class insecticide, in all four districts. The selection of pirimiphos-methyl was based on its long residual effect on the sprayed surfaces and evidence indicating vector resistance to other classes of insecticide in the spray areas.

In comparison to 2015, there was slightly higher community acceptance of IRS in 2016 as evidenced by decrease in locked/refused rates from 5.6 percent in 2015 to 4.4 percent in 2016.

CHALLENGES AND LESSONS LEARNED

- Spray operators (SOPs) each carry a bag with the nine OP bottles in addition to a 10-liter pump to meet their daily spray target. This slows their performance and tires them out faster. To alleviate the weight, in 2016 SOPs carried eight bottles each and AIRS Zimbabwe required a team leader or supervisor to carry extra bottles to meet the daily target of nine bottles per day.
- Lack of storage space and washing facilities for spray teams remains a major challenge, especially to new sites like Dombo and Nyutare in the Nyanga district. The team will look to identify additional storage space near sites and construct temporary washing facilities as was done in the existing sites.
- Although a lot was done in 2016 to sensitize the community about the campaign, there is still a need to strengthen community mobilization and social and behavior change communication (SBCC) activities to enhance community preparedness and IRS acceptance, especially in Chimanimani. Some home owners, especially in areas previously not sprayed, waited until the SOP had arrived to begin moving household items out of their houses. To address this, the team will continue to involve more community leaders long before and during the campaign. It will conduct regular community meetings and use “warners”, village headmen and health workers. A day before spraying takes place, the team will continue to place communication materials in public places to remind residents of the spraying. Use of such activities increased acceptance of IRS, especially in Nyanga and Mutare districts, and the project will continue this combined mobilization approach in 2017.
- Some batches of OP bottles used in phase I of the IRS campaign were found to contain suspended particles that could not dissolve even after vigorous shaking and mixing, resulting in clogged nozzles. It delayed spray progress as SOPs had to spend extra time cleaning the pumps before proceeding to spray. The team sent samples to a laboratory for analysis but have not received results yet.
- Supervisors and SOPs well accepted the mHealth tools including smartphones to complete supervisory and EC inspections and short message service (SMS) messaging. More intensive training in the use of smartphones will be required to improve the competence and confidence of supervisors and team leaders to strengthen supportive supervision at all levels.
- Joint support and supervision visits and close monitoring of spray operations by teams drawn from the National Malaria Control Program (NMCP), from the Ministry of Health and Child Care (MOHCC), and from among provincial and district health executives ensured better performance by spray teams.
- There is need to strengthen messaging on household preparation, as frequently this was only done when the SOPs arrived at homesteads.
- The lack of mosquitoes to assess vector susceptibility to insecticides at all three sites in Manicaland remains a serious issue. Previous tests were done on adult mosquitoes collected by the Prokopack aspirator before the introduction of pirimiphos-methyl in 2014. The same collection method did not yield sufficient numbers of mosquitoes for resistance testing after the 2016 spray campaign.

1. INTRODUCTION

Malaria, which is predominantly caused by parasites of the genus *Plasmodium* and transmitted by female *Anopheles* mosquitoes, is by far one of the most important diseases in Zimbabwe, despite being preventable and treatable. Presently, IRS and long-lasting insecticidal nets are the two major vector control strategies that contribute to the prevention and control of malaria transmission in Zimbabwe. Indoor spraying of houses with residual insecticides can reduce the longevity and density of indoor resting *anopheline* mosquitoes, greatly limiting malaria transmission. The National Malaria Strategic Plan for 2008-2013 (extended to 2015, with an addendum covering through 2017) aims to provide nearly universal access to malaria prevention and protection with 90 percent of the at-risk populations targeted by IRS covered.

Following discussions between PMI and the NMCP in 2014, AIRS Zimbabwe was directed to support IRS implementation in four high burdened districts in Manicaland province (Chimanimani, Mutare, Mutasa, and Nyanga). From 2014, AIRS has conducted spraying in these four districts for three successive years. The support given in 2016 was guided by the following objectives:

- Spray at least 85 percent (about 218,048) of the structures found in 2015 including structures in 22 wards added for blanket spraying in the four PMI supported IRS districts (256,527 structures found total).
- Protect at least 85 percent of the 515,884 persons found in 2015 (about 438,501) including populations from additional wards to be protected under blanket spraying in the four districts.
- Develop capacity for provincial and district health staff to organize, plan, implement, monitor, and evaluate IRS through joint planning meetings, joint supervision, monitoring and evaluation (M&E) activities during the IRS campaign, and data collection and analysis that involve local counterparts in the IRS campaign.
- Ensure spray campaign data are entered daily into Microsoft Excel spreadsheets in accordance with the NMCP's M&E and data collection system, to allow AIRS Zimbabwe to report on spray campaign progress weekly.
- Complete high-level entomological surveillance nationally, to ensure data are available for future IRS decision making, programming, and campaign planning.

In addition to working with the NMCP, AIRS Zimbabwe worked closely with provincial and district health offices in Manicaland to support their implementation of the 2016 IRS campaign. The project continued its focus on strengthening environmental management and safety of the IRS campaigns. Other areas that AIRS Zimbabwe supported during the 2016 campaign included: co-facilitation and logistics of trainings; support for data collection and reporting; procurement of insecticide, spray materials, and equipment; and monitoring of spray operations using the PMI AIRS project-wide supervision forms. In addition, the project worked with the National Institute for Health Research (NIHR) to complete entomological monitoring activities nationwide.

In the 2016 spray campaign, the project continued to use Actellic 300 CS following the NMCP change from pyrethroids to an OP in 2014 in four districts in Manicaland province. Susceptibility tests conducted by the NMCP and partners in 2014 showed resistance in malaria vectors to pyrethroids, and susceptibility to OPs. Table I shows the numbers of targeted structures and population by district in 2016. All districts achieved the 85 percent PMI spray coverage target. Three of the four districts

(Mutare, Mutasa, and Nyanga) surpassed the NMCP 95 percent spray coverage target and overall, the project achieved 95.6 percent spray coverage. AIRS Zimbabwe provided technical support to the IRS campaign and entomological activities led by the NMCP. AIRS Zimbabwe also actively participated in the Vector Control Sub-Committee and supported the 20 nationwide entomological sentinel sites. The project distributed entomological kits to 17 sentinel sites, which was greatly appreciated by the NMCP and the provinces, as the kits will help strengthen entomological surveillance in Zimbabwe.

TABLE I. STRUCTURES AND POPULATION FOR 2016 IRS CAMPAIGN

District	Target Structures	Found Structures	Sprayed Structures N (%)	Population Protected		
				Males	Females	Total
Chimanimani	46,580	43,383	36,954 (85.2)	46,881	52,048	98,929
Mutare	98,098	91,320	88,078 (96.4)	100,238	115,338	215,576
Mutasa	54,722	49,311	48,658 (98.7)	52,945	61,294	114,239
Nyanga	57,127	56,030	55,687 (99.4)	57,512	64,219	121,731
Total	256,527	240,044	229,377 (95.6)	257,576	292,899	550,475

2. PRE-SPRAY ACTIVITIES

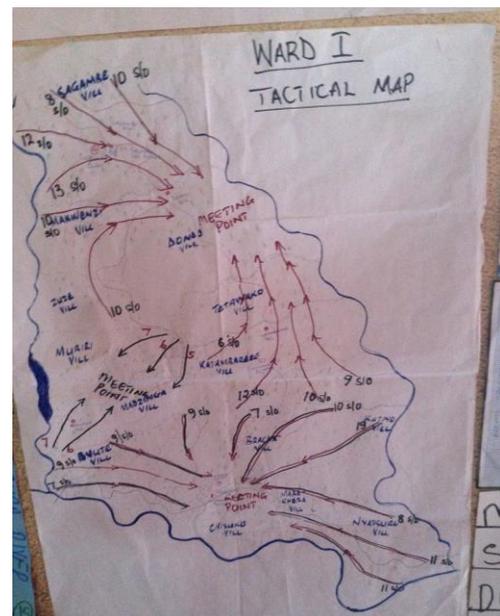
2.1 INSECTICIDE SELECTION

Pirimiphos-methyl remains the insecticide of choice in the four districts supported by PMI/AIRS in Manicaland province, because bioassay tests indicate the continuous effectiveness of OP class insecticide. Susceptibility tests could not be performed at all the sentinel sites in Manicaland because of an inadequate number of sample mosquitoes.

2.2 MICRO-PLANNING

AIRS Zimbabwe conducted micro-planning meetings with national, provincial, and district government stakeholders to effectively plan for a successful 2016 IRS campaign in four districts of Manicaland province: Chimanimani, Mutare, Mutasa, and Nyanga. The team also held a national meeting with the NMCP to share and review the operational plan and targets for 2016 IRS campaign, and review and agree on stakeholder roles, responsibilities, and obligations. The national planning meeting was followed by a provincial meeting that included Manicaland provincial and district health officials. Major issues discussed were:

- National and international procurement of IRS commodities, insecticide, and equipment
- Hiring of lorries and SOPs
- Length of spray campaign
- Daily spray targets
- Training of campaign staff and spray teams
- IRS data management and reporting frequency
- Support and supervision
- Roles and obligations of stakeholders
- EC activities before, during, and after the campaign
- Campsites and storage facilities
- Entomological monitoring activities
- SBCC activities and gender mainstreaming
- Phone-based data collection for EC and spray operations



Tactical Map of Chisuko Site, Mutasa District

2.3 LOGISTICAL NEEDS ASSESSMENT

The aim of the logistical needs assessment was to conduct an inventory of storage facilities, supplies, and materials required for the smooth and cost-efficient implementation of the 2016 IRS campaign. The process, which was conducted from July to September 2016, included field visits to the central and district warehouses, as well as all ward operational sites. The following activities were carried out:

- National level: The project held a brief meeting with the NMCP to discuss IRS logistical arrangements. The arrangements included a spray plan, IRS commodity distribution plan, hiring of lorries, engagement of the province to facilitate servicing of motorcycles, and joint field monitoring visits. Meeting participants also clarified their roles and responsibilities in facilitating provision of storage spaces for IRS commodities in government institutions where possible during the campaign.
- Provincial and district levels: A series of meetings was held with provincial and district health personnel to gain their support in providing facilities for the storage of insecticides and other IRS commodities at operational sites. Following these meetings, the MOHCC donated 10 rooms to the project for the period of spray campaign to store IRS commodities, including insecticides, at operational sites.
- Quantification of IRS commodities: This was mainly based on the number of structures targeted for spraying in the four districts as well as additional wards for blanket spraying. AIRS Zimbabwe project officers stationed in Mutare physically counted IRS commodities available in the central warehouse. The team used this information to quantify PPE, pumps, tents, and other supplies needed for the 2016 campaign.

The project used the results from this assessment and quantification exercise to develop a logistics distribution plan to dispatch local and internationally procured IRS commodities from Harare to the central warehouse in Mutare and then to district stores and operational sites.

2.4 PROCUREMENT

Procurement of IRS commodities consisted of international and local purchases. International procurement began in April including 116,581 bottles of Actellic 300 CS. The team did not include a buffer stock with this order due to budget constraints. Other international procurements included Hudson pumps and spare parts, gumboots, gloves, face masks, and face shields.

Procurement of local IRS commodities began in July and ended in September 2016. It was an open and competitive selection process, in compliance with USAID and Abt policies and procedures. The AIRS Zimbabwe procurement committee opened the bids and evaluated vendors using specifications listed in the advertisement, ability to offer a competitive pricing, and capacity to deliver within a reasonable time frame. The key services/commodities procured locally were:

- Transportation for the IRS campaign, which included: 14 lorries (13 hired and one provided by MOHCC) to ferry PPE and IRS commodities from Harare to Mutare, insecticide from Mutare to operational site stores, SOPs to and from the field; 4X4 vehicles for monitoring; and motorcycles for community mobilization
- Vendors to service motorcycles for the warners
- Printing of IEC materials and M&E tools (data collection tools, performance tracker)
- Materials and services for refurbishment/screening of IRS storerooms and soak pits
- Vendors to construct ablution facilities
- Vendors to prepare breakfast for the spraying teams

The local and international procurement items were received in good working condition and distributed to various operational sites before the start of the 2016 spray operations.

Annex A provides more information on IRS commodities procured locally and internationally for use during the 2016 campaign.

2.5 DISTRIBUTION OF IRS MATERIALS

A month prior to commencement of the 2016 IRS campaign, all PPE, equipment, and commodities that had been delivered to the AIRS Zimbabwe office in Harare were transferred and stored in the central warehouse in Mutare. A week before the start of the IRS campaign, the project distributed the commodities to the warehouses in the districts and to the operational sites. Most of the items were distributed to Mutare district, which has the highest number of targeted structures, and the least to Chimanimani district, which has the fewest structures.

2.6 IRS TRAINING

Table 2 lists the types of training that AIRS Zimbabwe conducted in 2016 to give participants knowledge and skills that enabled them to effectively implement IRS operations. For the training of SOPs, the project followed the NMCP's established three-level system of training.

Table 3 presents data on the people trained for all IRS positions in 2016. The project trained a total of 763 people (658 men, 105 women) 687 of whom were trained to deliver IRS. The overall percentage of women trained increased from 14.2 percent in 2015 to 15.9 percent in 2016. The increase is largely the result of the continued intensive gender inclusion activities by AIRS Zimbabwe staff prior to the 2016 IRS campaign.

TABLE 2. SUMMARY OF 2016 IRS TRAININGS

Type of Training	Dates	Length (days)	Location	Description of Training
Level 1 training (National training of trainers (TOT))	Aug 22-26, 2016	5	Mazowe Hotel- Mazowe district	Challenges observed during the previous IRS campaign, IRS targets and plans for 2016, insecticide management, community mobilization, spraying techniques, data tools and collection, support and supervision, EC issues, and entomological monitoring
Level 2 training (Provincial TOT)	Sept 12-16, 2016	5	Hot Springs Resort- Chimanimani	Handling of insecticides and spray pumps, spraying techniques and practicals, effective community mobilization, management of call-backs, daily targets, data cleaning, analysis, and utilization, importance of checklists in IRS, gender integration, IRS reporting frequency, supervision of spray operations, the importance of EC in IRS, entomological monitoring, and management of IRS resources
SBCC training (TOT)	Sept 22-23, 2016	4	Chimanimani Mutasa Mutare Nyanga	Strategies to reduce locked rooms and refusals, and to improve IRS warning/mobilization, district schedules for social mobilization for community leaders, community sensitization meetings, short presentations, demonstrations, role plays, distribution of IEC materials and planning for mobilization at district levels, and

Type of Training	Dates	Length (days)	Location	Description of Training
				implementation of community mobilization before and during spray campaign
Guards and storekeepers training	Oct 4, 2016	1	Christmas Pass-Mutare	Roles and responsibilities of guards and storekeepers, code of conduct, handling of insecticides (types) and PPE, insecticide poisoning signs and symptoms and first aid, spills response procedure, firefighting theory and demonstrations, storeroom standards, stock management, and security of IRS commodities
Drivers training	Oct 5, 2016	1	Christmas Pass Hotel- Mutare	Roles and responsibilities of drivers in IRS, code of conduct, handling of insecticides (types) and PPE, insecticide poisoning, signs and symptoms and first aid, spills response procedure, transportation of IRS commodities, firefighting theory and demonstrations, security of IRS commodities, and accident response procedures
Insecticide poisoning training	Oct 6, 2016	1	Christmas Pass Hotel- Mutare	Roles and responsibilities of nurses in IRS, chemical handling and safety, hazard analysis, hazard mitigation plans, management of pesticide poisoning, management of snake bites, and contingency planning
M&E training	First group: Oct 12, 2016 Second group: Oct 14, 2016	1	Christmas Pass Hotel- Mutare	Overview of the IRS campaign, M&E, IRS M&E tools, EC monitoring indicators, data management, and reporting deadlines
mHealth training	First group Oct 11, 2016 Second group Oct 13, 2016	1	Christmas Pass Hotel- Mutare	Familiarization with the smartphone, getting started with the CommCare software, opening the CommCare application on the phone's home screen, login to the application, diagram of the application and guidelines for data collection, how to move through the application, completing the supervisory checklists using the smartphone, registering information and answering questions, adding comments to the checklist, SMS job aids and EC monitoring indicators.
Level 3 training (training of SOPs)	Oct 19 -23, 2016	5	Chitakatira and Marange- Mutare; Nyamaropa-Nyanga; Chisuko-Mutasa; Ngorima and Nyanyadzi-Chimanimani	Mixing insecticide, use of PPE, spraying techniques, dismantling and assembling of sprayers, trouble shooting, maintenance and cleaning of sprayers, spray targets, data collection tools and recording data, community information after spraying, community mobilization, and EC.

TABLE 3. NUMBER OF PEOPLE TRAINED, 2016

Categories of Persons Trained	Training on IRS Delivery								Other Trainings				Total Participants		
	TOT: Spray Ops		Spray Ops (including EC)		M&E		TOT: SBCC		Insecticide Poisoning Management		Drivers/Storekeepers/Guards				
Gender	M	F	M	F	M	F	M	F	M	F	M	F	M	F	TOTAL
Provincial field officer	1	-											1	0	1
DEHO/PEHO	7	2											7	2	9
SOPs			435	22									435	22	457
Team leaders			22	8									22	8	30
Data manager					7	1							7	1	8
Washers			3	20									3	20	23
Transport officer	-	1											0	1	1
Storekeepers											12	-	12	0	12
Nurses/ Clinicians									16	18			16	18	34
Pump technicians			6	-									6	0	6
IEC implementers, mobilizers							29	1					29	1	30
Field supervisors			82	32									82	32	114
IRS district coordinators	8	-											8	0	8
Drivers											14	-	14	0	14
Guards											16	-	16	0	16
TOTAL M/F	16	3	548	82	7	1	29	1	16	18	42	0	658	105	763
Total number of people trained to deliver IRS in target districts	687 (600 males, 87 female)														

Note: Positions highlighted in light blue are reported in the PMI indicator 6.1.1 "Number of people trained to deliver IRS in target districts."
 DEHO=district environmental health officer, PEHO=provincial environmental health officer

2.7 HUMAN RESOURCES

The human resources requirements were grouped into three categories: 1) AIRS staff, 2) government staff, and 3) seasonal workers (SOPs, washers, guards, and storekeepers). On average, the seasonal workers were hired for a period of 30–32 days. The government employees served as IRS coordinators, data managers, warners/community mobilizers, supervisors, and team leaders. The project worked with these officials for 32 days on average. In addition, the M&E consultant, AIRS IT consultant, and the partner firm Dimagi supported data collection and reporting, mHealth supervisory checklists, and SMS job aids, respectively. Table 4 shows the distribution of human resources by district and sex. The table excludes government officials who provided high-level supervision and contribution such as a provincial field officer (PFO), a PEHO, an Environmental Health Officer, and three DEHOs from other districts in Manicaland who were trained and one transport officer.

A total of 497 temporary staff were hired to deliver services during the 2016 IRS campaign; 455 were males, 42 were females. The majority of seasonal workers hired in 2016 were SOPs. The number of females hired as SOPs in 2016 increased by 4.2 percent to 9 percent, from 4.8 percent in 2015.

TABLE 4. POSITIONS ENGAGED FOR 2016 CAMPAIGN, BY DISTRICT

Position	Chimanimani		Mutare		Mutasa		Nyanga		Total			% Females
	M	F	M	F	M	F	M	F	M	F	Both	
DEHOs	1	0	1	0	1	0	1	0	4	0	4	0
IRS district coordinator	2	0	2	0	2	0	2	0	8	0	8	0
Team leader	4	1	7	4	6	1	5	2	22	8	30	26.7
Field supervisor	18	3	31	12	20	5	13	12	82	32	114	28.1
SOP	85	0	157	15	99	1	94	6	435	22	457	4.8
Washers	0	5	0	8	1	4	2	3	3	20	23	87
Nurses/ Clinicians	3	5	6	4	3	4	4	5	16	18	34	52.9
Pump technicians	1	0	2	0	1	0	2	0	6	0	6	0
Storekeeper	3	0	3	0	3	0	3	0	12	0	12	0
Guards	4	0	4	0	4	0	4	0	16	0	16	0
Mobilizers	5	0	11	0	7	0	6	1	29	1	30	3.3
Data managers	2	0	2	0	1	1	2	0	7	1	8	12.5
Drivers	3	0	5	0	3	0	3	0	14	0	14	0
Total	131	14	231	43	151	16	141	29	654	102	756	11.9

2.8 MEDICAL EXAMINATION OF SPRAY TEAMS

In mid-October 2016, just prior to the start of spray operations, all SOPs and supervisors had a medical examination to assess their health and fitness to participate in the IRS campaign (Table 5). District Medical Officers under the supervision of the Provincial Epidemiology and Disease Control Officer and the Provincial Medical Director, and in liaison with the DEHOs, carried out the health examinations. They consisted of a routine physical check-up and a pregnancy test for all female workers including storekeepers and IRS supervisors. The health examinations are required prior to hiring all seasonal personnel and are documented in the district files in line with Government of Zimbabwe policy. Anyone who was found unfit did not participate in the level 3 training and spray operations. During the spray campaign, team leaders assessed health of each SOP daily during morning mobilization and took appropriate actions if required including referral to the nearest health centre, arranging period of rest or lighter duties at the camp depending on severity of the case.

TABLE 5. MEDICAL CHECK-UP FOR IRS STAFF

District	SOPs, Supervisors, and Storekeepers Examined		SOPs, Supervisors, and Storekeepers Found Unfit	
	Male	Female	Male	Female
Chimanimani	124	9	0	0
Mutare	219	39	0	0
Mutasa	144	12	0	0
Nyanga	132	25	0	0
Total	619	85	0	0

3. INFORMATION, EDUCATION AND COMMUNICATION ACTIVITIES

3.1 INTRODUCTION

AIRS Zimbabwe employed several IEC strategies to ensure successful spray operations in 2016. These strategies included IEC training, district sensitization meetings with Environmental Health Technicians (EHTs), distribution of IEC materials, community meetings, radio spots, and door-to-door mobilization. The project also worked with the MOHCC to seek support of village health workers and community leaders to promote acceptance of the project by the general population. School Health and Health Centre Committees were also engaged to assist in mobilizing communities.

Although the AIRS Zimbabwe project did not have a budget for communication activities, with the exception of IEC training, IEC materials were produced in liaison with the Zimbabwe Assistance Program in Malaria (ZAPIM) project, which received funding from PMI for SBCC activities. SBCC Committee chaired by NMCP reviewed the messages and materials and ensured that guidance from provincial and district health offices is considered. Nevertheless, many activities need to be done prior to IRS in 2017 to ensure that the communities are well informed about and sensitized about the program to avoid high refusals and locked rooms, especially in Chimanimani district.

AIRS Zimbabwe continued to use results from the Beneficiary Satisfaction Assessment conducted after the 2014 campaign to inform the messaging and door-to-door strategies for community and household mobilization in 2017. The project also negotiated for radio spots through Diamond FM, a community radio station based in Mutare City, which aired free talk shows informing the community about the IRS campaign.

3.2 INFORMATION, EDUCATION, AND COMMUNICATION TRAINING

The experience of having relatively high percentage (5.6 percent) of locked rooms and refusals affected the IRS program achievements in 2015. Hence, IEC training that AIRS Zimbabwe conducted in September 2016 for PMI-supported districts of Manicaland had an enhanced agenda to address those issues. Specifically, AIRS staff teamed up with the DEHOs and health promotion officers to train EHTs, who cascaded the trainings to village health workers and community group leaders. The trainees agreed that there was a need to continue strengthening community meetings for effective IRS sensitization and identified the main reasons for refusals and locked rooms in 2015. Together they devised strategies to address these issues including creating a schedule for meetings with community leaders and community sensitization meetings. Involving local leaders and other influential community members in IRS mobilization was also noted as a good practice to avoid refusals and locked rooms. Loudhailers (megaphones) were again singled out to be very effective when doing warnings, especially in areas where the terrain is not accessible. The number of EHTs trained in each district is shown in Table 6.

TABLE 6. NUMBER OF EHTS TRAINED PER DISTRICT IN 2016

District	Date	Venue	Females	Males	Total
Chimanimani	22/09/16	Chimanimani Rural District Council	2	17	19
Mutasa	23/09/16	Mutasa District Council	4	14	18
Mutare	29/09/16	Mutare MPH	6	21	27
Nyanga	30/09/16	Nyanga District Hospital	7	11	18
Total			19	63	82

3.3 PRODUCTION AND DISTRIBUTION OF IEC MATERIALS

Following sensitization meetings for the districts, AIRS Zimbabwe worked with ZAPIM to develop and produce IEC materials (posters and pamphlets). After the provincial medical director (PMD) for Manicaland granted permission to conduct a photo shoot in Burma Valley, Mutare district, ZAPIM, supported by the AIRS project and MOHCC, held a shoot to take IRS promotional photos for use in IEC materials. The national SBCC Committee reviewed the materials before production.



IRS Poster in Local Shona Language

AIRS Zimbabwe distributed the IEC materials to all the four PMI-supported districts (Table 7) to ensure that the communities received adequate information about the upcoming IRS program, to equip the communities with the dos and don'ts of the spray process.

TABLE 7. DISTRIBUTION OF IEC MATERIALS FOR 2016 IRS CAMPAIGN, BY DISTRICT

District	IRS Pamphlets	IRS Posters
Mutare	12,000	340
Mutasa	8,000	200
Nyanga	12,000	240
Chimanimani	7,000	180
Total	39,000	960

3.4 COMMUNITY MEETINGS

AIRS Zimbabwe implemented a blanket spray approach in 2016, after both NMCP and PMI had expressed the need to make the blanket spraying definition in Zimbabwe more precise. This is considered a best practice to increase IRS efficiency and protection. The change in approach in this spraying season added more households to be covered. The approach included addition of 22 new wards with an Annual Parasite Index (API) of five and above (national criterion for high risk areas), which had not previously been sprayed. Based on the new approach, the project noted that the targeted villages needed intensified community sensitization. While community sensitization meetings were carried out in all the targeted villages, more emphasis was placed on hard-to-reach and new areas, as well as those villages that had high locked and refusal rates during 2015 IRS campaign. The community sensitization meetings were conducted on October 1–15, 2016, two weeks before the IRS campaign began, by EHTs supported by the village health worker. The main objectives of the meetings were to: gain community endorsement of the IRS campaign; make villagers aware of spraying schedules so that they could prepare; and instill community confidence in IRS. In addition, the meetings targeted schools, church gatherings, or any community gathering that coincided with this IRS sensitization period. Table 8 shows the population reached and number of wards covered.

TABLE 8. SUMMARY OF 2016 SENSITIZATION MEETINGS IN HARD-TO-REACH WARDS, BY DISTRICT AND GENDER

District	Wards	Population Reached		Total
		Females	Males	
Chimanimani	16	10,284	3,037	13,321
Mutare	30	28,017	9,804	37,821
Mutasa	22	11,012	6,152	17,164
Nyanga	27	16,534	9,360	25,894
Total	95	65,847	28,353	94,200

3.5 DOOR-TO-DOOR MOBILIZATION

The warners were tasked with carrying out door-to-door mobilization a day before an area was sprayed. MOHCC EHTs on motorcycles would visit village heads and households, sensitize them to

prepare for spray operations the following day, and distribute IEC materials to household members. Village health workers and representatives of village headmen assisted the warners to ensure the door-to-door mobilization was comprehensive. This greatly helped to inform households about when spray teams would be in their village, organize a water supply for spray pumps, and inform people on what to do to prepare their households for spraying. To ensure that all the community members were reached, the warners also used loudhailers to inform the communities where the IRS teams would be visiting the following day. During this mobilization, the warners collected information on potential number of locked houses and refusals and if the village has any other community events that may jeopardize the spraying. This information would inform and guide the IRS coordinator to correctly deploy SOPs on the actual day of spraying.

Overall, to ensure an enhanced and targeted approach for mobilization through community meetings and door-to-door mobilization, the project carried out the following changes in 2016:

- Increased the number of community meetings organized through ward community leaders and facilitated by local EHTs
- Held special sensitization meetings in the wards that had low coverage in 2015, and in hard-to-reach and new villages targeted for IRS.
- Closely cooperated with village heads and village health workers who identified and assigned village volunteers to walk SOPs from house to house to minimize refusal rates

While many efforts were made to improve IRS acceptance, still more must be done in future campaigns to continue increasing the spray coverage, particularly in Chimanimani District where spray coverage was lowest (85.2 percent) in 2016. Low coverage was mainly due to competing programs, difficult terrain and parliamentary bye-elections, which coincided with the spraying period. These resulted in inadequate sensitization, warning and deployment in some cases.

3.6 RADIO BROADCASTS

To enhance the 2016 IRS sensitization coverage, ZAPIM supported AIRS Zimbabwe by broadcasting IRS messages in the radio. Diamond FM, a Manicaland-based radio station with listenership of approximately 67,000 people, aired the radio spots from September 19 to December 31, 2016. During that period, Diamond FM allocated AIRS Zimbabwe project a 30-second jingle played during morning peak and evening off-peak hours on Mondays, Wednesdays, and Saturdays. In addition, Diamond FM donated four free 10-minute guest appearance spots during their Mobile Integrated Social Health Awareness Approach program. PMD technical staff used the opportunity to showcase and market the 2016 IRS campaign live on the radio.

4. IMPLEMENTATION OF IRS ACTIVITIES

4.1 SPRAY CAMPAIGN

AIRS Zimbabwe implemented the 2016 IRS campaign in four districts (Chimanimani, Mutare, Mutasa, and Nyanga) in Manicaland province. Following a series of micro-planning meetings, spray operations began on October 24 in Chimanimani, Mutare, and Mutasa, and on October 25 in Nyanga district. The spray campaign was scheduled to last for 30 days with a seven-day break mid-way. However, due to rains and competing public health, food, and seed distribution programs that increased the number of call-backs for the government staff supporting the campaign, the 2016 IRS campaign took 31–33 days. Also, a Parliamentary by-election in Chimanimani West constituency disrupted spray operations in Chimanimani district, necessitating additional call-backs. Spray teams operated from 19 campsites during the campaign using 14 lorries (13 hired by the project and one provided by the MOHCC) to ferry SOPs to and from targeted areas daily in the respective districts and wards.



A Spray Operator Is Preparing Insecticide Mix,
Nyanyadzi Area, Chimanimani District.

4.2 MONITORING AND SUPERVISION

To improve spray performance, the project strengthened supervision by assigning one or two AIRS technical staff to each of the four districts. Joint supervisory field trips were conducted with the

provincial and district MOHCC staff, and this approach improved teamwork and collaboration with provincial and district health personnel (Table 9). The regular field monitoring enabled early identification of challenges, and on-the-spot corrections were made where possible, resulting in improvements of overall outputs.

TABLE 9. SUPERVISION OF 2016 IRS CAMPAIGN

Level	Organization/Position	Roles and Responsibilities
National	NMCP, PMI, AIRS Zimbabwe	Overall IRS monitoring and supervision. Provision of solutions to field challenges where possible.
Provincial	Provincial Medical Director, Provincial Environmental Health Officer, Provincial Epidemiology and Disease Control Officer, Provincial Health Services Administrator, Provincial Field Officer, Provincial Health Promotion Officer, Transport Officer	Routine IRS monitoring and supervision. Immediate resolution of challenges where possible. Sharing spray experiences from other districts.
District	District Medical Officers, District Environmental Health Officer, District Health Promotions Officer, District Health Services Administrator	Regular, consistent, and close IRS monitoring and supervision. Monitor spray performance against district targets. Ensure IRS coordinators, team leaders, data managers, and supervisors remain focused. Address challenges encountered and escalate issues to province and AIRS.

At the campsite, IRS supervisors, team leaders, and the IRS coordinator monitored and supervised IRS activities on a daily basis. The performance of each SOP was monitored daily and weekly against the set targets. Immediate corrective actions were taken where performance was found to be below the target.

All IRS supervisors, team leaders, IRS coordinators, as well as AIRS Zimbabwe staff, used standardized AIRS supervision and monitoring tools to evaluate spray quality, EC, and spray data collection. The tools are briefly described in Table 10.

A monitoring and supervision schedule with the roles and responsibilities of each type of campaign supervisor, the type of supervisory checklists, and the frequency of use were developed and used during the 2016 IRS campaign.

TABLE 10. SPRAY CAMPAIGN SUPERVISORY TOOLS

Supervisory Checklist	Purpose and Person Responsible
Morning mobilization and transport	Aim: To ensure spray teams leave for the day with adequate and appropriate PPE and clothing, insecticide, and supplies, and are safely transported to the spray areas. Person responsible for completing this checklist: IRS coordinator, environmental compliance officer (ECO), and environmental compliance assistant (ECA)
End-of-day clean-up	Aim: To ensure spray teams correctly follow EC standard procedures for cleaning IRS equipment, account for insecticide stocks and safe storage of equipment. Person responsible for completing this checklist: IRS coordinator, ECA, and ECO

Home owner preparation and SOP performance checklist	<p>Aim: To ensure that SOPs spray houses that have been correctly prepared for spraying and that they use correct spraying techniques.</p> <p>Person responsible for completing this checklist: IRS field supervisors, team leaders, IRS coordinators, ECA, and ECO</p>
Direct Observed Supervision	<p>Aim: To ensure that SOPs are following the laid-down spray techniques and can show spray skills and achieve high quality of spray.</p> <p>Person responsible for completing this checklist: IRS field supervisors, team leaders, IRS coordinators, ECA, ECO, operations manager, and the AIRS chief of party (COP)</p>
Storekeeper performance checklist	<p>Aim: To ensure that storekeepers are following the laid-down best warehousing practices and can account for stocks and equipment in their stores at any time</p> <p>Person responsible for completing this checklist: IRS coordinator, ECA, ECO, warehouse manager, operations manager, and COP</p>

The AIRS ECO, COP, Operations Manager, ECA, Provincial Coordinator and MOHCC DEHOs, PFO, and PEHOs conducted regular IRS support and supervision visits that included EC monitoring of IRS operations. The teams visited all sites to assist district supervision teams to ensure full compliance. Each supervisor was given a smartphone loaded with IRS supervisory checklists. The following checklists were used for IRS/EC support and supervision: morning mobilization; home owner preparation and SOP performance; storekeeper performance; and the end of day checklist. In the morning, every team leader or the IRS coordinator would fill in the morning mobilization checklist to verify the preparedness and health of the SOPs and safety of the vehicles.



Morning Mobilization at Chakonwa Site, Chimanimani District

All team leaders and supervisors also completed the home owner preparation, and SOP performance checklist, which focused on the following key areas:

- Availability and consistent use of adequate PPE by the SOPs
- Home preparation for IRS
- Spraying techniques by the SOPs
- Safety of SOPs and the beneficiary community
- Post-IRS measures
- Action to be taken in the event of adverse reactions

Results of the four types of inspections conducted during the spray period are provided in Annex B.

Team leaders and supervisors also closely observed insecticide mixing and spraying procedures and filled out phone-based Directly Observed Spraying (DOS) questionnaire to report findings. Out of 5,709 submitted reports, the most common shortcoming observed was non-use of control flow valves (8.5 percent).

Other areas that were monitored during the IRS campaign were:

- Proper storage of insecticides
- Stock control and inventory management procedures
- Effluent waste disposal and sprayer cleaning at the end of the day
- Proper spill response procedures in the field
- Proper handling of insecticide and mixing procedures including the triple rinse process for empty Actellic 300 CS bottles

Generally, the supervisors demonstrated high compliance during the spray campaign: 13,209 supervision observations were made of homes and SOPs to ensure safety and compliance.

4.3 MOBILE-BASED DATA COLLECTION AND REPORTING

Mobile phones for data collection and reporting were used for the second time in Zimbabwe during the 2016 IRS campaign. mHealth has become an integral part of IRS monitoring. Prior to the campaign, a technology expert from Dimagi conducted an online refresher training for AIRS staff. AIRS Zimbabwe staff then conducted a one-day training in October 2016 in Mutare district on the use of the phones and use of the mobile supervisory application for DEHOs, IRS coordinators, data managers, team leaders, and supervisors.

During the campaign AIRS Zimbabwe implemented two mHealth tools:

- SMS job aid messaging, and
- Field supervision (including directly observed spraying) using smart phone-based supervisory forms.

The SMS job aid messaging system was used to convey IRS notices and information were sent to all SOPs, IRS team leaders, and supervisors at least three times a week throughout the spray campaign in all four districts. The messages received on personal phones included the following:

- All unsprayed eligible rooms should be included in the SOP's note book.
- Good morning from PMI AIRS project! Remember to spray with the tip of the nozzle 45 cm from the wall.

- Good morning! Remember the spray target is 19 structures per SOP per day. Thanks for the good job.
- Full PPE use remains mandatory for the duration of the spray operation.
- Eating or smoking during the spraying period will result in dismissal. It is not allowed.
- Team leaders MUST carefully check the filled SOP data collection forms at the close of the day before submitting to the supervisors.
- Mobilizers should notify the communities to prepare a day ahead of the arrival of the spray team.
- For tomorrow, remember to remove food items. Only heavy, non-edible, bulky items should be packed in the center of the room and covered with the polythene sheet before spraying.

AIRS Zimbabwe staff, PEHOs, DEHOs, PFOs, and IRS coordinators monitored receipt of SMS-based job aid messages for IRS through interactions with spray team members during field monitoring and supervision. The majority of the recipients acknowledged the value added by the messages. However, messages were sometimes received late, due primarily to frequent power cuts. Another reason was an inadequate number of electrical sockets available, or blackout of electricity at the site, preventing SOPs from charging their phones. Although the team had considered solar chargers as additional power supply, these could not be procured due to budgetary restraints.

The second tool is a mobile version of the supervisory checklists that AIRS Zimbabwe introduced in an effort to move away from the paper-based checklists used until 2015. The purpose of this mobile application is to obtain prompt feedback on compliance reports coming from the field and enable immediate corrective actions by AIRS Zimbabwe and MOHCC staff where appropriate. Dimagi developed the application using CommCare, an open-source software, to program the supervisory checklists for Android-based smartphones.

Upon submission of data to a server, an email was generated and sent to selected recipients, including the COP, operations manager, ECO, ECA, provincial coordinator, and home office team, as well as MOHCC staff. In response to any non-compliance reported by email, the project team carried out immediate corrective actions. Actions taken included on-the-job training to ensure SOPs maintain the correct distance of 45 cm between the nozzle tip and the wall, as well as close supervision to ensure that all SOPs are in full PPE during IRS operations and that home preparation is adequately done before spraying.

Within the first two weeks of spray operations, it was observed that some supervisors, team leaders and IRS coordinators were not facile at using smartphones and the mobile-based checklists, and hence some submitted incorrect reports. It was also noted that some field supervisors, team leaders, and IRS coordinators, especially the new supervisors exposed to the technology for the first time, did not understand questions well, resulting in coding incorrect or inconsistent data, and miscommunication about conditions in the field. The AIRS Zimbabwe project team addressed all the issues fully during the first part of the campaign using on-the-job trainings and on-site feedback to spray teams.

4.4 LOGISTICS

4.4.1 IRS STORAGE AND INSECTICIDE STOCK MANAGEMENT

The Mutare warehouse was the central storage facility and served as a distribution center for the four districts, while district storage facilities worked as distribution centers for all IRS commodities required at operational sites. A short-term warehouse manager (an AIRS Zimbabwe temporary hire) managed the central warehouse, while storekeepers managed district and campsite storage facilities to ensure

distribution and tight supervision of IRS commodities at all levels. The warehouse manager supervised and monitored management of IRS stocks at district and campsite levels.

There were 22 storage facilities at 22 operation sites previously established in the four districts and 21 sites were used during the campaign. The MOHCC did not camp in the 22nd site as previously planned to save the time of setting up and dismantling the campsites. Of the 21 sites, the MOHCC provided 10 stores at the health center level at no cost to the project, while AIRS Zimbabwe rented the remaining stores from private owners at business locations near the IRS operational sites. The AIRS Zimbabwe team closely supervised and monitored the performance of the storekeepers and provided guidance and coaching on the spot when required. In 2016, the project rented a larger space at Mutare Dry Port to use as a provincial warehouse. An enhanced ventilation system installed in 2015 and serviced in 2016 to comply with insecticide storage and safety requirements was used. Securing adequate storage facilities remains a challenge at district and operational levels as the space provided is often too small to accommodate all the insecticide, PPE, and IRS equipment.

All storekeepers and the warehouse manager regularly maintained and updated records including stock cards and ledgers with notations for each item including details of transactions, quantities, dates, and destination. They tracked insecticide bottles at the operational sites and district stores by recording the number of bottles issued to each SOP every morning and compared it with the number of empty and full bottles returned by each SOP at the end of a spray day. All returned empty and full insecticide bottles were documented on stock cards.

4.4.2 IRS VEHICLES

The project hired various vehicles from the private sector for use during the 2016 IRS campaign. The project used 14 lorries including one provided by MOHCC and 13 rented from private transport companies. Twenty-one motorcycles provided by the MOHCC were serviced and repaired for use by warners. The lorries were used to transport PPE, insecticide, and other IRS commodities from Harare to the Mutare central warehouse, to district stores in the four districts, and to the district campsites. Lorries also transported spray teams from the campsites to the field and back, as well as empty OP bottles, cardboard boxes, and other IRS materials from the campsites to the central warehouse. Motorcycles were used by warners for their daily community mobilization work.

The project also hired 4X4 trucks to transport AIRS Zimbabwe staff, the NMCP, and provincial and district spray campaign supervisors to monitor IRS operations throughout the campaign. AIRS Zimbabwe requested transport vendors to send their vehicle for inspection by the Vehicle Inspection Department, and where needed, modify the vehicle to ensure that it was safe for transporting spray teams, IRS equipment, and insecticide. In some cases, AIRS Zimbabwe provided fuel support to district teams to strengthen routine supervision and close monitoring of the campaign. The MOHCC provincial office provided vehicles and fuel for provincial supervisory teams.

4.5 IRS PAYMENTS

In 2016, AIRS Zimbabwe team managed the following activities to ensure financial issues did not delay the spray campaign:

- The team ensured that all the seasonal staff (SOPs, storekeepers, security guards, and breakfast caterers) had contracts and the project obtained signed copies for the records.
- The project established and maintained log sheets for the IRS lorries, trucks, and motorcycles.
- The team maintained daily registers for the SOPs, lorry drivers, security guards, storekeepers, and breakfast caterers that were approved by the IRS coordinators on a regular basis.

- The AIRS team verified and collected the daily registers for the breakfast caterers and IRS spraying teams before preparing payrolls.
- An agreement was reached with a reputable mobile banking system through the Ecocash service provider used to pay, through mobile money, the seasonally hired personnel.
- Allowances for government employees were paid through their bank accounts. With the cash shortages during the period under review, the Ecocash system proved to be reliable for all the IRS spraying teams. There were no major delays in processing the payroll.
- All breakfast service providers were paid through their bank accounts. Despite the cash shortages the vendors managed to utilize their funds either by transferring the money from their bank accounts into Ecocash phone numbers or by paying through the electronic payment system.
- Fixed price contracts were signed with lorry and trucks service providers who were paid through their bank accounts after their log sheets had been verified and reconciled.
- All payments were verified and approved by finance and administration staff and the COP.

4.6 COST-EFFICIENCY OF SPRAY OPERATIONS

- AIRS Zimbabwe hired 13 lorries for the 2016 IRS campaign season through a competitive bidding process. The response rate to the call for a cost proposal was very low, with only four vendors participating. Before the final selection of the lorry vendors the AIRS team negotiated with the service providers and managed to reduce the daily rate from \$300 to \$270, which was in the 2016 approved budget.
- The spraying teams completed all call-backs to locked houses before moving from one campsite to another and this saved time and transport costs. In addition, handling call-backs while still on location may improve SOPs recall of locked houses.
- The AIRS Zimbabwe also negotiated the price of the 4x4 trucks that were used by the supervisory teams to monitor IRS operations. The daily rate approved in the budget was \$130 but the project negotiated this to \$110 per vehicle for the Mutare 4x4s. The approved daily rate budget for the Harare-based truck rental was \$170, but the team negotiated it to \$120.

5. POST-SPRAY ACTIVITIES

5.1 POST-SPRAY STAKEHOLDER MEETING

Based on consultations with the NMCP and provincial and district health personnel, AIRS has scheduled the post-spray review and planning meeting for the last week of January 2017. Meeting participants will do the following:

- Review progress, performance, challenges, and opportunities during the implementation of 2016 IRS campaign.
- Share experiences in strengthening IRS operations, EC, and entomological monitoring.
- Strengthen linkages for sustaining gains and developments in IRS operations through strong partnerships.
- Develop a preliminary 2017 IRS provincial implementation plan.

The expected outcomes of the meeting are the following:

- 2016 IRS performance feedback, and shared lessons learned, best practices/experiences on delivery of 2016 IRS program
- Clear analysis of IRS data collection, cleaning, and reporting system
- Consolidated IRS operations and waste disposal management plans for 2017
- Recommendations for improving 2017 IRS campaign

5.2 DEMOBILIZATION

Following the successful completion of the 2016 IRS campaign, the project team moved all equipment and supplies from the campsites to the four district storerooms. The equipment was inventoried using a checklist to guide and ensure the items tallied with quantities indicated in issue vouchers (Annex A). Retrieved items included overalls, gumboots, helmets, rubbers gloves, satchels, mattresses, tents, and sprayers. After careful sorting of overalls by the team and thorough washing with soap and clean water, AIRS Zimbabwe handed over to SOPs 826 pairs of coveralls that were found unusable for future campaigns. The rest will be sent to a private launderer for further cleaning, decontamination, and disinfection, and then they will be stored at the central warehouse for use next season. The project hired 10 part-time workers, who, under the supervision of AIRS Zimbabwe staff and provincial health officers, will clean all the equipment at the Dora IRS campsite in Mutare district, selected for its proximity to the Mutare central warehouse. The OP bottles were separately transported to the central warehouse for safe keeping.

The temporary storerooms at operational sites were thoroughly cleaned using soapy water when spray teams changed from one campsite to the other during operations. All 14 lorries used during the campaign were also satisfactorily cleaned with soapy water before the AIRS team returned them to the owners.

6. ENTOMOLOGY

6.1 CONE BIOASSAY TESTS

Burma Valley was sprayed on October 24, 2016, and Chakohwa was sprayed on November 16, 2016. Cone bioassay tests were performed within 24 hours of spraying at Burma Valley and Chakohwa sentinel sites. The project completed T0, T1, T2, and T3 tests at Burma Valley in October, November, December, and January, respectively, and T0, T1, and T2 at Chakohwa in November, December, and January. The NIHR supplied the *An. arabiensis* for the cone bioassay tests.

Ten recently sprayed rooms were sampled per site to ensure tests were performed on the different types of wall surfaces available at each site. At Burma Valley tests were done on brick, cement, mud, and painted wall surfaces; at Chakohwa, brick, cement, and mud surfaces were tested. Batches of 10 2–5-day-old non-blood-fed female *An. arabiensis* (susceptible Kanyemba *Gambiae* Strain (KGB) strain) were introduced in each cone. Three cones were set per room; one each at 0.5, 1.0 and 1.5 meters from the floor. Mosquitoes were left in the cones for 30 minutes, after which they were transferred to paper cups and provided with sugar solution and kept under observation. Mosquito mortality was recorded after the 24-hour holding period. Control mosquitoes were exposed to clean untreated surfaces for the same period.

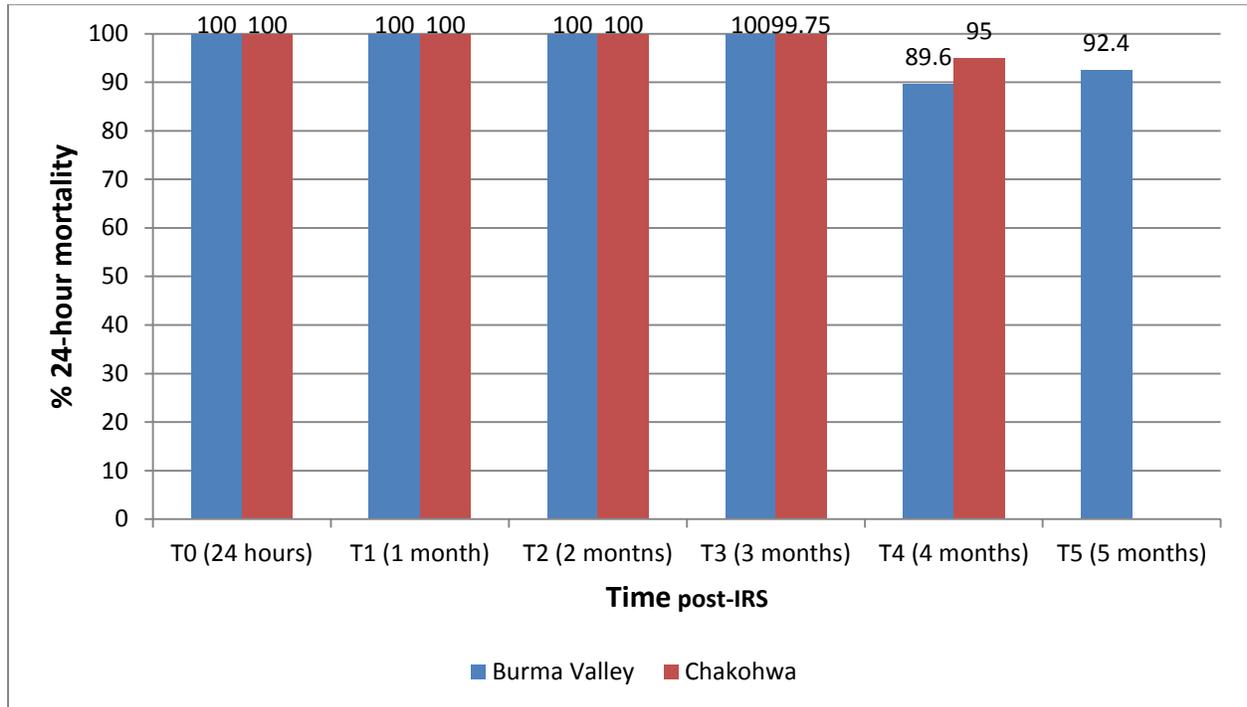
The results show that the application of insecticide was satisfactory. The rate of knock down of mosquitoes after 30 minutes varied for each room and type of wall surface and level above the floor (Table II). The results showed 100 percent mortality rates on all wall surface types for the tests done at T0, T1, T2 and T3 for Burma Valley site, and at T0, T1 and T2 for Chakohwa site (Figure 1). Table II and Figure 1 include data for February and March. No mosquito mortality was recorded in the two control sites at any time.

TABLE II. BIOASSAY TEST RESULTS SUMMARY

Time of test (2016)	District	Site	% Knockdown (30 minutes)				% Test Mortality (24-Hr)			
			B*	C*	M*	PP*	B	C	M	PP
T0 (Oct)	Mutare	Burma Valley	20	24.2	16.7	13.3	100	100	100	100
T0 (Nov)	Chimanimani	Chakohwa	13.3	32.5	3.3	N/A	100	100	100	N/A
T1 (Nov)	Mutare	Burma Valley	23.3	14.2	15	11.1	100	100	100	100
T1 (Dec)	Chimanimani	Chakohwa	63.3	48.3	32.2	N/A	100	100	100	N/A
T2 (Dec)	Mutare	Burma Valley	23.3	41.7	50	43.3	100	100	100	100
T2 (Jan)	Chimanimani	Chakohwa	23.3	6.7	31.7	N/A	100	100	100	N/A
T3 (Jan)	Mutare	Burma Valley	3.3	5.0	1.7	27.8	100	100	100	100
T3 (Feb)	Chimanimani	Chakohwa	10.8	15.8	13.3	N/A	100	99.3	100	N/A
T4 (Feb)	Mutare	Burma Valley	6.7	7.5	21.7	5.5	90	97.3	100	71.1
T4 (Mar)	Chimanimani	Chakohwa	30.8	27.5	35	N/A	100	88	98	N/A
T5 (Mar)	Mutare	Burma Valley	16.7	2.5	3.3	0	93	98	100	80

Note: B = brick; C = cement; M = mud and PP = plastered and painted

FIGURE I: WALL BIOASSAY TEST RESULTS FOR BURMA VALLEY AND CHAKOHWA (OCTOBER – MARCH, 2017)



7. ENVIRONMENTAL COMPLIANCE

7.1 PRE-SEASON ASSESSMENT

Successful implementation of IRS includes having in place EC procedures that ensure the safety of the SOPs and beneficiaries, and that protect the environment through appropriate use and disposal of insecticides and other wastes. Prior to the start of any IRS program, an environmental assessment is conducted to inform the environmental mitigation plan. In 2016, Zimbabwe submitted the “Letter Report” and also conducted Pre-season Environmental Compliance Assessment (PSECA) at all operations sites.

7.1.1 LETTER REPORT

In 2016, AIRS Zimbabwe continued operating under the Supplemental Environmental Assessment 2012-2016 that the project conducted in 2012. Two months before spray activities began, the project submitted a letter report that summarized the most current EC information on the AIRS Zimbabwe program.

The letter report included information on intended environmental trainings for the IRS campaign; the condition, organization, and schedule for repair or upgrade of district warehouses and operation sites (storerooms and soak pits); and the proposed methods for management of all IRS wastes. The major issue discussed in the report was related to insecticide left over from the 2014 campaign. Section 7.5 reports the results of the incineration of the expired insecticide.

7.1.2 PRE-SEASON ENVIRONMENTAL COMPLIANCE ASSESSMENT

The 2016 PSECA was conducted in July. The assessment was carried out by two teams, each of which covered two districts. The teams comprised representatives from AIRS Zimbabwe (ECO, ECA, and provincial coordinator) and from the NMCP, MOHCC head office, PEHO office, and DEHOs from the four districts. Teams collected the data using a smartphone-based application to capture the information on the state of preparedness of the IRS sites.

The broad aim of PSECA was to assess the level of IRS preparedness for 2016 in the four PMI-supported districts in Manicaland province. Specific objectives were to:

- Check on the status of the 19 permanent and 15 mobile soak pits
- Check on the status of IRS storage facilities
- Identify 11 campsites, where dual toilets were constructed
- Develop the work plan for refurbishment of the soak pits and storage facilities in preparation for the 2016 IRS season

The following campsites were inspected during period under review (21 including three district stores):

- Nyanga District: Elim, Nyamaropa, Tombo, Nyautare, Nyatate, and Nyanga District hospital (6).
- Mutare District: Chitakatira, Marange, Bezel Bridge, Dora, and Nyagundi (5).
- Chimanimani District: Chakohwa, Nyanyadzi, Biriwiri, and Rusitu (4)
- Mutasa District: Chisuko, Gatsi district storeroom, Mupotedzi, Manica Bridge, and Sherukuru (5).

- Mutare provincial warehouse (1)

The PSECA inspections resulted in the following the major findings and remedial activities that were completed to prepare for 2016 IRS season:

- Fencing poles at most of soak pits were damaged by white ants. All damaged poles were replaced.
- Lines for drying washed spray pumps were in poor condition. Necessary repairs were made.
- The grit trap screens at most of the progressive rinsing slabs were broken or clogged with debris. The debris was removed and new grit trap screens installed.
- Door screens and burglar-proof bars were already provided at 18 out of 19 proposed storerooms and these storerooms were then provided with pallets, firefighting equipment, and thermometers to make them compliant with BMP. Charcoal and sawdust layers of the soak pits at Dora and Nyagundi campsites were replaced because they had outlived their effectiveness after being heavily used for three years.
- Danger warning signs at the 19 soak pits were no longer in good shape. The project replaced signs at all soak pits.
- Most of the IRS sites did not have stand-alone bathing facilities for SOPs, so the project upgraded temporary bathing facilities constructed in 2015 for both males and females at 19 field IRS campsites used regularly during the 2016 IRS campaign.

The AIRS ECO and ECA, and the DEHOs in the four targeted districts then did a final certification of storage facilities and soak pits in mid-October.

7.2 MID-TERM ENVIRONMENTAL COMPLIANCE ASSESSMENTS

The AIRS ECO, operations manager, COP, ECA, and provincial coordinator as well as the DEHOs visited all 19 sites to assist district teams with EC issues and to ensure full EC. The team also used the visits to conduct mid-season EC assessments for all the sites using supervisory checklists. Emphasis was on the safety of the IRS workers and community members, proper storage of insecticides, stock control and inventory management procedures, effluent waste disposal, proper spill response procedures, and pump maintenance. In total, the supervisors observed usage of all 19 permanent and 15 mobile soak pits on a regular basis.

During IRS operations, all implementation staff had to adhere to environmental and human safety requirements for IRS. Appropriate PPE was issued to all spray personnel and others who might be exposed to insecticide. PPE included coveralls, gloves, boots, helmets, face shields, and dust masks. Supervision by AIRS staff and government inspectors ensured the continuous use of PPE by all affected personnel.

The inspection team paid special attention to the appropriate use of PPE, proper handling of insecticide, and correct mixing of insecticide, including the triple-rinse process for empty Actellic 300 CS bottles. The team observed that all the sites met the standards for IRS operations. Nevertheless, AIRS Zimbabwe, DEHOs, and supervisors provided refresher orientations and reminders throughout the spray campaign to ensure that EC requirements were always adhered to.

An independent EC assessment took place for the PMI AIRS Zimbabwe project during the second half of the spray program, from November 21 to November 30, 2016. The field evaluation focused on AIRS support of the Zimbabwe NMCP, which includes specific IRS activities, and use of OP in two PMI-supported OP-spraying districts in Manicaland province: Chimanimani and Mutasa. The evaluation assessed IRS program compliance with BMPs in all aspects of spray operations from storage sites, to

supervision, to PPE, spray, beneficiary communication, and wash operations. The USAID partner issued the final report, whose recommendations will be used to strengthen EC during the 2017 IRS campaign.

7.3 INCIDENTS

During the IRS campaign, two SOPs who were working in Mutare District passed away. The first one died on the first day of operations and the other on December 20, a day before the final day of IRS operations. The two incidents were investigated and the PMD has produced a report, which concluded that the deaths were not a result of insecticide poisoning but due to pre-existing medical conditions for the deceased SOPs. As a result of these two deaths, the Provincial Medical Directorate has determined to critically review its SOP recruitment criteria and process as well as the way SOP medical examinations are to be conducted prior to engagement of casual spray operators.

7.4 POST-SEASON ENVIRONMENTAL COMPLIANCE ASSESSMENT

Post-spray EC inspections will be completed during the first week of February and the exercise will be logged out using smartphones. During this period, three storage facilities and 19 soak pits at the operational sites will be cleaned. All sites will be well cleaned and locked according to BMP standards. The provincial warehouse still has some OP waste, empty bottles, which will be thoroughly cleaned once recycling is finished.

7.5 WASTE DISPOSAL

All solid waste materials will be disposed of in accordance with the PMI/IRS BMP. Four main forms of solid waste were generated during the 2016 IRS campaign:

- Empty bottles of Actellic 300 CS
- Empty cardboard boxes
- Used disposable respirators
- Well-washed damaged gloves, boots, and plastic sheets

The project incinerated 2,200kg of contaminated used disposable respirators, used mutton cloth and contaminated empty cardboard boxes at Hwange Colliery incinerator in February 2017. In March 2017, David Tebogo Investments, formerly Go Green Company, chipped and baled 11,960 kg of empty OP bottles and 3,640 kg of empty OP cardboard boxes generated from the 2016 spray campaign at the project's Mutare warehouse. The company will send chipped empty bottles to a South Africa-based company, for recycling into irrigation pipes, electrical conduits and refuse bins. Uncontaminated cardboard boxes will be recycled into tissue papers and covers for school workbooks. The AIRS ECO, an NMCP representative, and one representative from the Environmental Management Agency and the PMD's office observed the chipping and baling of the empty OP bottles in Mutare. The project gave away as a reward well-washed but damaged overalls to SOPs.

In January 2017, AIRS Zimbabwe finally incinerated and disposed of the expired Actellic 300CS insecticide left over from the 2014 IRS campaign at the Hwange Colliery incinerator. AIRS Zimbabwe had a stock of approximately 12,543 bottles of Actellic CS from the 2014 campaign that had expired in June 2015. The stock was tested and failed recertification and therefore could not be used in 2016. The supplier agreed to replace the stock with the new bottles for the 2016 campaign. The expired stock was incinerated in two stages. In the trial stage, 400 bottles were incinerated at Afrochine Chrome Smelters in Chegutu in May 2016 but the facility did not receive certification for such works from the Environmental Management Agency. As a next option, AIRS Zimbabwe conducted several inspections of the Hwange Colliery Company incinerator as part of the 2016 PSECA. These inspections identified several insufficiencies for proper disposal of IRS insecticide, and this resulted in many improvements

being made to the colliery. Once the improvements were made, the Environmental Management Agency gave the AIRS project approval to do a trial incineration of the expired insecticides, and 525 bottles were incinerated at Hwange Colliery Company in Hwange in September 2016. Following the successful trial, the colliery incinerated the remaining 11,618 bottles of expired Actellic 300CS, in January 2017.

8. MONITORING AND EVALUATION

8.1 2016 HYBRID M&E SYSTEM: STANDARD NMCP M&E METHODS WITH AIRS COMPONENTS

In 2014, AIRS Zimbabwe, in collaboration with the NMCP, created a data flow document that helped to eliminate parallel M&E systems and ensured district and provincial officials reviewed the data before approving and sending the data to the NMCP and AIRS Zimbabwe. The diagram in Annex E illustrates the data flow.

In 2016, data managers continued to use Microsoft Excel spreadsheet developed by the AIRS home office, into which they entered aggregated data at the end of each week. These spreadsheets were then collected and analyzed by the AIRS Zimbabwe M&E Manager for weekly reporting. Individual structure data were not entered or reported, as is typically done in other AIRS countries.

The data managers also submitted the totals in the weekly IRS summary sheet via the Frontline SMS system, which auto-integrated them into District Health Information System 2 (DHIS2). Hard copies of spray data were sent to DEHOs, PEHOs, and the NMCP after the data were submitted via Frontline, but these staff members had access to DHIS2 and could view IRS data at any time.

8.2 RESULTS OF 2016 IRS CAMPAIGN

All AIRS Zimbabwe performance indicators are presented in an M&E Plan matrix in Annex F. AIRS Zimbabwe sprayed 229,377 structures out of 240,044 structures found, resulting in 95.6 percent spray coverage that protects 550,475 people in the four supported districts. A breakdown of the 2016 IRS campaign results by district is shown in Table 12. Tables 13 and 14 provide information on insecticide usage collected during the spraying and insecticide-treated nets (ITNs).

TABLE 12. SUMMARY OF SPRAY COVERAGE DURING THE 2016 IRS CAMPAIGN

District	Structures Found	Structures Sprayed	% of Structures Sprayed	Population Protected					Overall Population		% of Population Protected
				Total	Males	Females	Pregnant Women	Children <5 Years	Total Found	Not Protected	
Chimanimani	43,383	36,954	85.2%	98,929	46,881	52,048	1,517	17,092	106,594	7,665	92.8
Mutare	91,320	88,078	96.4%	215,576	100,238	115,338	11,249	39,309	219,274	3,698	98.3
Mutasa	49,311	48,658	98.7%	114,239	52,945	61,294	1,868	19,646	114,807	568	99.5
Nyanga	56,030	55,687	99.4%	121,731	57,512	64,219	2,691	19,740	122,715	984	99.2
Total	240,044	229,377	95.6%	550,475	257,576	292,899	17,325	95,787	563,390	12,915	97.7

TABLE 13. SUMMARY OF INSECTICIDE USAGE DURING THE 2016 IRS CAMPAIGN

District	Structures Sprayed	Total Bottles Received	Total Used	Total Lost/Damaged	Total Left	# of Days Worked	Avg # of SOPs	Avg # Str Sprayed/Bottle	Avg # of Str Sprayed/SOP /Day	Avg # of Bottles/SOP /Day
Chimanimani	36,954	20,837	17,437	0	3,400	33	80	2.2	14	6
Mutare	88,078	43,982	42,336	0	1,646	32	170	2.1	16	8
Mutasa	48,658	24,913	22,813	0	2,100	31	98	2.1	16	8
Nyanga	55,687	26,788	22,888	0	3,900	31	99	2.4	18	8
Total	229,377	116,520	105,474	0	11,046		447	2.2	16	7

Note: The insecticide has a shelf life of two years after the date of manufacture. The 2016 insecticide balance was manufactured in July 2016 and will expire in June 2018. In 2017, the project will use the entire balance for the IRS campaign.

TABLE 14. SUMMARY OF ITN FINDINGS DURING THE 2016 IRS CAMPAIGN

District	Total ITNs Found	Pregnant Women Sleeping Under ITNs	Children <5 Years Sleeping Under ITNs
Chimanimani	27,495	715	8,366
Mutare	53,920	3,164	15,479
Mutasa	22,008	657	7,382
Nyanga	29,544	1,191	10,329
Total	132,967	5,727	41,556

Note: SOPs were instructed to collect data on pregnant women and children under five sleeping under ITNs for sprayed and unsprayed structures. However, they only recorded the data for sprayed structures.

8.1.1 REASONS STRUCTURES WERE NOT SPRAYED

Though in 2016 AIRS Zimbabwe sprayed 95.6 percent of eligible structures found, well in excess of the minimum threshold of 85 percent spray coverage, the NMCP spray data reported that 10,667 structures were not sprayed. According to the NMCP, and per discussions with the MOHCC and AIRS field observations, reasons for which structures were not sprayed were the following:

- Competing programs such as free maize seed distribution or community meetings coincided with spraying in some villages and so residents were not home to comply with spray preparations.
- Households had members who had asthma or who were infants and could not tolerate spray for health reasons.
- Households had only elderly members, who could not move furniture and other goods outside the structures before spraying and put them back afterward.
- Household owners were away doing gold panning or cross-border trade.
- Households were not warned in time to leave at least one adult to prepare structures for spraying due to being away from home for an extended time.
- Some people claimed that their religious doctrines do not allow chemicals on their walls.
- Drought in some areas reportedly prevented residents from supplying water for mixing the insecticide.

8.1.2 CHALLENGES TO HIGH-QUALITY DATA REPORTING

- Data are aggregated multiple times (i.e., Daily SOP form to Supervisory Summary form to Daily IRS Summary form to Weekly IRS Summary form) before being reported. This risks transcription error at each level of aggregation, jeopardizing data quality.
- Eligible structures are not assigned a unique IRS structure number and data are not entered into a pre-programmed validated database by structure, making it difficult to verify spray coverage data.
- Data are available to AIRS Zimbabwe on a weekly basis, not daily as in other AIRS countries, making it difficult to closely monitor spray progress and address operational concerns in “real time.” IRS data are also submitted to the NMCP weekly, slowing down its ability to respond to campaign challenges.

9. CAPACITY BUILDING

Capacity building is an ongoing process through which individuals, groups, and organizations enhance their ability to identify and overcome development challenges. AIRS Zimbabwe's role in capacity building is primarily to improve the knowledge and skills of the NMCP and MOHCC provincial and district personnel in the planning, implementation, and monitoring of IRS. This will ensure sustainability of IRS, EC, and entomological monitoring by the NMCP and MOHCC when PMI support ends.

AIRS Zimbabwe guiding partnership principles emphasize the importance of building relationships with local partners and strengthening their skills in various areas including strategic planning, leadership, operating systems (technical), advocacy, organizational management, and program development and management.

Following the experience that AIRS Zimbabwe has gained over the years within the country and from other AIRS country programs, as well as interactions and discussions with local stakeholders, gaps in knowledge and technical skill were identified, which necessitated capacity building. Various areas for capacity building were prioritized especially in IRS operations, and entomological surveillance and compliance. In 2016, AIRS Zimbabwe trained MOHCC staff and other malaria stakeholders on new concepts on EC, operations, entomology, and M&E:

- New knowledge was imparted to MOHCC staff on the need to fit and use constant flow valves on Hudson sprayers to improve spray quality.
- IRS supervisors were trained on mHealth, a system that allows for promptly highlighting IRS implementation challenges, triggering quick responses to the issues, and thus helping to improve IRS management in general. The IRS supervisors trained in mHealth were equipped with smartphones, which they used to collect IRS data and upload immediately to the next level for action.
- Nurses, DEHOs, PFOs, and IRS coordinators were trained in management of patients with insecticide poisoning as well as proper management of dog, snake and insect bites, which SOPs might incur in the field. Fortunately, no staff experienced either insecticide poisoning or bites during the 2016 IRS campaign.
- The knowledge and skills imparted to IRS managers during level 1, 2, and 3 training, SBCC and gender training, and M&E training motivated PEHO, DEHOs, PFOs, data managers, IRS coordinators, and IRS team leaders and supervisors to scale up their roles in IRS support and supervision in the targeted districts working closely with the AIRS Zimbabwe staff during the 2016 spray campaign.
- These officials were also helpful in community sensitization and mobilization especially in relatively resistant communities. In addition, they conducted some of the gender campaigns, and continue to be gender campaign champions in Manicaland province moving forward to IRS 2017 and beyond.
- The AIRS project supported the NMCP and Manicaland province by showing how to properly dispose of empty OP bottles and other waste through recycling. Having been trained in proper management of OP waste, it is expected that NMCP and provincial staff will be able to safely manage and provide technical assistance on OP waste management in an environmentally friendly manner throughout the country.

10. GENDER INTEGRATION

To comply with the overall PMI goal of addressing gender equality, inclusion, and women’s empowerment in malaria, especially IRS, AIRS Zimbabwe project contributed using the following strategies:

- *AIRS Zimbabwe gender focal person:* Following selection and attending the regional PMI AIRS project gender training in Rwanda in 2015, the gender focal person continued to train all AIRS Zimbabwe project staff on strategies that can be employed to improve female participation in IRS, especially IRS supervisory positions.
- *Training:* To further its progress toward PMI gender equality and female empowerment objectives, AIRS Zimbabwe conducted several gender integration trainings, especially for provincial and district health personnel. As in 2015, gender integration training was included in level 2 and 3 trainings.
- *Increased women’s recruitment:* The AIRS project integrated gender and non-discrimination practices into the recruitment of all spray operations personnel, including SOPs and washers. Of the 23 washers hired for the 2016 IRS campaign, the vast majority were female (20 females, 3 males), and there was at least one female data manager in Mutasa district and one female warner/mobilizer using a motorcycle in Nyanga district. Female cadre engaged during the 2016 IRS almost doubled as compared to 2015 (Table 15). Female participants were encouraged to join surveillance activities when the project recruited local youths for routine entomological surveillance at 19 sentinel sites.

TABLE 15. FEMALE RECRUITMENT, 2014-2016

Year	Supervisory roles			Other roles					Total
	T/Leader	IRS supervisor	Total	Data manager	SOP	Washers	Warners	Total	
2014	5	11	16	0	2	0	0	2	18
2015	1	26	27	1	10	9	1	21	48
2016	8	32	40	1	22	20	1	44	84

- *Gender friendly work environment:* To strengthen gender integration and female empowerment, the project had well-demarcated accommodations and washing facilities for females and males at campsites, as well as provision of adequate and safe water supplies to promote female hygiene. Also, light-sole rubber boots were procured to ease movement of the female SOPs.
- *Gender norms survey* AIRS project conducted a Gender Norms evaluation among SOPs at the beginning and end of the 2016 IRS campaign. Results of the evaluation will be presented in a separate project report on gender.



A Female Supervisor Using Smartphone during mHealth Training

11. CHALLENGES AND RECOMMENDATIONS

The following challenges, lessons learned, and recommendations were identified during the 2016 spray campaign.

11.1 CHALLENGES

- Concern has been raised by the province and district officials about the current 5- day duration of the Level 3 training.
- Another concern the provincial post-IRS review meeting raised is the high daily targets set for the SOPs (36 rooms /18 structures) with recommendation to reduce them to 32 rooms/16 structures per SOP per day.
- Failure by some SOPs to closely follow guidance on home preparations. The team agreed to improve the mobilization efforts next year to minimize this issue.
- SOPs experienced blockages of sprayers due to insecticide that did not mix well with water; the mixture remained with suspended granulated material that blocked the strainers and nozzle tips. SOPs were advised to use mutton cloth to remove the OP crystals. In addition, batches of OP samples were taken to UK lab for testing.
- Not every SOP used mutton cloth to filter the OP. We agreed to reinforce such use and will do an orientation on how to use it (one layer of cloth, not two).
- Some SOPs were sloppy when mixing insecticide, letting it splash on the ground.
- Some SOPs were observed walking between houses with lances not tacked into the pumps and at times SOPs would carry the lances in their bare hands. The lances should be inserted as soon as spraying ends. SOP must have their gloves on all the time.
- Some SOPs damaged the gloves and boots within few days after the campaign started and required replacement.
- Team leaders and supervisors were not able to regularly charge their phones for mHealth activity. Additional charging outlets were procured and provided at each campsite.

11.2 RECOMMENDATIONS

- The project will strengthen the training of SOPs, supervisors, and team leaders on quality and requirements for home owner preparation. An additional solution to this problem would be providing each SOP with an extra plastic sheet to cover bulky objects inside the houses.
- Although the project had been requested by the province to consider extending the Level 3 training period from 5 to 7 days, due to budgetary constraints, we will instead negotiate for more of the 5- day training period to be devoted to practicals instead of theory to allow for more hands on training before SOPs are deployed into the field.
- The project should consider reducing the daily spray targets for SOPS from 18 to 16 structures per

day in line with the national targets of 32 rooms per SOP per day.

- To reduce further the number of refusals and locked rooms the project will improve the community mobilization, warning and deployment systems by strengthening the involvement of local community based health workers, local leaders and influential people including chiefs ,headmen, religious leaders, councilors and school health committees.
- To eliminate potential contamination during insecticide mixing process, the project will adjust mixing procedures. AIRS Zimbabwe will issue guidance to all SOPs to conduct triple-rinsing of an OP bottle above the pump opening to minimize splashing water onto work surfaces. On-the-spot training and coaching as well as reminders during the morning mobilization took place to minimize this issue during the 2016 campaign. In 2017 IRS campaign, all SOPs will be supplied with two ground sheets each of the recommended sizes and replace those torn with new ones.
- AIRS Zimbabwe communicated to all team leaders the importance of tackling the lances into a lance holder of a pump upon completion of spraying a house, and wearing full PPE including gloves while moving from house to house
- The project will follow up with the home office on the quality of gloves and boots procured for the 2016 campaign but also will add into the Level Three training a session on importance to take care of the PPEs and other materials as well as spray equipment.
- The project will procure more adaptors, sockets, and solar panels to facilitate charging of cellphones and smartphones to strengthen mHealth dissemination and completion of supervisory checklists and SMS messaging.
- AIRS Zimbabwe team will collaborate with PMI , NMCP and PMD to review and strengthen casual spray personnel criteria for recruitment, medical examinations and health screening before and during spray operations. Medical examinations prior to recruitment will be conducted over a two day period, instead of the current one day period, at designated District Hospitals in the four districts. Requisite laboratory support and materials will need to be availed. Government Medical Officers will be part of the IRS team and check SOPs who fall sick before they are readmitted back into their respective team for spray operations after a period off sick. PMD staff from the Human Resources Department will be involved in the recruitment exercise.

ANNEX A. INVENTORY OF STOCK AND QUANTITIES POST-SPRAY

TABLE A-I. IRS 2016 INTERNATIONALLY PROCURED ITEMS

Item	Balance from 2015	Quantity procured	Total	Quantit y used	Quantity damaged
<i>Pesticide</i>					
Actellic 300 CS	0	116,520	116,520	105,474	0
<i>PPE</i>					
Coverall	369	1,103	1,472	1,472	870
Boots	128	710	838	722	431
Face Shield	4	510	514	514	514
Hand Gloves	0	698	698	698	242
Hard Hat	406	323	729	729	0
Respirators	20,520	8,160	28,680	20,100	0
<i>Pumps and Accessories</i>					
Hudson (10 ltr)	100	184	284	284	0
Goizper pump	245	0	245	0	0

TABLE A-2. IRS 2016 LOCAL PROCUREMENT ITEMS

Item	Balance from 2015	Quantity procured	Total	Quantity used	Quantity damaged	Quantity remaining after campaign
PPE						
Apron	32	25	57	34	20	37
Cotton Socks	10	1370	1380	1380	1380	0
Raincoats	278	423	701	701	322	379
Face Shield brackets	503	262	765	514	112	653
IRS Reusable						
Calculator	0	24	24	24	10	14
Fire Extinguisher	16	0	16	16	0	16
Padlock	50	20	70	59	0	11
Tool kit	0	8	8	8	3	5
Rinsing Cup	374	391	765	0	219	546
Spray Bag	251	442	693	0	53	640
PVC Spread Sheet	15	60	75	47	47	28
Laptop	4	0	4	4	0	4
Spill storage clear bags	0	700	700	700	700	0
Progressive Rinsing Drums 200l	19	0	19	19	0	19
Water Buckets	219	195	414	414	8	406
Spray operator mattresses	359	338	697	687	10	687
Shovels	3	10	13	13	0	13
Spill kits	42	10	52	52	12	40
Solar Lamp	0	12	12	12	6	6
First Aid Kits	0	20	20	20	0	0
Loud hailers	25	4	29	29	3	26
Tents	42	40	82	82	0	82
Tarpaulin	5	4	9	9	0	9
Nylon Rope	30	10	40	13	20	7
Petrol Can 20Litre	2	0	2	2	0	2
Scissors	2	0	2	2	0	2
Nozzles	0	100	100	100	100	0
Torches	180	260	440	440	87	353

Item	Balance from 2015	Quantity procured	Total	Quantity used	Quantity damaged	Quantity remaining after campaign
Black Pvc Bins 50 Litres	46	55	101	97	16	85
Electricity Adaptors	0	13	13	13	2	11
IRS Consumables						
Nozzle Brush						
Towel	0	694	694	694	694	0
Mutton Cloth	6	445	451	447	0	4
Print Materials						
Team leader summary books	0	25	25	25	0	0
Daily Spray Operator's books	83	800	883	635	0	248
Spills response Procedures	40	100	140	130	0	10
Enday of Day Clean-up Checklist	195	1,000	1,195	1,095	0	100
Error Elimin/ Team Leader Card	200	1,000	1,200	1,100	0	100
Home Owner Prep. Checklist	280	1,000	1,280	1,080	0	200
Storerom Danger Warning Signs	6	46	52	43	0	9
Temperature Recording sheets	50	100	150	110	0	40
Motor cycle Log Sheets	100	100	200	120	0	80
Vehicle Hire log book	6	16	22	17	0	5
IRS Mobiliser Book	225	200	425	200	0	225
A3 stickers	0	40	40	33	0	7
PPE distribution forms	0	1,000	1,000	1,000	0	0
Material safety Data sheets	0	100	100	85	0	15
Performance Tracker	0	16	16	16	0	0
Stock Card	0	1,000	1,000	1,000	0	0
Storekeeper Performance Checklist	0	1,000	1,000	600	0	400
Daily Spray Operator Health Check list		200	200	200	0	0
Mobile Phone For Reporting						
Huawei Ascend Y511	65	0	65	65	0	65
Huawei Ascend Y5C	0	72	72	72	1	71
Nokia Asha	0	8	8	4	0	8

ANNEX B. PHONE-BASED IRS SUPERVISORY RESULTS

I. Storekeeper Performance Inspections

TABLE B-1.SUMMARY OF STOREKEEPER PERFORMANCE INSPECTIONS

District	Number of Forms Targeted	Number of Forms Filled	Non-compliance Observations
Chimanimani		5	5
Nyanga		2	0
Mutasa		9	3
Mutare		15	19
Total		402	31

AIRS Zimbabwe targeted to complete a total of 402 storekeeper performance forms for the 2016 IRS season. Preliminary data indicates that only 13% was completed. Each of eight IRS coordinators and four AIRS staff were supposed to fill in the forms on daily basis, and MOHCC staff had to fill in additional seven forms on a weekly basis. AIRS Zimbabwe team is checking if some of the forms are still not synchronized with the main database and are sitting in the phones.

The following major non-compliance issue stood out as the most frequently observed:

Unavailability of OP poisoning management antidotes at nearby health centers was 30 percent (8/27). The MOHCC policy is that antidotes should only be kept at national, provincial, and district hospitals. It is understood though that this shortcoming does not reflect performance of a storekeeper.

2. The next reported shortcoming was lack of thermometers (5/27).

Morning Mobilization and Vehicle Inspection

TABLE B-2.SUMMARY OF MORNING MOBILIZATION AND VEHICLE INSPECTIONS

District	Number of Forms Targeted	Number of Forms Filled	Non-compliance Observations
Chimanimani		97	3
Nyanga		81	5
Mutasa		14	1
Mutare		197	90
Total		477	389

In total, supervisors completed 82 percent of the targeted number for this inspection. Each of the 8, IRS coordinator and five AIRS staff members were supposed to fill the form on a daily basis. MOHCC staff had to fill in additional seven forms on a weekly basis.

Team leaders were responsible for filling daily health checks for spray operators.

However, not all supervisors were able to visit campsites on a daily basis to conduct the morning mobilization due to other competing issues.

In total, 99 non-compliance issues were observed, 1 percent of all the issues that were looked at.

Out of 99 non-compliance issues reported, the major issues noted on morning mobilization and transportation vehicle inspection were:

- SOPs are not in full PPE before boarding truck (42.4 percent 42/99)
- Failure to display accident reporting procedures by drivers (14.1 percent 14/99).

3. Homeowner Preparation and Spray Operator Performance Inspections

TABLE B-3.SUMMARY OF HOMEOWNER PREPARATION AND SPRAY OPERATOR PERFORMANCE INSPECTIONS

District	Number of Forms Targeted	Number of Forms Filled	Non-compliance Observations
Chimanimani		2133	159
Nyanga		1606	160
Mutasa		1917	389
Mutare		4,168	1,060
Total	23,082	9827	1,768 (1,768/276,339; 0.6%)

For this inspection, supervisors completed 42.5percent of the forms. The field supervisors, team leaders and AIRS staff had a target of five forms per day. The MOHCC officials had a weekly target of 42 forms to fill in in total. Occasional lack of connectivity, access to power, technical problems from the service provider (Econet), and technical problems with the CommCare application prevented the target number of electronic forms being completed.

In total, 1,768 non-compliance issues were recorded, which is 0.6 percent of all the issues that that were looked at. The following were the major non-compliance issues observed:

- Failure to observe a 5 cm overlap when spraying with an 8002E nozzle was noted on 5.5 percent (98/1768) of reports. The action by SOPs was in line with the NMCP policy of not leaving an overlap when using an 8002E, while the BMP Manual has different guidance.
- Failure to notify residents earlier, which also stood at 5.5 percent (98/1768).
- Leaking sprayers observed were 6.7 percent (118/1768) and repairs were made.
- Failure to put on full PPE was the highest non-compliance issue at 52.9 percent (935/1768). Flashlights were the piece of equipment most frequently recorded as missing.
- Approximately 164 non-compliance incidents (164/1768, or 9.3 percent) were the spraying of rooms with sick people. This could be a reporting error, where IRS supervisors did not understand the

question or ticked the smartphone wrongly as all supervisors and SOPs are trained to check a room before spraying and ensure that elderly and/or sick persons and babies are moved outside. If the person cannot be moved, the room is not sprayed.

4. End-of-day Clean-up Inspections

TABLE B-4.SUMMARY OF END-OF-DAY CLEAN-UP INSPECTIONS

District	Number of Forms Targeted	Number of Forms Filled	Non-compliance Observations
Chimanimani		52	3
Nyanga		32	9
Mutasa		17	3
Mutare		148	8
Total	1062	249	23 (23/13,944; 0.16%)

In total, supervisors completed 23 percent (249 forms) of the targeted forms. Every team leader and four AIRS staff were expected to fill in one form per day. MOHCC staff had a weekly target of 42 forms.

The following were the major noncompliance issues observed on end-of-day clean-up inspections:

- Eating or drinking while in PPE was 17.4 percent (4/23)
- Failure to place covers on triple-rinse drums was 21.7 percent (5/23)

GENERAL COMMENTS

The 2016 campaign was the second time for the IRS workers to use smartphones. With a greater number of SOPs, more supervisors were needed, and some senior SOPs were promoted to supervisor. As a result, many supervisors were not familiar with the phone-based supervisory application and made many mistakes or wrong entries early in the campaign. It was also noted that some field supervisors and IRS coordinators did not understand questions either. This lack of understanding resulted in coding incorrect or inconsistent data, which, at times, misrepresented what was happening in the field. The AIRS Zimbabwe project team addressed all issues fully during the campaign using on-the-job trainings and on-site feedback to spray teams.

Among the challenges encountered were the following:

- Most of the phones bought last year had faulty batteries that could not hold a charge for a full day; hence, supervisors only managed to fill in a few forms in the morning, before the batteries lost power.
- The CommCare application had some early-on challenges, which the home office addressed; in the meanwhile, supervisors used hard copies.
- All the old phones with old lines were affected by the service provider's (Econet) system upgrade and failed to transmit forms. Some supervisors again resorted to hard copies until they were advised

to continue using smartphones and save completed forms for later submission, after the system had been attended to.

- The greatest challenge was the lack of electricity/power to charge the phones. Some campsites (e.g., Dombo in Nyanga and Nyagundi in Mutare) had no electricity at all. In some areas, heavy rains caused days-long electrical outages (e.g., Ngorima campsite was without power for four days). Some campsites had electricity only in the associated clinic; this compromised phone security and also the ability to charge all the phones at the same time.

ANNEX C. IRS ENVIRONMENTAL MITIGATION AND MONITORING REPORT

Implementing Organization: **Abt Associates**

Geographic location of USAID-funded activities: **Manicaland (Mutare, Mutasa, Nyanga and Chimanimani)**

Period covered by this Reporting Form and Certification: **1 March 2016 -28 February 2017**

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
Ia. Pre-contract inspection and certification of vehicles used for pesticide or spray team transport	Pre-contract inspection and certification of vehicles was conducted in the last week of September 2016. Initial inspections by the AIRS ECO, operations manager, and Government of Zimbabwe Vehicle Inspection Department found defects, all of which were fixed so that all vehicles met all certification criteria. A total of 13 lorries were certified for the 2016 spray operations.	No outstanding issues	After repairs to the vehicles there was total compliance.
Ib. Storekeeper training	All storekeepers, IRS coordinators, DEHOs, and team leaders were trained on how to handle IRS equipment and health and safety issues.	No outstanding issues	The training was combined with guard training. There was total compliance.
Ic. Guard training	All security guards, IRS coordinators, DEHOs, and team leaders were trained on how to handle IRS equipment, security, and health and safety issues.	No outstanding issues	The training was combined with storekeepers training. There was total compliance.
Id. Driver training	All drivers, IRS supervisors, coordinators, and DEHOs were trained in Mutare on October 5. Topics included safety measures for transporting insecticides, accident and spills response procedures, and safe driving techniques.	No outstanding issues	Drivers were trained separately from guards and storekeepers. There was total compliance.
Ie. Training of clinical health workers in insecticide poisoning management	Training was done on roles and responsibilities of clinicians in IRS, chemical handling and safety, hazard analysis, hazard mitigation plans, pesticide poisoning, poisoning management, management of snake bites, and contingency planning.	No outstanding issues	There was total compliance.

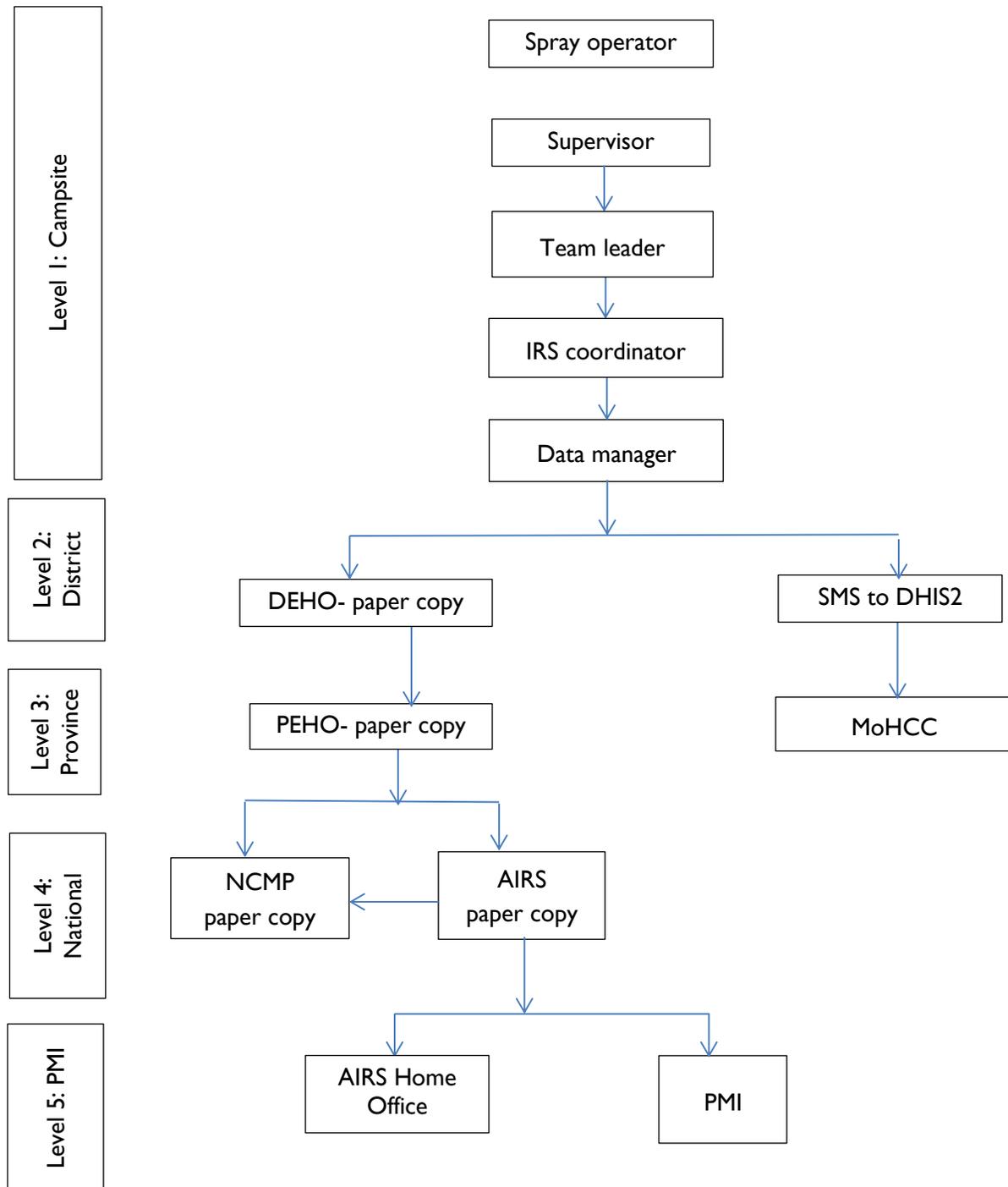
Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
If. Cell phone, PPE, and spill kits on board during pesticide transportation.	All drivers had cell phones as a pre-requisite to their vehicles being rented. All were given a set of PPE to use when transporting insecticides and/ or spray team members. Each vehicle used for the transport of pesticides was equipped with a spill kit. A total of 389 morning mobilization vehicle inspections were conducted during the 2016 spray campaign. On 372 occasions, the vehicle had all required PPE and spill kits.	No outstanding issues	Spill kit were provided after certification and training. There was total compliance.
Ig. Conduct initial and 30-day pregnancy testing for female candidates for jobs with potential pesticide contact	Before Level 3 training, 85 females (SOPs, washers, and supervisors) were screened for pregnancy. A second screening was done before the second phase of IRS began (in November).	No outstanding issues	No females were found to be pregnant during all tests. All test records are available on file. There was total compliance.
Ih. Conduct medical examination to spraying teams for health fitness testing for all operators	All 704 spray personnel candidates had the required pre-spray general physical/ medical examination on October 17-18; all were declared to be medically fit for training as spray team members. The exam included checking blood pressure, respiratory system, pulse, vision, ear nose and throat, chest condition, allergies to OPs and Locometer system. The exam was conducted by qualified Medical Officers from government health facilities.	No outstanding issue	All candidates passed the medical examination. The physical examination records are available on file.
Ii. Procurement of, distribution to, and training on the use of PPE for all workers with potential pesticide contact	Both international and local procurements for PPE were done on time. The PPE was received and distributed to all operations sites on time, before the spray campaign started. Also, all candidates with potential pesticides contact were fully trained on correct PPE use.	No outstanding issue	There was total compliance.
Ij. Training on mixing pesticides and the proper use and maintenance of spray pumps	At both TOT (Level 2) and district-level 3 SOP trainings, trainers demonstrated the proper mixing of pesticides including triple rinse of the Actellic 300 CS bottles. The trainings also demonstrated the proper use and maintenance of spray pumps. All supervisors, IRS coordinators, team leaders, SOPs, and government officials (field officers and ECOs in the targeted districts) were trained, a total of 704 people.	No outstanding issue	There was total compliance.
Ik. Provision of adequate facilities and supplies for end-of-day clean-up	Each IRS campsite had an adequate storage facility that was either provided by the MOHCC or health centers, or rented from an individual. All facilities were compliant, and had the materials required for clean-up. A total of 249 end-of-day inspections were conducted. 704 SOPs and supervisors were issued soap for bathing.	No outstanding issue	Adequate water, barrels, wash basins, soap, and detergents were available at all times at each operations site. Washing facilities for both female and male SOPs and

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
			supervisors were provided at all campsites for total compliance.
11. Enforce clean-up procedures	All clean-up procedures were inspected as scheduled. Sprayer clean-up procedures were done in the soak pits as required and supervised by the IRS coordinators every day throughout the spray campaign. Washing or bathing were supervised by team leaders and field supervisors. ECOs, COP, DEHOs, and operations managers supervised clean-up procedures when present at any operations site. The 249 end-of-day inspections conducted identified 23 instances of non-compliant clean-up procedures and the appropriate advise was given to SOPs, who were drinking while still in some PPE.	No outstanding issues	
2a. IEC campaigns to inform homeowners of responsibilities and precautions	Homeowners were fully informed about their roles, responsibilities, and precautions mainly through house-to-house mobilization. In addition, community meetings and discussions highlighted the roles, responsibilities, and precautions for homeowners before, during, and after their homes are sprayed.	No outstanding issues	There was total compliance.
2b. Avoidance of spraying houses that are not properly prepared	All houses/structures that were sprayed were properly prepared. All homeowners, SOPs, team leaders, and field supervisors were trained on how to prepare structures before spraying is done. Of the 9,531 homeowner preparation inspections carried out, only 8 indicated that homeowners and SOPs were non-compliant with preparations of houses before they are sprayed.	No outstanding issues	.
2c. Check for two-hour exclusion from house after spraying	SOPs reminded households to wait two hours after spraying before they opened the rooms to allow circulation of air for at least 30 minutes before cleaning. Homeowners were advised to bury dead insects and wash their hands with soap and water after cleaning.	No outstanding issues	There was total compliance.
2d. Instruct homeowners to wash itchy skin and go to health clinic if symptoms do not subside	All homeowners were instructed to wash with plenty of water and soap if any household member experienced itching skin, and to visit the nearest clinic if itching persisted. No incidences of itchness were reported.	No outstanding issues	
3a. Indoor spraying only	SOPs sprayed only the indoors of sleeping rooms. This included inner walls, ceiling, and eaves of all sleeping rooms.	No outstanding issues	There was total compliance.
3b. Training on proper spray technique	All SOPs and team leaders were trained on standard spray techniques during Level 3 training. This included emphasizing standing 1 meter away from the “sprayable” surface, keeping the nozzle tip 45 cm from the sprayable surface, and spraying at	No outstanding issues	The major issue noted was that the type of nozzle (8002E) that the NMCP

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
	the correct speed. There was constant supervision in the field to ensure that SOPs adhered to all BMP standards.		dierects does not require an overlap. Yet the checklist based on the BMP requires an overlap of 5 cm.
3c. Maintenance of spray pumps	SOPs, supervisors, and team leaders were trained in pump maintenance during Level 3 training. Pumps were checked daily before use by the spray pump technician. During the supervision of SOPs, 118 incidences of leakages were observed and the parts of pumps that were found to be faulty were replaced.	No outstanding issues	There should be at least one spray pump technician in each district to service the pumps on weekly basis.
4a. Disposal of IRS liquid wastes according to PMI BMPs	All IRS campsites were provided with soak pits for disposal of IRS liquid waste. All operations sites were inspected to ensure that they meet BMP standards before they were certified for use. Also, SOPs' washing slabs were provided at all campsites to facilitate their decent bathing.	No outstanding issues	There was total compliance.
4b. Provision of soak pits with charcoal to adsorb pesticide from rinse water	Each camp was provided with a soak pit. All soak pits had five layers, of sawdust, charcoal, bigger stones, smaller stones, and gravel as the top layer, in the appropriate dimension of 2 × 1 × 1 meters. The progressive rinsing slab was provided adjacent to the soak pit. Dora and Nyagundi soakpits had their layers of aggregate replaced to improve their efficiency, and they were sloped toward the bio-bed. The repairs were supervised by AIRS ECO and DEHOs. 15 mobile soakpits were assembled and installed at the new Dombo campsite in Nyanga.	No outstanding issues	There was total compliance.
Provision of latrines and bathing facilities at IRS campsites	A total of 22 latrines were constructed at 11 IRS camping sites before the start of the IRS campaign. One latrine was provided at Gatsi storeroom in Mutasa. Bathing facilities at all campsites were upgraded so that they could accommodate more SOPs at the same time.	No outstanding issues	There was total compliance
4c. Maintain soak pits as necessary during season	All soak pits were refurbished according to BMP standards. During the entire spray period, there was no need to do any form of renovation. All soak pits lasted throughout the spray campaign without any problems.	No outstanding issues	There was total compliance.
4d. Inspection and certification of solid waste disposal sites before spray campaign	All combustible solid waste generated will be incinerated at Hwange Colliery, Hwangwe, and empty bottles will be recycled at David Tebogo Investments formerly Go Green, Harare, in collaboration with its South African partner. These facilities are certified by Enviromental Management Agency.	Incineration and recycling will be done in February 2017	
4e. Monitoring waste storage and management during campaign	All waste materials were stored and managed according to PMI BMPs during the spray campaign. Generally, there was clear labeling of sacks/ boxes for storing used nose masks, hand gloves, and all other waste that was generated. However, there was one instance where such labeling was not done.	No outstanding issues	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
4f. Monitoring disposal procedures post-campaign	Waste disposal will be done at Hwange Colliery, which has already been inspected and meets requirements for waste disposal. The ECO will monitor the post-spray campaign solid waste management procedures.	IRS waste to be sent to Hwange Colliery	All solids including triple-rinsed empty Actellic 300 CS bottles are currently being stored in the provincial warehouses in Mutare. Recycling will be completed by February 2017.
5a. Maintain records of all pesticide receipts, issuance, and return of empty sachets/bottles	Records of all pesticides receipts, issuance, and returned empties were kept on stock cards with a backup in a ledger books at the regional, district, and operations site-level.	No outstanding issues	There was total compliance.
5b. Reconciliation of number of houses sprayed vs. number of sachets/bottles used	In Zimbabwe, the average number of structures sprayed per bottle is 2.2. This indicator was calculated daily throughout the spray campaign to ensure that insecticides usage was consistent with number of structures sprayed.		There was total compliance.
5c. Conduct inspections to observe homeowner preparation and the correct application of insecticide on the walls	Team leaders, field supervisors, senior supervisor, operations manager, and COP performed a total of 9,531 spot checks in sprayed houses to verify/confirm insecticides application. This was mainly done through visual examination of sprayed walls, eaves, and ceilings.	No outstanding issues	There was total compliance.
5d. Perform physical inventory counts during the spray season	ECO, warehouse consultant, storekeeper, operations manager, and COP performed regular inventory counts throughout the spray campaign across all the operations sites. 2 improperly managed stocks were observed and the the storekeepers were advised to regularly update their inventories	No outstanding issues	All inventory stock cards are available and were used for final inventory reconciliation.

ANNEX D. AIRS ZIMBABWE DATA FLOW PLAN



ANNEX E. MONITORING AND EVALUATION PLAN

INDICATOR MATRIX

UPDATED: March 10, 2017

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

			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
1.1.4 Number and percentage of local procurements for PPE delivered 14 days before the start of spray operations	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	1; 100%	1; 100%	2; 100%	2; 100%	100%	
1.1.5 Successfully completed spray operations without an insecticide stock-out	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
1.2 In-Country Exemption and Custom Clearance Process								
1.2.1 Complete exemption and clearance process within the minimum 2 weeks	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
1.3 In-Country Logistics, Warehousing, and Training								
1.3.1 Number and percentage of logistics and warehouse managers trained in IRS supply chain management	<i>Data source:</i> Training records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign By Gender	38; 100%	10 ¹ ; 100% (8 Males, 2 Females)	12; 100%	12; 100%	TBD; 100%	
1.3.2 Number and percentage of base stores where physical inventories are verified by up-to-date stock records	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	20; 100%	20 ² ; 100%	21; 100%	21; 100%	TBD; 100%	

¹ The target for this indicator was set with incorrect understanding to report on how many people will be trained on logistics and warehouse total. The indicator definition asks for number of logistics and warehouse managers trained.

² While the project inspected 23 only 20 stores were used.

			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
1.3.3 Submit up-to-date inventory records 30 days after the end of each spray campaign	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	Completed	Completed	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	<i>Data source:</i> Project records <i>Reporting frequency:</i> Annually	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
2.1.2 Percentage reduction in project operational expenses per structure from the previous year, excluding insecticide costs .	<i>Data source:</i> Project financial records <i>Reporting frequency:</i> Annually	By Spray Campaign	5%	-18% ³	5%	-10%	5%	
2.2 Support of Safety and Health Best Practices and Compliance with USAID and Host Country Environmental Regulations								
2.2.1 SEA/letter reports submitted on time based on schedule agreed upon with the-PMI COR team	<i>Data source:</i> Project records – submitted SEAs/ letter reports <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
2.2.2 Number of spray personnel trained in EC and personal safety standards in IRS implementation	<i>Data source:</i> Project records – <i>Training reports</i> <i>Reporting frequency:</i> Each spray season	By Spray Campaign By Gender	388	415 (354 males, 61 females)	689	704 (620 males, 84 females)	TBD	
2.2.3 Number of health workers	<i>Data source:</i> Project records –	By Spray	38	11 ⁴	43	34 (16 males,	TBD	

³ Dimagi subcontract and M&E and IT consultants hired at a higher rate than in previous year are the main contributors to increased operational costs of the 2015 campaign.

			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
receiving insecticide poisoning case management training	<i>Training reports</i> <i>Reporting frequency:</i> Each spray season	Campaign By Gender		(1 male, 10 females)		18 females)		
2.2.4 Number of adverse reactions to pesticide exposure documented	<i>Data source:</i> Incident report forms <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign By Residential/occupational exposure	0	0	0	0	0	
2.2.5 Number and percentage of soak pits and storehouses inspected and approved prior to spraying	<i>Data source:</i> Project records – Reports submitted by district environmental officers <i>Reporting frequency:</i> Each spray season	By Spray Campaign By Soak Pit By Storehouse	46; 100% Soak pits: 23 Storerooms: 23	46; 100% Soak pits: 23 Storerooms: 23	55; 100% Fixed soak pits: 19 Mobile soak pits: 15 Storerooms: 21	54:98% Fixed soak pits: 18 Mobile soak pits: 15 Storerooms: 21	TBD; 100%	
2.3 Conduct Communications Activities and Community Mobilization								
2.3.1 Number of radio spots and talk shows aired	<i>Data source:</i> Project records <i>Reporting frequency:</i> Per spray campaign	By Spray Campaign	30,000	0 ⁵	TBD	43	TBD	
2.3.2 Number of IRS print materials disseminated	<i>Data source:</i> Project records	By Spray Campaign	70,000	30,510 ⁶ (30,000)	20,000	39,960 (39,000)	TBD	

⁴ The target for this indicator was set with incorrect understanding to report on how many people will be trained on insecticide poisoning case management. The indicator definition asks for number of health workers trained.

⁵ IRS communication was conducted by another contractor, and AIRS Zimbabwe was only responsible for ensuring the content sufficiently covered IRS, LLIN distribution, and malaria case management. AIRS Zimbabwe was not, however, responsible for the dissemination of the radio spots.

⁶ PMI budget for print materials was predominantly allocated to PSI.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
	<i>Reporting frequency: Semi-annually</i>	By Type of printed material and message(s)		brochures; 200 posters; 310 calendars)		pamphlets, 960 posters)		
2.3.3. Number of people reached with IRS messages via door-to-door mobilization	<i>Data source: Mobilization Data Collection Forms</i> <i>Reporting frequency: Daily per mobilization conducted</i>	By Spray Campaign By Gender	N/A ⁷	13,006 (8,007 females 4,999 males)	182,713	241,200 ⁸	TBD	
2.4 Spray Targeted Structures According to Technical Specifications								
2.4.1 Number of structures targeted for spraying	<i>Data source: Previous spray campaign data, enumeration data (targets); Daily Spray Operator Forms (results)</i> <i>Reporting frequency: Daily per spray campaign</i>	By Spray Campaign	163,922	171,736	256,478	240,044	TBD	
2.4.2 Number of structures sprayed with IRS	<i>Data source: Daily Spray Operator Forms</i> <i>Reporting frequency: Daily per spray campaign</i>	By Spray Campaign	139,334	162,127	218,006	229,377	TBD	
2.4.3 Percentage of total structures targeted for spraying	<i>Data source: Daily Spray Operator Forms</i>	By Spray Campaign	85%	94.4%	85%	95.6%	85%	

⁷ Historically, AIRS Zimbabwe has not has access to this data, therefore, it was difficult to ascertain a target number of individuals who are likely to be reached with messages via door-to-door mobilization.

⁸ The result is comprised of an estimate of 94,200 that EHTs provided and an estimate of 147,000 that warners provided. The warners use several methods for IRS mobilization which include door to door, schools, church gatherings, community meetings, community influential leaders, and loud hailers. These communication methods present challenge for warners to collect accurate data.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results						
			Year 1		Year 2		Year 3		
			Target	Results	Target	Results	Target	Results	
that were sprayed with a residual insecticide (Spray Coverage)	<i>Reporting frequency:</i> Daily per spray campaign								
2.4.4 Number of people residing in structures sprayed (Number of people protected by IRS)	<i>Data source:</i> Daily Spray Operator Forms <i>Reporting frequency:</i> Daily per spray campaign	By Spray Campaign By Gender By pregnant women By children <5 years old	351,575. 172,272 males; 179,303 females 3,516 pregnant women 52,736 Children <5 years old	365,425 (170,888 males, 194,537 females, 5,763 pregnant women, 62,937 children <5)	515,884	550,475 (257,576 males, 292,899 females, 17,325 pregnant women, 95,787 children <5)	TBD		
Component 3: Ongoing Monitoring and Evaluation and Quality Control Measures									
3.1 Submit AIRS Zimbabwe M&E Plan to PMI for approval	<i>Data source:</i> Project records <i>Reporting frequency:</i> 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	<i>Data source:</i> Spray operations reports <i>Reporting frequency:</i> Per spray campaign	By Spray Campaign	N/A	N/A	Completed	TBA	Completed	Completed	
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	<i>Data source:</i> Project records – Activity reports <i>Reporting frequency:</i> Semi-annually	By Spray Campaign By Guideline/checklist/tool	2	3 (Data collection Verification, Error Eliminator, Home Preparation)	2	2 (data collection verification form, use of constant flow regulator)	TBD		

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
4.2 Number of articles/best practices documents published	<i>Data source:</i> Project records – Activity reports <i>Reporting frequency:</i> Semi-annually	By Spray Campaign By IRS Technical Area	1	0	1	0	TBD	
4.3 Number of best practice presentations given at national/regional/international workshops and conferences	<i>Data source:</i> Project records – Activity reports <i>Reporting frequency:</i> Semi-annually	By Spray Campaign By IRS Technical Area	5	3 (two posters at ASTMH and one APHA presentation)	3	5	TBD	
4.4 Number of enterprises engaged through public-private partnerships	<i>Data source:</i> Project records – Activity reports <i>Reporting frequency:</i> Semi-annually	By Spray Campaign	5	4 (HEDEC, Go Green, ZIMASCO, Tongaart Hullet)	3	5 ⁹	TBD	
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 AIRS Zimbabwe established to monitor vector bionomics and behavior (vector species, distribution, seasonality, feeding time, and location)	<i>Data source:</i> Entomological reports <i>Reporting frequency:</i> Annually	By Spray Campaign	20	20	20	20	20	

⁹ Hwange Colliery, Afrochine Smelting Company, Go Green, Diamond Radio Station, Africa University, Notre Dame University.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
5.1.2 Number and percentage of entomological monitoring sentinel sites measuring all the five primary PMI entomological monitoring indicators	<i>Data source: Entomological reports</i> <i>Reporting frequency: Annually</i>	By Spray Campaign By Type of Insecticide	3	3	3 (4)	4 (100%)	3	
5.1.3 Number and percentage of entomological monitoring sites measuring at least one secondary PMI indicator	<i>Data source: Entomological reports</i> <i>Reporting frequency: Annually</i>	By Spray Campaign By Type of Insecticide	N/A	N/A	20 ¹⁰	8	20	
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	<i>Data source: Entomological reports</i> <i>Reporting frequency: Annually</i>	By Spray Campaign By Type of Insecticide	15	6	20	2 (10%)	8	
5.1.5 Number of wall bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS*	<i>Data source: Entomological reports</i> <i>Reporting frequency: Per spray campaign</i>	By Spray Campaign By Type of Insecticide	2	2	2	2	2	
5.1.6 Number of wall bioassays conducted after the completion of spraying at monthly intervals to evaluate insecticide decay*	<i>Data source: Entomological reports</i> <i>Reporting frequency: Per spray campaign</i>	By Spray Campaign By Type of Insecticide	3	3	5	5	12 (6 per site)	

¹⁰ NIHR tested sporozoite infection for four sites. Notre Dame tested sporozoites for six sites. Two of the sites are common for NIHR and Notre Dame

			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
			5.1.7 Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites*	<i>Data source: Entomological reports</i> <i>Reporting frequency: Per spray campaign</i>	By Spray Campaign By Type of Insecticide	60	21	80
5.2 Support Epidemiological Malaria Data Collection and Analysis								
5.2.1 Collect routine epidemiological data	<i>Data source: Project Reports</i> <i>Reporting Frequency: Annually</i>	By Spray Campaign	Complete	Completed	Complete	Completed	Complete	
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	<i>Data source: Project records – Training reports</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign By Spray Campaign By Gender Percentage of Women Trained	388	351 (301 males, 50 females; 14% Female)	677	687 (600 males, 87 females)	TBD	
6.1.2 Total number of people trained to support IRS in target districts	<i>Data source: Project records – Training reports</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign By Spray Campaign	392	415 (354 males, 61 females; 15% female)	734	763 (658 males, 105 females)	TBD	

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results						
			Year 1		Year 2		Year 3		
			Target	Results	Target	Results	Target	Results	
		By Gender Percentage of women trained							
6.1.3 Number of women recruited (i.e. number of women on the selection list) for IRS employment	<i>Data source: Project records – Recruitment reports reports</i> <i>Reporting frequency: Semi-annually</i>	By Country By Percentage of women recruited	13	50; 14%	110 (15%)	105 (13,7%)	TBD		
6.1.4 Number of people trained as IRS Training of Trainers	<i>Data source: Project records – Training reports</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign By Gender Percentage of women trained	87	56 (46 males, 10 females); 18%	88	49 (45 males, 4 females)	TBD		
6.1.5 Total number of people hired to support IRS in target districts	<i>Data source: Project records – Contracts signed</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign Gender Percentage of women hired	284	383 (335 males, 48 females; 13% female)	518	704 (620 males, 84 females)	TBD		
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	<i>Data source: Project records – Contracts signed</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign Percentage of women hired	N.A. ¹¹	28; 32%	60	41 (25.6%; 41/160)	TBD		

¹¹ As this indicator requires number of women actually hired by The PMI AIRS project, this indicator cannot be used due to the fact that all supervisors working on the AIRS Zimbabwe spray campaign are hired by the government.

			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
supervise seasonal staff)								
6.1.7 Number of staff (permanent and seasonal) who have completed gender awareness training	<i>Data source: Project records – Training reports</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign Gender Percentage of women hired	N.A.	383 (335 males, 48 females; 13% female)	734	763	TBD	
6.2 Capacity Building								
6.2.1 Number of government officials trained in IRS oversight	<i>Data source: Project records – Training reports</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign By Gender Percentage of Women Trained	91	105; 76 (68%) males; 29 (32%) females	160	160 (119 males, 41 females)	TBD	
6.2.2 Implement all activities outlined in their yearly Capacity Building Action Plan	<i>Data source: Project records – Capacity assessment reports</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
6.2.3 Zimbabwe government implements at least one aspect of the IRS program independently.	<i>Data source: Project records – MOUs</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign	Completed	Completed (Level I Training)	Completed	Completed	Completed	