



U.S. PRESIDENT'S MALARIA INITIATIVE



# PMI | Africa IRS (AIRS) Project

## Indoor Residual Spraying (IRS 2) Task Order Six

# ZIMBABWE

# END OF SPRAY REPORT

# 2017

**SPRAY CAMPAIGN:**  
**OCTOBER 23 – NOVEMBER 30, 2017**

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**Prepared by:** Abt Associates Inc.



Abt Associates Inc. | 4550 Montgomery Avenue | Suite 800 North  
| Bethesda, Maryland 20814 | T. 301.347.5000 | F. 301.913.9061  
| [www.abtassociates.com](http://www.abtassociates.com)

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# ACRONYMS

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<b>AIRS</b>	Africa Indoor Residual Spraying
<b>BMP</b>	Best Management Practices Manual
<b>COP</b>	Chief of Party
<b>CS</b>	Capsule Suspension
<b>DEHO</b>	District Environmental Health Officer
<b>DHIS2</b>	District Health Information System 2
<b>EC</b>	Environmental Compliance
<b>ECO</b>	Environmental Compliance Officer
<b>ECA</b>	Environmental Compliance Assistant
<b>EHO</b>	Environmental Health Officer
<b>IRS</b>	Indoor Residual Spraying
<b>ITN</b>	Insecticide-treated Net
<b>MOHCC</b>	Ministry of Health and Child Care
<b>M&amp;E</b>	Monitoring and Evaluation
<b>NIHR</b>	National Institute for Health Research
<b>NMCP</b>	National Malaria Control Program
<b>OP</b>	Organophosphate
<b>PEHO</b>	Provincial Environmental Health Officer
<b>PFO</b>	Provincial Field Officer
<b>PMI</b>	President's Malaria Initiative
<b>PPE</b>	Personal Protective Equipment
<b>PSECA</b>	Pre-Spray Environmental Compliance Assessment
<b>SBCC</b>	Social and Behavior Change Communication
<b>SOP</b>	Spray Operator
<b>TOT</b>	Training of Trainers
<b>USAID</b>	United States Agency for International Development
<b>VHW</b>	Village Health Worker
<b>WHO</b>	World Health Organization
<b>WHOPES</b>	World Health Organization Pesticide Evaluation Scheme
<b>ZAPIM</b>	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, which provided technical support for IRS operations, environmental compliance (EC) activities, and entomological monitoring; the project ended in 2013. Currently, Abt is implementing the PMI AIRS project (or “the project”) through another three-year contract launched in October 2014 as IRS 2 Task Order 6 in up to 17 countries including Zimbabwe.

AIRS Zimbabwe implements a full IRS package in four districts in Manicaland province, and conducts entomological monitoring in at least one site in two of those districts and in seven rural provinces. The 2017 spray campaign began on October 23 and ended on November 30; entomological monitoring is being conducted throughout the year from March 2017 through February 2018, and includes data collection on vector mosquito density, behavior, and insecticide susceptibility. In 2015, PMI identified Africa University (AU) as an additional entity to provide technical expertise and services, and supported the establishment of a molecular and immuno-diagnostic laboratory for analysis of entomological collections. PMI is supporting establishment of an AU insectary, where a mosquito colony is being raised to provide control specimens to AIRS for insecticide susceptibility tests.

In 2017, AIRS Zimbabwe continued working with the National Malaria Control Program (NMCP), as well as the provincial and district health officials in Manicaland, to plan, implement, manage, and monitor the IRS campaign in all four districts. Following the adoption of the expanded, blanket spraying approach in 2016, additional wards in Chimanimani, Mutare, and Nyanga districts were sprayed that year with Mutasa adding only a few villages in already-sprayed wards. In 2017, the project maintained the same level of coverage. AIRS Zimbabwe also continued to support nationwide entomological monitoring and surveillance in 20 sites and supplied entomological reagents to two major institutions (National Institute of Health Research and AU) that have laboratory facilities to conduct different entomological assays.

For the IRS campaign, the project recruited and trained seasonal staff prior to the spraying; 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 PMI Best Management Practices (BMP) Manual were consistently adhered to. The project held stakeholder and partner planning meetings, as well as health worker sensitizations, which were cascaded to the communities in order to create the beneficiaries awareness and service demand needed for successful spray operations. Key results are summarized in Table ES 1.

**TABLE ES 1. 2017 AIRS ZIMBABWE AT A GLANCE**

Number of districts covered by PMI-supported IRS in 2017	4 districts: Chimanimani, Mutare, Mutasa, Nyanga
Insecticide	Organophosphate (Actellic 300CS)
Number of structures targeted by PMI-supported IRS	240,044
Number of structures found by SOPs during PMI-supported IRS spray season	216,864
Number of structures sprayed by PMI-supported IRS	209,055

Spray coverage	96.4%
Population protected by PMI-supported IRS	517,374 (including 8,121 pregnant women and 87,279 children under 5 years old)
Dates of PMI-supported IRS campaign	October 23 to November 30, 2017
Length of campaign	31 days
Number of people trained with U.S. Government funds to deliver IRS*	687 (594 men, 94 women)

Note: SOP=spray operator

\* Based on the PMI indicator definition. It includes only spray personnel such as SOPs, 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.

As in 2016, in 2017, AIRS Zimbabwe used pirimiphos-methyl capsule suspension (CS) formulation (Actellic 300CS), an organophosphate 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.

## CHALLENGES/RECOMMENDATIONS

- Procurement of adequate PPE is key in IRS. Due to limited budget, the project requested the NMCP to contribute some of the IRS materials to cover PPE gaps. The boots the NMCP supplied for use by SOPs were cut too low (just above the ankle) to adequately protect the legs. Similarly, the NMCP supplied latex gloves rather than the recommended heavy-duty rubber gloves for use by SOPs. Procurement of adequate and appropriate PPE is key for smooth implementation of IRS program.
- Most of the spray pumps were procured by the government of Zimbabwe more than 15 years ago and frequently needed repair. Budget limitations prevented the project from procuring new spray pumps in 2017. Thus, all four districts experienced a shortage of spray pumps and spare parts which was costly in terms of time and quality of spray. The project should consider procuring additional spray pumps and spare parts for the 2018 campaign.
- Homeowners not removing belongings from their homes prior to SOPs' arrival meant that SOPs had to spend a considerable amount of time assisting with this process, which slowed the pace of spraying. To ensure household preparedness during the future spray campaigns, the project will have to enhance collaboration with village health workers and headmen to increase their role and support in this IRS mobilization activity. An additional solution to this challenge would be strengthening SBCC, stressing the roles of communities in IRS operations. Messages from warners through loud hailers should emphasize the importance of advance home owner preparation to enhance the efficiency of IRS operations.
- There were refusals noted in peri-urban areas and growth points (market centers located in rural areas), especially Nyanyadzi in Chimanimani district and Nyanga town in Nyanga district. To reduce the number of refusals and locked rooms, the project in partnerships with the NMCP and provincial and district MOHCC staff will improve IRS advocacy by engaging politicians and senior administrators such as Members of Parliament, other sector Ministry staff, local councilors, district administrators, and chief executives for local authorities as well as traditional and church leaders. Enhanced SBCC efforts should be considered in 2018 to reduce the number of refusals and locked rooms.
- Most of the newly hired supervisors and team leaders had no experience in using a smart phone. Although the project conducted formal training for team leaders and supervisors on the use of smart phones for supervision of the spray campaign, the budget could not accommodate formal

training for all of them. Some received on-the-job training and attended sessions at level 3 (SOP) training only. In addition, the number of smart phones available in 2017 was not adequate for all the intended users, with a deficit of 24 smart phones. In 2018, the project should replace all old phones and procure new models of smart phones which are more sensitive in detecting GPS signals and have longer battery life. The project will also continue to conduct refresher training on the use of phones and supervision applications for all supervisors, team leaders, and IRS coordinators.

# I. INTRODUCTION

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The President's Malaria Initiative (PMI) has supported IRS in Zimbabwe since August 2011. In 2017, AIRS Zimbabwe conducted IRS in the four districts and carried out robust capacity building for entomological surveillance to enhance nation-wide vector control monitoring. The intensity of malaria transmission in Zimbabwe differs by region, with Chimanimani, Mutare, Mutasa, and Nyanga districts of Manicaland province being among the top 20 districts with a high malaria burden in recent years. In the four districts, 95 percent of all malaria cases are caused by *Plasmodium falciparum* and transmitted predominantly by either *Anopheles arabiensis* or *Anopheles funestus sensu stricto* (s.s.), depending on the district's unique ecological setting.

The National Malaria Control Program (NMCP) Strategic plan 2016-2020, aims to provide Zimbabweans universal access to malaria prevention. Measures, including application of indoor residual spraying (IRS), use of long-lasting insecticidal nets, larval source management, environmental management and case management, intermittent preventive treatment in pregnancy, and social and behavior change communication (SBCC) are used to control both malaria vectors and parasites, in order to reduce malaria morbidity and mortality. IRS and nets are the two major vector control strategies.

## **Objectives of 2017 IRS Campaign**

In 2017, AIRS Zimbabwe continued to work with the NMCP, as well as the provincial and district health officials in Manicaland to plan, implement, manage, and monitor a full IRS package in the aforementioned PMI-supported districts and support entomological surveillance in 20 sentinel sites across the country. The support was guided by the following objectives:

- Spray at least 85 percent of the 240,044 structures found in the four districts (Chimanimani 43,383; Mutare 91,320; Mutasa 49,311; Nyanga 56,030) in 2016, including structures in 22 wards added for blanket spraying.
- Protect at least 85 percent of the 550,475 persons found in the four PMI-supported districts in Manicaland Province in 2016.
- Develop capacity for national, 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 monitoring and surveillance to ensure data are available for future IRS decision making, programming, and campaign planning.
- Continue to strengthen environmental management capacity building to ensure safety of IRS operations before, during and after the campaign.

Other important areas that the project supported during the 2017 campaign included: co-facilitation and logistics of trainings; support for data collection and reporting; procurement, distribution and storage of insecticide, spray materials, and equipment; and monitoring of spray operations using the PMI AIRS project-wide supervision forms.

## Results in brief

Table I shows the percentage of structures sprayed and total population protected by district in 2017. Spray coverage is based on the number of structures found in 2017 while the target structures are based on the number of 2016 structures found during the 2016 campaign, which is used as a proxy for planning purposes. All districts exceeded the 85 percent the PMI spray coverage target. Three of the four (Mutare, Mutasa, and Nyanga) surpassed the NMCP 95 percent of rooms spray coverage target and overall, the project achieved 96.4 percent spray coverage.

**TABLE I. STRUCTURES AND POPULATION FOR 2017 IRS CAMPAIGN**

District	Target Structures	Found Structures in 2017	Sprayed Structures N (%)	Population Protected		
				Males	Females	Total
Chimanimani	43,383	33,949	31,462 (92.7)	41,023	45,565	86,588
Mutare	91,320	86,003	81,891 (95.2)	97,997	106,782	204,779
Mutasa	49,311	48,083	47,950 (99.7)	53,735	62,425	116,160
Nyanga	56,030	48,829	47,752 (97.8)	52,269	57,578	109,847
<b>Total</b>	<b>240,044</b>	<b>216,864</b>	<b>209,055 (96.4)</b>	<b>245,024</b>	<b>272,350</b>	<b>517,374</b>

## Other Activities

AIRS Zimbabwe also provides technical support to NMCP-led entomological activities. The project is working with the NMCP to complete the year's entomological monitoring activities with support from an experienced entomologist seconded by the project to the NMCP who is located at the National Institute for Health Research (NIHR). The entomological monitoring is being conducted March 2017–February 2018 in 20 sites nationwide (in two of the IRS districts and in seven rural provinces) and includes data collection on vector mosquito density, behavior, and insecticide susceptibility.

## 2. PRE-SPRAY ACTIVITIES

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### 2.1 INSECTICIDE SELECTION

In accordance with the NMCP's change from pyrethroids to an organophosphate (OP) in 2014 in Manicaland – following susceptibility tests by the NMCP and partners that showed resistance in malaria vectors to pyrethroids (which had been used for IRS for several years) and susceptibility to OPs – the project applied the OP Actellic 300CS during the 2017 spray campaign.

Pirimiphos-methyl remains the insecticide of choice in the four districts supported by PMI in Manicaland Province, based on the 2013 insecticide resistance tests that showed that the pyrethroid-resistant local vector was susceptible to OP insecticide. Follow-up susceptibility tests could not be performed at all the sentinel sites in Manicaland because of an inadequate number of sample mosquitoes. The choice of insecticide in the four districts was due to continued effect of pirimiphos-methyl on the vector population in Manicaland province.

### 2.2 MICRO-PLANNING

AIRS Zimbabwe conducted micro-planning meetings with national, provincial, and district government stakeholders to effectively plan a successful 2017 IRS campaign in four districts of Manicaland province: Chimanimani, Mutare, Mutasa, and Nyanga. Also, the team held a national meeting with the NMCP to share and review the operational plan, commodities and personnel requirements, spray targets, and review and agree on stakeholder roles and responsibilities, as well as on M&E. The national planning meeting was followed by a provincial meeting that included key Manicaland provincial and district health officials. Several issues were discussed, and chief among them were:

- Timelines for international and national procurement of IRS commodities, insecticide, and equipment
- Possible support from the Provincial Medical Director, Manicaland, by providing two or three lorries to the PMI AIRS project during the 2017 IRS campaign
- Medical examinations and pregnancy tests
- Reduction in the number of spray operators (SOPs) to strengthen supervisor/SOP supervisory ratio
- Timelines for hiring of lorries, SOPs, and breakfast vendors
- Daily spray targets for SOPs and supervisory targets for IRS coordinators, team leaders, and supervisors
- Timelines for training of campaign staff and spray teams, and possible training venues
- Provision of mobile water tanks in areas where water is scarce
- IRS data collection tools, management, and data submission timelines to the next level
- Importance of joint support and supervision where possible
- Roles and responsibilities of stakeholders and the importance of timeous and regular feedback
- Timelines for conducting Pre-and Post-Spray Environmental Compliance Assessments and the roles and obligations of stakeholders

- Refurbishment of soak pits, wash facilities and store rooms
- Management of IRS waste materials
- Development of a new Supplemental Environmental Assessment for 2017–2022
- Entomological monitoring activities and frequencies

## 2.3 LOGISTICAL NEEDS ASSESSMENT

To ensure availability of storage facilities and the correct quantification and daily supply of materials and insecticides at the campsites, which are the operation sites during spraying, AIRS Zimbabwe conducted an inventory of storage facilities, supplies, and materials required for the smooth and cost-efficient implementation of the 2017 IRS campaign. The inventory was conducted from July to September 2017, and it included field visits to the central and district warehouses, as well as all ward operational sites, to take stock of storage facilities and materials. The major activities carried out were:

- National level: The project held a series of meetings with the NMCP to discuss and give updates on IRS logistical arrangements. The arrangements included a spray operational plan, IRS commodity distribution plan, hiring of lorries and breakfast vendors, engagement of the NMCP and Manicaland Province to provide a few sets of personal protective equipment (PPE) and lorries, to facilitate servicing of motorcycles, and joint field monitoring visits. The meetings also helped to clarify participants' roles and responsibilities, including provision of storage spaces for IRS commodities in government institutions, where possible, and venues for level 3 training in the villages.
- Provincial and district levels: A series of meetings was held with provincial and district health personnel to gain their support in identifying and providing facilities for the storage of insecticides and other IRS commodities at operational sites. Following these meetings, the Ministry of Health and Child Care (MOHCC) donated eight rooms to the project for the period of the spray campaign to store IRS commodities, including insecticides, at operational sites. In addition, the MOHCC negotiated for community halls, which were used as training venues for training of SOPs.
- Quantification of IRS commodities: This was based on the number of structures found in the four districts during the 2016 IRS campaign. AIRS Zimbabwe project officers stationed in Mutare physically counted IRS commodities available in the central warehouse. The commodities were categorized into usable, usable after repairs, and unusable. The team used this information to quantify PPE, spray pumps, tents, and other supplies needed for the 2017 campaign.

The project used the results from this assessment for quantification purposes and 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, and included an order of 93,000 bottles of Actellic 300CS. Unlike in previous years, no buffer stock was procured, in part to save project funds but also to avoid having leftover insecticide when the project ends. Since, over the years, AIRS Zimbabwe has sprayed 93-95 percent of structures found in 2016, it was felt adequate to adjust the procurement downward by 5 percent. Other international procurements included Hudson pump spare parts, gumboots, gloves, face masks, and face shields. However, there was not enough funds to procure all required sprayers and spare parts leaving two-three SOPs to share a sprayer while waiting for theirs to be replaced or fixed.

Procurement of local IRS commodities began in July and ended in September 2017. It was an open and competitive selection process, in compliance with United States Agency for International Development

(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, capacity to deliver within a reasonable time frame, and compliance with Zimbabwe company registration policies and regulations. The key services/commodities procured locally were:

- Transportation for the IRS campaign, which included: 14 lorries (12 hired and two provided by the MOHCC at no cost to the project) to transport PPE and IRS commodities from Harare to Mutare, insecticide from Mutare to operational site stores, SOPs to and from the field; four 4X4 vehicles for monitoring; and 30 motorcycles provided by the MOHCC for the warners to use for community mobilization
- Vendors to service motorcycles for the warners
- Printing of M&E tools (data collection tools, performance tracker, error eliminator)
- Materials and services for refurbishment/screening of IRS storerooms and soak pits
- Vendors to prepare breakfast for the spraying teams
- Service providers to handle mobile payments for spray teams
- Network service provider for mobile data services

The project completed all planned local and international procurement in a timely manner. All items were received in good working condition and distributed to various operational sites before the start of the 2017 spray operations.

Annex A provides more information on IRS commodities procured locally and internationally for use during the 2017 campaign.

## 2.5 DISTRIBUTION OF IRS MATERIALS

A month prior to commencement of the 2017 IRS campaign, all PPE, equipment, and commodities that had been delivered to the AIRS Zimbabwe office in Harare were transferred and placed 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. There was little variation in the materials distributed to Mutasa and Nyanga districts as these districts have more or less the same number of targeted structures.

## 2.6 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). The days for which the seasonal workers were hired ranged from 30 to 33. The government employees served as IRS coordinators, data managers, warners/community mobilizers, supervisors, and team leaders. The project worked with these officials for 31 days on average. In addition, the M&E consultant directly supported data collection and reporting, mHealth supervisory checklists, and SMS job aids in the field, while the AIRS IT consultant and the partner firm, Dimagi, carried out the same tasks remotely. 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, and an Environmental Health Officer (EHO).

A total of 739 (males 635; females 104) were engaged in various IRS positions during 2017 campaign. Of these, the majority were SOPs. The percentage of females hired as SOPs increased by 1.5 percent, from 4.8 percent in 2016 to 6.3 percent in 2017.

**TABLE 4. POSITIONS ENGAGED FOR 2017 IRS CAMPAIGN, BY DISTRICT**

Position	Chimanimani		Mutare		Mutasa		Nyanga		Total			% Female
	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	1	1	2	0	2	0	2	0	7	1	8	12.5
Team leader	4	1	9	2	5	2	5	2	23	7	30	23.3
Field supervisor	15	6	28	15	19	6	19	6	81	33	114	28.9
SOP	85	0	157	15	99	1	87	13	428	29	457	6.3
Washers	0	5	0	8	2	3	2	3	4	19	23	82.6
Nurses/ Clinicians	2	2	0	5	2	2	3	4	7	13	20	65.0
Pump technicians	1	0	2	0	1	0	2	0	6	0	6	0
Storekeeper	3	0	2	0	3	0	3	0	11	0	11	0
Guards	4	0	2	0	4	0	4	0	14	0	14	0
Mobilizers	5	0	11	0	7	0	6	1	29	1	30	3.3
Data managers	1	1	2	0	2	0	2	0	7	1	8	12.5
Drivers	3	0	5	0	3	0	3	0	14	0	14	0
<b>Total</b>	<b>125</b>	<b>16</b>	<b>221</b>	<b>45</b>	<b>150</b>	<b>14</b>	<b>139</b>	<b>29</b>	<b>635</b>	<b>104</b>	<b>739</b>	<b>14.1</b>

## 2.7 IRS TRAINING

Table 2 lists the types of training that AIRS Zimbabwe conducted in 2017 to equip participants with the knowledge and skills that enabled them to effectively and safely implement IRS operations. For the training of SOPs, the project followed the NMCP's established three-level system of training, while for guards and storekeeper training, AIRS project training guidelines were followed. Insecticide poison management training was facilitated by the Provincial Epidemiology and Disease Control Officer, assisted by District Medical Officers and other senior clinicians.

Table 3 presents data on the people trained for all IRS positions in 2017. The project trained a total of 746 people (639 men, 107 women), 687 of whom were trained to deliver IRS. The number of women trained to deliver IRS changed from 87 in 2016 to 94 in 2017, an increase of 8%.

**TABLE 2. SUMMARY OF 2017 IRS TRAININGS**

Type of Training	Dates	Length (days)	Location	Description of Training
Level 1 training (National training of trainers (TOT))	Jul 24-28, 2017	5	Chinhoyi University of Technology Hotel, Chinhoyi	Challenges observed and lessons learned during the previous IRS campaign, IRS targets and plans for 2017, new IRS policies and operational procedures, insecticide management, community mobilization, spraying techniques, data tools and collection, support and supervision, EC issues, and entomological monitoring, especially WHO cone bioassays on sprayed surfaces to monitor quality of spray and insecticide decay rate
Level 2 training (Provincial TOT)	Aug 21-25, 2017	5	Birchnough Brigde, Buhera	Handling of insecticides and spray pumps, spraying techniques and practicals, trouble shooting, 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, IRS solid and liquid waste management, proper use of PPE, entomological monitoring, and management of IRS resources
Guards and storekeepers training	Oct 3-4, 2017	2	Christmas Pass Hotel, 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, Concepts of EC in IRS operations and security of IRS commodities.
Drivers training	Oct 3-4, 2017	2	Christmas Pass Hotel, Mutare	Roles and responsibilities of drivers in IRS, code of conduct, handling of vehicles, handling of insecticides (types) and PPE, insecticide poisoning signs, symptoms, and first aid, spills response procedure, transportation of IRS commodities, firefighting theory and demonstrations, security of IRS commodities, Concepts of EC in IRS operations and accident response procedures.
Insecticide poisoning training	Oct 5-6, 2017	2	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, insect, and dog bites, Concepts of EC in IRS operations and contingency planning.
M&E training	First group: Oct 10, 2017 Second group: Oct 12, 2017	1	Christmas Pass Hotel, Mutare	Overview of the IRS campaign, M&E for IRS, IRS M&E tools, EC monitoring indicators, data collection theory and practicals, data management, and reporting deadlines

Type of Training	Dates	Length (days)	Location	Description of Training
mHealth training	First group Oct 11, 2017 Second group Oct 13, 2017	1	Christmas Pass Hotel, Mutare	Familiarization with the smart phone, getting started with the CommCare and ODK software, opening the CommCare and ODK applications 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 smart phone, registering information and answering questions, adding comments to the checklist, SMS job aids and EC monitoring indicators, trouble shooting and handling of phones
Level 3 training (training of SOPs)	Oct 18 -22, 2017	5	Chitakatira and Marange, Mutare; Nyamaropa, Nyanga; Chisuko, Mutasa; Ngorima and Nyanyadzi, Chimanimani	Mixing insecticide, use of PPE, spraying techniques, dismantling and assembling of spray pumps, trouble shooting, maintenance and cleaning of spray pumps, spray targets, data collection tools and recording data, community information after spraying, community mobilization, and EC.

TABLE 3. NUMBER OF PEOPLE TRAINED, 2017

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			428	29									428	29	457	
Team leaders			23	7									23	7	30	
Data manager					7	1							7	1	8	
Washers			4	19									4	19	23	
Transport officer	-	1											0	1	1	
Storekeepers											11	-	11	0	11	
Nurses/ Clinicians									7	13			7	13	20	
Pump technicians			6	-									6	0	6	
IEC implementers, mobilizers							29	1					29	1	30	
Field supervisors			81	33									81	33	114	
IRS district coordinators	7	1											7	1	8	
Drivers											14	-	14	0	14	
Guards											14	-	14	0	14	
<b>TOTAL M/F</b>	<b>15</b>	<b>4</b>	<b>542</b>	<b>88</b>	<b>7</b>	<b>1</b>	<b>29</b>	<b>1</b>	<b>7</b>	<b>13</b>	<b>39</b>	<b>0</b>	<b>639</b>	<b>107</b>	<b>746</b>	
Total number of people trained to deliver IRS in target districts	<b>649 (557 males, 92 females)</b>															

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."

## 2.8 MEDICAL EXAMINATION OF SPRAY TEAMS

In mid-October 2017, 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. District Medical Officers assisted by nurses under the supervision of the Provincial Epidemiology and Disease Control Officer and the Provincial Medical Director, and in liaison with the DEHOs and PEHO, carried out the health examinations. The examinations consisted of a thorough routine physical check-up and a pregnancy test for all female workers including storekeepers and IRS supervisors. Of those tested for pregnancy, no one tested positive. 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. Only two SOPs, both from Mutasa district, were found unfit to engage in IRS operations; hence both were excused and did not participate in the level 3 training and spray operations.

# 3. INFORMATION, EDUCATION AND COMMUNICATION ACTIVITIES

## 3.1 INTRODUCTION

Information, education and communication (IEC) is key to IRS programming because it focuses on advocacy and information dissemination, thereby improving uptake of IRS program and ownership by the beneficiaries. Cognizant of the importance of IEC in IRS, AIRS Zimbabwe leveraged on communication activities from past IRS campaigns implemented jointly by the AIRS Zimbabwe, the Zimbabwe Assistance Program in Malaria (ZAPIM), the NMCP, and provincial and district health staff in Manicaland. IEC messages on IRS were transmitted through posters, pamphlets, and door-to-door mobilization, implemented before and during the IRS campaign, to ensure beneficiaries were aware of the importance and benefits of spraying and ready to welcome SOPs for spraying.

## 3.2 IEC TRAINING

Due to the tight budgetary constraints, the project could not conduct the key IEC components included in the 2017 work plan, including training of Environmental Health Technicians, sensitizing communities through community meetings and stakeholder meetings, and engaging Village Health Workers (VHW) and other important community leaders and advocating for their full support of and participation in the IRS campaign.

## 3.3 PRODUCTION AND DISTRIBUTION OF IEC MATERIALS

For the same reason of limited budget, AIRS Zimbabwe did not produce the IEC materials but instead, it distributed leftover IRS posters and brochures that it had prepared jointly with ZAPIM and the NMCP for the 2016 IRS campaign. MOHCC staff distributed the IEC materials to Environmental Health Technicians during the level 2 training and to IRS beneficiaries by before and during the campaign. The number of posters and brochures distributed to each district is shown in Table 5. The total number of IEC materials distributed increased from 39,960 in 2016 to 43,790 in 2017, an increase of approximately 10%.

**TABLE 5. NUMBER OF POSTERS AND BROCHURES DISTRIBUTED PER DISTRICT IN 2017**

District	Posters Distributed	Brochures Distributed
Chimanimani	150	8,000
Mutasa	180	10,000
Mutare	260	15,000
Nyanga	200	10,000
<b>Total</b>	<b>790</b>	<b>43,000</b>

## 3.4 DOOR-TO-DOOR MOBILIZATION

As in previous IRS campaigns in Manicaland, warners visited every household in the spray areas the day before spraying took place. After informing each household about the IRS process, the warners marked

all structures visited with chalk noting the date of the visit, the initials of the warner, and if the structure was mobilized, refused mobilization, or was locked to note that their structures were reached during mobilization. In addition, the warners recorded the name of the head of the household, number of structures, and the population in the warner's note book. The information was used by the IRS coordinators and team leaders in deploying spray team the following day. The AIRS Zimbabwe team and provincial and district MOHCC staff verified, where possible, that the number of households mobilized was adequate for each SOP to meet the following day's target.

To complement the door-to-door mobilization campaign, the warners also used local Rural Health Centers, schools and churches to ensure that the area(s) to be covered the following day were well sensitized. Also, the warners used loud hailers to ensure that all community members were reached.

## 4. IMPLEMENTATION OF IRS ACTIVITIES

### 4.1 SPRAY CAMPAIGN

AIRS Zimbabwe continued to implement the 2017 IRS campaign in four districts (Chimanimani, Mutare, Mutasa, and Nyanga) in Manicaland province. After consultations and discussions during a series of micro-planning meetings, spray operations began on October 23 as scheduled in all the four districts. The spray campaign was scheduled to last for 30 days in two phases of 15 days each, with a seven-day break mid-way. However, rains, food and agricultural input distribution programs as well as other competing community activities increased the number of call-backs needed, which increased the length of the campaign. Call backs are revisits to an area by SOPs when spray coverage in a particular area was less than 85%.

In addition, voter education and registration activities for the 2018 harmonized national elections disrupted spray operations in all the four districts, necessitating additional call-backs; hence the 2017 IRS campaign took 30 operational days in Nyanga, 31 in Chimanimani and Mutasa, and 33 in Mutare. Spray teams operated from 18 campsites during the campaign using 14 lorries (12 hired by the project and two provided by the MOHCC) to transport SOPs to and from targeted areas daily in the respective districts and wards.

### 4.2 PHONE-BASED IRS SUPERVISION

To ensure close and consistent supervision of the campaign, AIRS Zimbabwe assigned one technical staff to each of the four districts throughout the campaign. Each team member used a phone-based checklist for each area of supervision and was responsible for on-the-spot trainings and corrective actions for any performance issues identified. Joint supervisory field trips were conducted with provincial and district MOHCC staff (Table 6), an approach that improved team building and collaboration, and assisted in experience and knowledge sharing. The regular and consistent IRS monitoring enabled early identification of challenges. A supervision team, which included supervisors and AIRS country staff, made on-the-spot corrections wherever possible, which resulted in improvement of overall spray outputs. Also, IRS monitoring enabled identification of good operational procedures and best practices (e.g. firm schedule of leaving IRS camp before 6.00 am and stopping spray field operations at 2.00 pm), which were rapidly shared with other spray teams, further improving IRS operations.

**TABLE 6. SUPERVISION OF 2017 IRS CAMPAIGN**

Level	Organization/Position	Roles and Responsibilities
National	NMCP, PMI, AIRS Zimbabwe	Provision of policies, procedures, and strategic directions. Overall IRS monitoring and supervision. Provision of solutions to field challenges where possible.

Provincial	Provincial Medical Director, Provincial Epidemiology and Disease Control Officer, Provincial Environmental Health 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. Monitoring compliance in the spray teams and taking corrective action where deviation from the set standard is found.
District	District Medical Officers, District Environmental Health Officer, District Health Promotions Officer, District Health Services Administrator, Environmental Health Officer	Regular, consistent, and close IRS monitoring and supervision. Monitoring spray performance against district targets. Ensuring IRS coordinators, team leaders, data managers, and supervisors remain focused. Addressing challenges encountered and escalating issues to province and AIRS.

The project developed 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 (targets). IRS supervisors, team leaders, and district IRS coordinators monitored and supervised IRS activities on a daily basis. All supervisors and 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 Annex C. The daily performance of each SOP and team was measured using graphs. Daily campsite meetings held at each site also helped to improve spray performance.

The AIRS COP, ECO, operations manager, ECA, provincial coordinator, and the MOHCC PEHO, PFO, DEHOs, and EHOs were organized in supervisory teams and conducted regular IRS support and supervision visits that included EC and IRS operation monitoring. The teams visited all sites each day to assist district supervision teams to ensure full compliance, and to identify on-site problems and solving them where possible. Each supervisor was given a smart phone loaded with IRS supervisory checklists, a practice that improved supervision. The mobile checklist completion rate ranged from 83 percent for morning mobilization inspections to 100 percent for the end-of-day clean-up supervision. In the morning, every supervisor would also fill in an SOP Health Check form to ensure his/her SOPs are fit for the day. Only in few cases the supervisors took appropriate action if required, including referral to the nearest health center, and arranging a period of rest or lighter duties at the camp depending on severity of the case.

Team leaders and supervisors also closely observed spraying procedures and techniques, and filled out phone-based the Directly Observed Spraying questionnaire to report findings. The most common shortcoming observed was minor leaking of aged sprayers, constituting 25 percent of all errors (139/554). Any contaminated soil and mutton cloth used for hard surface clean-up, resulting from leakage, was disposed of in accordance with the PMI BMP.



SOP is explaining IRS procedures to a homeowner, Nyanga district.

Generally, the supervisors demonstrated a high level of compliance during the spray campaign as phone-based IRS supervisory results showed overall compliance was more than 90 percent (93 percent in store keeper performance [147/159]; 94 percent in morning mobilization [321/342]; 95 percent in home preparation [11,044/11,598]; and 98 percent in end-of day clean up [369/376]).

Similar to 2016, some supervisors, team leaders, and IRS coordinators were not facile at using smart phones and the mobile-based checklists during the first two weeks of 2017 spray operations; some submitted incorrect reports and some forgot to send checklists to the server after completion. 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 incorrect message coding or inconsistent data, and miscommunication about conditions in the field. The AIRS Zimbabwe project team and provincial counterparts addressed all the issues during the first part of the campaign using on-the-job trainings and on-site feedback to spray teams.

### 4.3 PHONE-BASED IRS JOB AIDS

In 2017, AIRS Zimbabwe continued to use mobile technology (SMS) for job aid messaging and reminders. The SMS job aid messaging system was used to convey IRS important notices and information to all SOPs, supervisors, and IRS team leaders at least three times a week throughout the spray campaign in all four districts. Examples of the messages are:

- Good morning from the AIRS project. Ensure that the spray pump is fitted with CFV/flow regulator at all times.
- Remember to maintain correct speed of spray, i.e., 2m of vertical wall surface in 5 seconds.
- One of the project goals is to create a safe and stable environment for each employee, man or woman, to achieve the fixed objectives.
- Team leaders must carefully review and verify SOPs' and team leaders' forms before submitting to

the next level each day. Thank you.

AIRS Zimbabwe team and other supervisors closely monitored receipts of the SMS messages through interactions with spray team members during field inspection visits. Most of the recipients acknowledged that the messaging approach was helpful and improved their daily operations. However, some spray teams experienced challenges including receiving messages late sometimes.

Prior to the campaign, an expert from Dimagi, a technology partner on the PMI AIRS project, conducted online refresher training for AIRS Zimbabwe staff, including a series of follow-up conference calls for trouble-shooting purposes. The objective of this work was to prepare the team and the equipment for implementation of the two mHealth tools phone-based supervision and SMS job aid messaging.

## 4.4 LOGISTICS

### 4.4.1 IRS STORAGE AND INSECTICIDE STOCK MANAGEMENT

The Mutare warehouse continued to be 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 equipment and materials required at operational sites. Unlike the previous years, in 2017 AIRS Zimbabwe could not manage to hire a short-term warehouse manager for the central warehouse due to budgetary challenges; instead, the AIRS provincial coordinator managed the warehouse in addition to her routine duties. Storekeepers, under close supervision by the AIRS Provincial Coordinator, managed district and campsite storage facilities to ensure appropriate distribution and tight supervision of IRS commodities at all levels. Also, the COP, Operations Manager, ECO, and ECA supervised monitored management of IRS stocks at district and campsite levels.

The project inspected 23 operational sites that included storage facilities and campsites (one central store, three district stores, and 19 campsites) in the four districts. However, only 18 campsites were used during the 2017 campaign. The project and MOHCC did not use one inspected campsite as previously planned in order to save the time of dismantling and setting up the site. Among all sites used, the MOHCC provided eight facilities for stores at the health center level at no cost to the project, while AIRS Zimbabwe rented the remaining stores from private owners. The AIRS Zimbabwe team closely supervised and monitored the performance of the storekeepers and provided guidance and coaching on the spot, when required. In 2017, the project continued to rent a larger space at Mutare Dry Port to use as a provincial warehouse. Servicing of an enhanced ventilation system installed in 2015 was done in 2017 to comply with insecticide storage conditions and safety requirements. Over the years, securing adequate storage facilities was a challenge at district and operational levels as the space provided at local level is often too small to accommodate all the insecticide, PPE, and IRS equipment.

All storekeepers and the Provincial Coordinator at the central warehouse regularly and consistently 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, with the records safely kept at local levels before being transported to central warehouse at the appropriate times and finally at the end of campaign for safe keeping and accountability.

### 4.4.2 IRS VEHICLES

The project hired various vehicles from the private sector for use during the 2017 IRS campaign. The project used 14 lorries including two provided by the MOHCC and 12 rented from private transport companies. The AIRS Zimbabwe procured seven tires for the MOHCC lorries to make them usable.

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. The MOHCC also provided lorries to transfer contaminated solid waste to the incinerator at Hwange Colliery.

MOHCC provided 30 motorcycles that the project serviced and repaired for use; six of them were non-functional when the MOHCC turned them over to the project, and they had to undergo an engine overhaul. Warners were the primary users of the motorcycles for their daily community mobilization.

The project also hired four 4x4 trucks to transport AIRS Zimbabwe staff, NMCP staff, and provincial and district spray campaign supervisors to monitor IRS operations throughout the campaign. In addition to certification of all the hired vehicles by the Vehicle Inspection Department, AIRS Zimbabwe with assistance from the MOHCC transport officer and senior drivers conducted pre-contract physical inspections of the vehicles for compliance, and the MOHCC drivers road tested them. Where needed, the vendors were asked to modify the vehicles to ensure that they were safe for transporting spray teams, IRS equipment, and insecticide. In some cases, AIRS Zimbabwe provided fuel for district MOHCC vehicles to strengthen routine supervision and close monitoring of the campaign. In some instances, the MOHCC provincial office provided vehicles and fuel for provincial supervisory teams.

## 4.5 IRS PAYMENTS

In 2017, the AIRS Zimbabwe team managed the following activities to ensure financial processes did not delay the spray campaign:

- Contracted in a timely manner all seasonal staff (SOPs, washer, storekeepers, security guards, and breakfast caterers) obtained signed copies of associated documents for the records.
- Established and maintained log sheets for the IRS lorries, trucks, and motorcycles.
- Maintained daily registers for the SOPs, washers, lorry drivers, security guards, storekeepers, and breakfast caterers that were approved by the IRS coordinators on a regular basis.
- Verified the daily registers for the breakfast caterers and IRS spraying teams to establish who was on duty on a particular day before preparing payrolls.
- Negotiated an agreement with Ecocash, a reputable mobile banking provider, to pay the IRS spray teams using mobile money.
- All breakfast service providers were paid electronically through their bank accounts. Despite the cash shortages, the vendors managed to procure supplies either by transferring the money from their bank accounts into Ecocash phone numbers or by paying through the electronic payment system. Spray teams in all the four districts were satisfied with the breakfast provided by the vendors.
- Signed fixed-price contracts with lorry and trucks service providers. The first payments were done electronically, through the providers' bank accounts; the second and final payments were in cash following current cash shortage crisis in the country. The project made the final payments only after vendor log sheets had been verified and reconciled.

All payments were verified and approved by the AIRS Zimbabwe finance and administration staff and the Chief of Party.

## 4.6 COST-EFFICIENCY OF SPRAY OPERATIONS

- Out of 14, MOHCC provided two lorries and AIRS Zimbabwe hired 12 lorries for the 2017 IRS campaign season through a competitive bidding process. The response rate to the call for a cost proposal was very low, with only five 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 \$270 to \$260, the rate in the 2017 approved budget.
- AIRS Zimbabwe also negotiated down the price of the four 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 \$100 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.
- The spraying teams completed all call-backs to locked houses before moving from one campsite to another and this saved time and transport costs.
- The project was able to leverage Global Fund resources through the NMCP to supply missing PPEs. The NMCP provided 421 gloves, 179 overalls, and 280 safety shoes – although, as mentioned earlier, the latex gloves supplied were inadequate for SOP use and the project had to replace them during IRS campaign.
- The provision of two lorries by MOHCC helped to cut the rental costs of IRS operations.
- The project negotiated cheaper rates at some of the hotels in all four districts for the supervisory staff, resulting in a saving of \$11,934.

# 5. POST-SPRAY ACTIVITIES

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## 5.1 POST-SPRAY STAKEHOLDER MEETING

Based on consultations with the NMCP and provincial and district health personnel during micro-planning, AIRS conducted the post-spray review and planning meeting on February 22-23, 2018 at Christmas Pass Hotel, in Mutare. A total of 40 participants (33 males, 7 females), drawn from all seven districts (Chimanimani, Mutare, Mutasa, Nyanga, Buhera, Chipinge and Makoni) in Manicaland province, attended the meeting. Meeting outcomes were as follows:

- Reviewed 2017 IRS campaign implementation, performance including lessons learned and best practices, challenges, and opportunities.
- Analyzed IRS data collection, cleaning, and reporting systems.
- Shared experiences in strengthening IRS operations, EC, and entomological monitoring resulting in consolidated IRS operations and waste disposal management plans for 2018.
- Strengthened linkages for sustaining gains and developments in IRS operations through strong partnerships.
- Developed a preliminary 2018 IRS provincial implementation plan based on recommendations emerging from the 2017 campaign.
- Developed new IRS policies for implementation in 2018.

Participants expressed concern over the planned withdrawal of AIRS/VectorLink project from Manicaland Province; therefore, VectorLink will develop a transition plan to allow for a smooth and phased withdrawal in an effort to sustain gains made in the four PMI districts over the previous four years.

## 5.2 DEMOBILIZATION

After the successful completion of the 2017 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. Retrieved items included overalls, gumboots, helmets, rubber gloves, satchels, mattresses, tents, and spray pumps. The coveralls were sent to a private launderer for further cleaning, decontamination, and disinfection, and then 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 PHOs, cleaned the equipment at the Dora IRS campsite in Mutare district, located close to the project 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 another during operations. All 14 lorries used during the campaign also were cleaned with soapy water, and jointly inspected by AIRS staff, MOHCC officials, and transport providers; when all parties were satisfied, the lorries were returned to the owners.

# 6. ENTOMOLOGY

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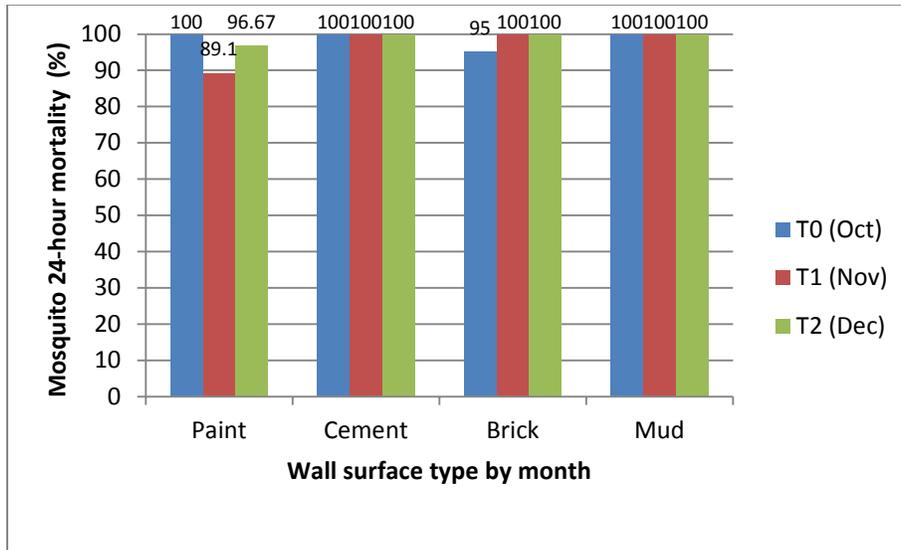
## 6.1 BIOASSAY TESTS

Burma Valley was sprayed on October 24, 2017, and Chakohwa was sprayed on November 27, 2017. Cone bioassay tests were performed within 24 hours of spraying at Burma Valley and Chakohwa sentinel sites. The airborne effect was also assessed concurrently in all the test houses at both sites. The project completed T0, T1, and T2 tests at Burma Valley in October, November, and December, respectively, and T0 and T1 tests at Chakohwa in November and December. The AU in Mutare and the NIHR in Chiredzi jointly supplied the *An. arabiensis* susceptible mosquitoes for the bioassay tests.

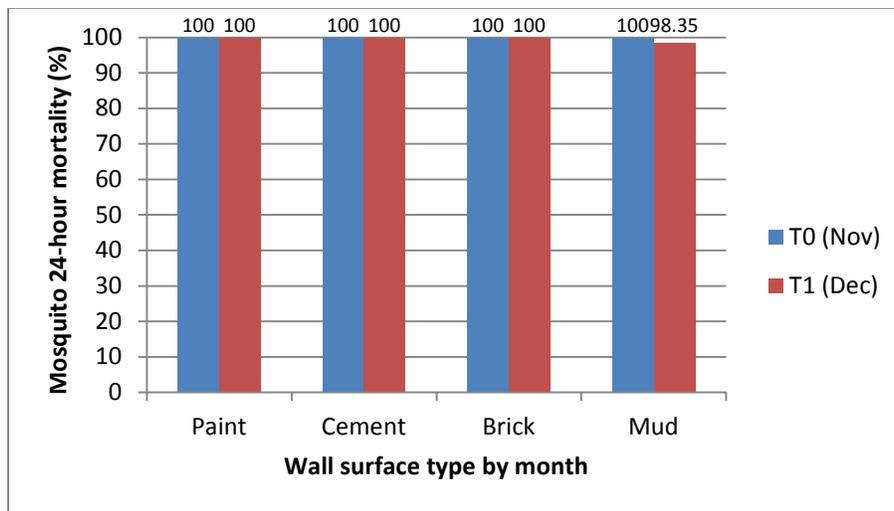
Ten recently sprayed rooms were sampled per site to ensure tests were performed on the four different types of wall surfaces available at each site. At Burma Valley, tests were done on two brick, three cement, two mud, and three painted wall surfaces; at Chakohwa, three brick, three cement, two mud, and two painted surfaces were tested. Batches of ten, 2–5-day-old, non-blood-fed female *An. arabiensis* (susceptible Kanyemba *gambiae* (KGB) strain) were introduced in each cone and paper cup (for the airborne effect). Three cones were set per room for the cone bioassay tests, one each at 0.5, 1.0, and 1.5 meters from the floor. One paper cup was set per room for the airborne effect bioassay test. The paper cup was put on a specially designed metal stand at 1m from the floor and 10cm from the sprayed wall. Mosquitoes were left in the cones and paper cup 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 and paper cup 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. The results showed 100 percent mortality rates on all wall surface types for the tests done at T0, T1, and T2 at the Burma Valley site (Figure 1) except for 95 percent recorded on the brick wall at T0, and the decline on painted walls at T1 (89.1%) and T2 (96.67%); at Chakohwa, there was a decline at T1 on the mud surface (98.35%) (Figure 2).

**FIGURE 1: WALL BIOASSAY RESULTS, BURMA VALLEY, OCTOBER-DECEMBER 2017**

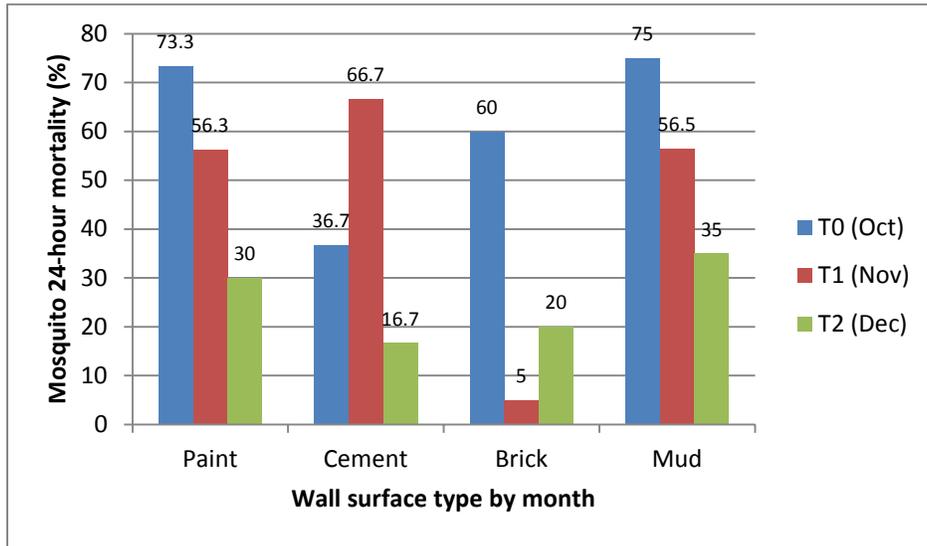


**FIGURE 2: WALL BIOASSAY RESULTS, CHAKOHWA, NOVEMBER-DECEMBER 2017**

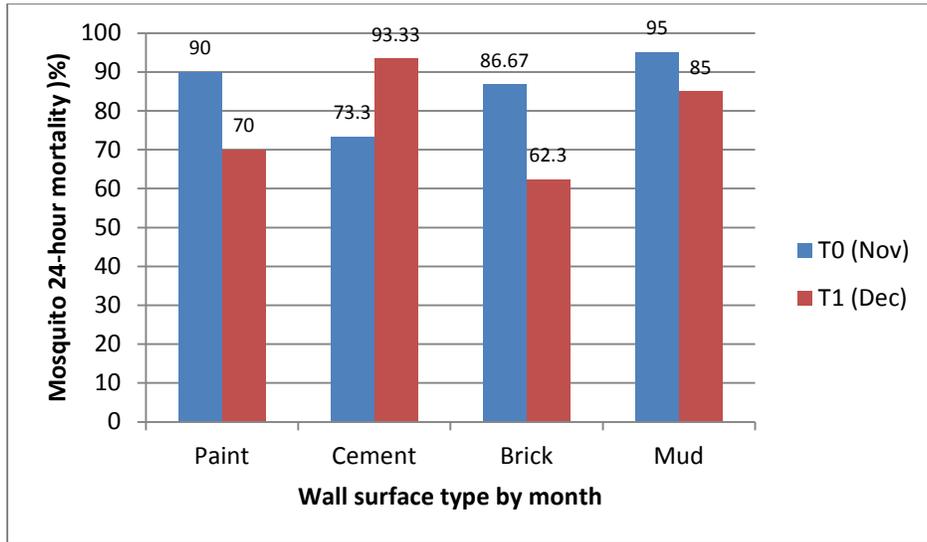


The 24-hour mortality due to the airborne effect showed a progressive decline from T0 to T2 in painted houses (73.3, 56.3, and 30.0%) and mud houses (75.0, 56.5, and 35.0%) but fluctuated on cement and brick surfaces at Burma Valley (Figure 3). At Chakohwa, the 24-hour mortality due to the airborne effect showed progressive decline in painted (90.0 and 70%), brick (86.0 and 62.0%), and mud (95.0 and 85.0%) houses despite the limited observation period (Figure 4). No mosquito mortality was recorded in the controls at the two sites at any time.

**FIGURE 3: AIRBORNE EFFECT BIOASSAY TEST RESULTS, BURMA VALLEY, OCTOBER-DECEMBER 2017**



**FIGURE 4: AIRBORNE EFFECT BIOASSAY TEST RESULTS, CHAKOHWA, NOVEMBER-DECEMBER 2017**



# 7. ENVIRONMENTAL COMPLIANCE

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## 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 waste. Prior to the start of any IRS program, an environmental assessment is conducted to inform the environmental mitigation plan.

### 7.1.1 SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT (SEA)

The SEA for PMI-supported IRS in Zimbabwe for the period 2017-2022 was developed during the period reported on here, after the one for 2012-2016 had expired. The previous SEA authorized the nationwide use of the WHO Pesticide Evaluation Scheme (WHOPES)-recommended pyrethroid, carbamate, and OP pesticides from 2012 to 2016. The new nationwide SEA, approved by USAID and PMI, was developed to meet the provisions of USAID 22 CFR (216) and reauthorizes the above-mentioned pesticides and expands the authorization to the use of DDT, chlorfenapyr (when listed by the WHO Prequalification Team), and clothianidin.

Data collection for preparation of the SEA was done through field assessments and stakeholder consultations. The following five provinces of different geographical, ecological, entomological, insecticide use and epidemiological background were visited: Manicaland, Mashonaland Central, Mashonaland West, Masvingo, and Matabeleland North. The stakeholders consulted included: WHO, the Environmental Management Agency, and the MOHCC Environmental Health Department and NMCP.

### 7.1.2 PRE-SEASON ENVIRONMENTAL COMPLIANCE ASSESSMENT (PSECA)

The 2017 PSECA was conducted in July. Two teams carried it out, each of which covered two districts. The teams comprised representatives from AIRS Zimbabwe (ECO, ECA), the PEHO office, and DEHOs from the four districts. Teams collected data using a smart phone-based application to capture the information on the state of preparedness of the IRS sites.

The broad aim of the PSECA was to assess the level of IRS preparedness for 2017 in the four PMI-supported IRS districts in Manicaland province. Specific objectives were to:

- Check on the status of the 19 permanent and 15 mobile soak pits at one site
- Check on the status of 23 IRS storage facilities
- Develop the work plan for refurbishment of the soak pit sites and storage facilities in preparation for the 2017 IRS season

The following campsites and storerooms were inspected during the period under review (23 including three district stores):

- Nyanga District: Elim, Nyamaropa, Tombo, Nyautare, Nyatate, Dombo and Nyanga District hospital (7)
- Mutare District: Chitakatira, Marange, Bezel Bridge, Dora, and Nyagundi (5)
- Chimanimani District: Biriwiri District stores, Chakohwa, Nyanyadzi, Biriwiri campsite storeroom,

and Rusitu (5)

- Mutasa District: Chisuko, Gatsi district storeroom, Mupotedzi, Manica Bridge, and Sherukuru (5)
- Mutare provincial warehouse (1)

The PSECA inspections resulted in the following findings and remedial activities that were completed to prepare for 2017 IRS season:

- Metal fencing poles were getting rusty and all were painted
- Some fencing poles at most soak pits had been damaged by termites. All damaged poles were replaced.
- Lines for drying cleaned 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.
- Danger warning signs at the 19 soak pits were no longer in good shape. The project replaced signs at all soak pits.

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-SEASON ENVIRONMENTAL COMPLIANCE ASSESSMENTS

The AIRS ECO, operations manager, COP, ECA, and provincial coordinator as well as the DEHOs visited all 20 sites to assist district teams with EC issues and to ensure full EC. The team used the visits to conduct EC assessments for all the sites using supervisory checklists. The main focuses of the assessments included: proper storage of insecticides, stock control and inventory management procedures, proper IRS effluent disposal, proper spill response procedures, pump maintenance, availability and usage of PPE by spraying teams, and home owner preparation. The purpose of the above mentioned assessments was to ensure the safety of the IRS workers, community members and the environment. In total, the supervisors observed usage of all 19 permanent and 15 mobile soak pits on a regular basis

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

The inspection teams 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 300CS bottles and the safety of home owners. 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.

## 7.3 POST-SEASON ENVIRONMENTAL COMPLIANCE ASSESSMENT

Post-spray EC inspections were conducted during mid-December 2017. They involved closing out all campsites and entering the data on smart phones. All soak pits and storerooms at the operations sites were cleaned and locked according to BMP standards. The provincial warehouse still has some OP waste (empty bottles and cardboard boxes), and will be thoroughly cleaned once recycling of these items is completed.

## 7.4 INCIDENTS

No incidents or accidents were experienced during the period under review.

## 7.5 WASTE DISPOSAL

All solid waste materials were disposed of in accordance with the PMI BMP. Five main forms of solid waste were generated during the 2017 IRS campaign:

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

The project incinerated 2,700 kg of contaminated used disposable respirators, used mutton cloth, and contaminated empty cardboard boxes at Hwange Colliery incinerator during the first week of January 2018 and the process was witnessed by EMA and Ministry of Health officials. During the same month, David Tebogo Investments chipped and baled 12,480 kg of empty OP bottles with bottle tops and 2,860 kg of empty OP cardboard boxes generated from the 2017 spray campaign at the project's Mutare warehouse. The company will send chipped empty bottles to a South Africa-based company for recycling into pallets, irrigation pipes, electrical conduits, and refuse bins. Empty boxes will be remolded into new boxes and tissue hardcore. Uncontaminated cardboard boxes will be recycled into tissue paper and covers for school workbooks. The AIRS ECO, an NMCP representative, and one representative from the Environmental Management Agency and the Provincial Medical Director's office observed the chipping and baling of the empty OP bottles in Mutare. The projects will give away, as a reward, well-washed but torn and unusable overalls to SOPs.

The detailed environmental monitoring and mitigation report is attached as Annex B.

## 8. MONITORING AND EVALUATION

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### 8.1 2016 HYBRID M&E SYSTEM: STANDARD NMCP M&E METHODS WITH THE PMI 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 that district and provincial officials would review the data before approving and sending the data to the NMCP and AIRS Zimbabwe. The diagram in Annex D illustrates the data flow.

In 2017, data managers continued to use the 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 which follows the standard of 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, PEHO, and the NMCP after the data were submitted via Frontline, but these staff members had access to DHIS2 so could view IRS data electronically at any time.

### 8.2 RESULTS OF 2017 IRS CAMPAIGN

All AIRS Zimbabwe performance indicators are presented in an M&E Plan matrix in Annex E. AIRS Zimbabwe sprayed 209,055 structures out of the 216,864 structures found, resulting in 96.4 percent spray coverage, protecting 517,374 people (245,024 males and 272,350 females) in the four supported districts. A breakdown of the 2017 IRS campaign results by district is shown in Table 8. Note that percentage of structures sprayed is based on the number of structures found. Target structures are the number of structures found during 2016 operations and was used in planning for 2017 operations. Tables 9 and 10 provide information on insecticide usage and ITNs respectively collected during the spray campaign. A total of 4,498 bottles of insecticide were left over following the campaign due to the gap in structures targeted from the 2016 campaign and the structures found during the 2017 campaign. The entire balance will be used for the 2018 campaign.

**TABLE 8. SUMMARY OF SPRAY COVERAGE DURING THE 2017 IRS CAMPAIGN**

District	Target Structures	Structures Found in 2017	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	33,949	31,462	92.7%	86,588	41,023	45,565	1,298	14,286	89,578	2,990	96.7
Mutare	91,320	86,003	81,891	95.2%	204,779	97,997	106,782	3,426	36,085	209,142	4,363	97.9
Mutasa	49,311	48,083	47,950	99.7%	116,160	53,735	62,425	1,738	19,809	117,381	1,221	99.0
Nyanga	56,030	48,829	47,752	97.8%	109,847	52,269	57,578	1,659	17,099	111,909	2,062	98.2
<b>Total</b>	<b>240,044</b>	<b>216,864</b>	<b>209,055</b>	<b>96.4%</b>	<b>517,374</b>	<b>245,024</b>	<b>272,350</b>	<b>8,121</b>	<b>87,279</b>	<b>528,010</b>	<b>10,636</b>	<b>98.0</b>

**TABLE 9. SUMMARY OF INSECTICIDE USAGE DURING THE 2017 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	31,462	16,177	15,330	0	847	31	83	2.0	12.2	6.0
Mutare	81,891	40,719	39,717	0	1,002	33	161	2.1	15.4	7.5
Mutasa	47,950	24,988	24,001	0	987	31	84	2.0	18.4	9.2
Nyanga	47,752	22,162	20,100	0	2,062	30	100	2.4	15.9	6.7
<b>Total</b>	<b>209,055</b>	<b>104,046</b>	<b>99,148</b>	<b>0</b>	<b>4,898</b>	<b>125</b>	<b>428</b>	<b>2.1</b>	<b>14.8</b>	<b>7.0</b>

Note: The 2017 insecticide balance of 4,898 bottles has expiration date of April 2019. The project will use the entire balance for the 2018 IRS campaign.

**TABLE 10. SUMMARY OF ITN FINDINGS IN SPRAYED STRUCTURES IN FOUR PMI SUPPORTED DISTRICTS, 2017 IRS CAMPAIGN**

District	Total ITNs Found	Pregnant Women Sleeping Under ITNs	Children <5 Years Sleeping Under ITNs
Chimanimani	6,717	244	2,334
Mutare	22,297	587	5,976
Mutasa	4,869	206	1,453
Nyanga	11,626	353	3,143
<b>Total</b>	<b>45,509</b>	<b>1,390</b>	<b>12,906</b>

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.

### 8.2.1 REASONS TARGETED STRUCTURES WERE NOT FOUND

In 2017, fewer structures were found than in 2016, mainly because some of the SOPs either missed or did not record structures which were not able to be sprayed. In 2016, the SOPs had the assistance of VHWs and local headman to help locate structures and record population data for structures found which were locked or unattended. In 2017, these groups – VHWs and local headman - complained about not having received any meaningful incentives for providing these services last year. Since the 2017 budget could not pay for increased incentives, these groups were not used resulting in less structures found. Additionally, SOPs may not have recorded all structures found which were unable to be sprayed due to being vacant or locked. Importance of identification and recording of all structures – whether able to be sprayed or not - will be emphasized in the 2018 spray campaign.

### 8.2.2 REASONS STRUCTURES WERE NOT SPRAYED

Despite achieving spray coverage of 96.4 percent of eligible structures found in 2017, exceeding both the minimum threshold of the 85 percent PMI spray coverage target and the 95 percent NMCP spray target, 7,809 of the found structures were not sprayed. As reported by the NMCP during routine IRS progress meetings, frequent discussions with the provincial and district MOHCC staff, and AIRS field observations, reasons for which structures were not sprayed included the following:

- In many cases, SOPs found structures locked. People were not at home during the campaign primarily for the following reasons: the onset of the rainy season (during which people prioritized farming operations and were in the field), voter education and registration drives, and agricultural and food distribution activities.
- District teams also reported that as a result of the bumper harvests registered in the 2016-17 agricultural season many rooms at households had been converted into “granaries” to store the harvested crops rendering them ineligible for spraying.
- There were also relatively higher refusals noted in peri-urban areas and growth points, especially Nyanyadzi in Chimanimani district and Nyanga town in Nyanga district. These communities were reluctant to accept IRS due to concerns about removing their household goods (for fear of theft), and also some beliefs that the insecticide used for IRS spoils the indoor surfaces of the homes.

### 8.2.3 CHALLENGES TO HIGH-QUALITY DATA REPORTING

Some challenges with reporting arose including:

- Data was 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 were not assigned a unique IRS structure number as Zimbabwe had a limited number of mobilizers and warners during mobilization efforts. Therefore, data was not entered into a pre-programmed, validated database by structure (as in other AIRS countries), making it difficult to verify spray coverage data.
- Data was only 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 was also submitted to the NMCP weekly, slowing down its ability to respond to campaign challenges.

## 9. CAPACITY BUILDING

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Capacity building is the process by which individuals and organizations obtain, improve, and retain the skills and knowledge needed to do their jobs competently. AIRS Zimbabwe's role in capacity building is not only to identify and recognize existing capacities of the NMCP and MOHCC provincial and district personnel, but also to identify existing knowledge and skill gaps to improve management of IRS, especially planning, implementation, and monitoring. 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, as well as M&E. Also, partnerships give local stakeholders access to knowledge and skills, innovativeness, networking and funding opportunities, and strategies for advocacy, government relations, and community outreach.

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 that necessitated capacity building. Various areas for capacity building were prioritized especially in IRS operations as well as entomological surveillance and environmental compliance. In 2017, AIRS Zimbabwe continued to train MOHCC staff and other malaria stakeholders on new concepts on EC, operations, entomology, and M&E:

- The project supported the NMCP and five provinces by showing how to properly conduct a SEA. Knowledge and skills gained will assist NMCP to conduct their own SEA.
- The post-spray data quality audit (PSDQA) for 2016 IRS conducted in the four IRS-supported districts by AIRS staff, together with NMCP and Manicaland MOHCC provincial and district staff, built the capacity of the NMCP and the province to carry out similar activities in their areas of operation.
- New knowledge continues to be imparted to national-level MOHCC staff on the need to fit and use constant flow valves on Hudson spray pumps to improve spray quality.
- The knowledge and skills imparted to IRS managers during level 1, 2, and 3 training on use of mobile soak pits, a technology that enables management of pyrethroid, carbamate, and OP liquid waste in an environmental friendly manner, were well received. The NMCP agreed to make this change in its IRS program.
- NMCP officials were helpful in community sensitization and mobilization especially the use of loud hailers. Manicaland province appreciated the utility of the apparatus and will try to procure some for non-PMI-supported districts.
- NMCP officials recognized the value of the AIRS practice of doing medical exams of all SOPs and pregnancy tests for female members of spray teams, though as a government department. However, they indicated that NMCP adoption of such tests may be limited due to a lack of resources to transport SOPs to central and specific health facilities for medical exams as well as to support allowances for clinicians conducting medical exams.

- AIRS Zimbabwe delivered the first of two containers to serve as insectary-in-a-box and auxiliary equipment at AU for rearing of a susceptible colony of malaria vector species.
- PMI/AIRS, in conjunction with ZAPIM, equipped a molecular and immunological laboratory at AU for entomological analyses of malaria vector mosquitoes and assisted with the recruitment and training of four new staff to work in the laboratory and insectary.

# 10. GENDER INTEGRATION

In compliance with the PMI goal of addressing gender equality, the PMI AIRS project supports gender equality and female empowerment as development objectives in their own right and also as approaches to improve vector control activities. During the 2017 IRS campaign, AIRS Zimbabwe mainstreamed gender throughout its project operations, with a particular focus on women’s economic empowerment through seasonal employment with the project. Since 2015, AIRS Zimbabwe’s provincial IRS coordinator has led this work as the gender focal point. Specific action items are listed below:

- *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 promote gender mainstreaming by training all AIRS Zimbabwe project staff and provincial MOHCC officials on strategies that can be employed to improve not only female participation in IRS, but decision making at all levels during the implementation of IRS.
- *Training:* To improve the support of gender quality in IRS, the project conducted several gender integration trainings, which started in level 1 training and cascaded to level 2 and 3 trainings. Also, the AIRS Zimbabwe gender focal person took advantage of her invitation to Manicaland provincial health team meeting to train provincial MOHC leaders, as well as heads of health department in the local authorities, including Mutare City Health, on gender integration.
- *Increased women’s recruitment:* The AIRS project continued to integrate gender and non-discrimination practices into the spray operations personnel recruitment, training of trainers, and community mobilization (Table 11). As in 2016, Nyanga district had one female warner/mobilizer using a motorcycle. Also, the AIRS project continued to share data and to work with the NMCP to attract and hire more female seasonal workers, with an emphasis on increasing the percentage of female supervisors and recruiting women for roles traditionally filled by men, such as drivers and spray pump technicians.

**TABLE 11. FEMALES HIRED, 2014-2017**

Year	Supervisory Roles				Other Roles					Total
	IRS coordinator	Team leader	IRS supervisor	Total	Data manager	SOP	Washer	Warner	Total	
2014	0	5	11	16	0	2	0	0	2	18
2015	0	1	26	27	1	10	9	1	21	48
2016	0	8	32	40	1	22	20	1	44	84
2017	1	7	33	41	1	29	19	1	50	91

- *Gender-friendly work environment:* Apart from the continued provision of well-demarcated accommodations and washing facilities for females and males at campsites, as well as provision of adequate and safe water supplies, the project provided feminine hygiene products to female seasonal workers to eliminate menstruation as a possible barrier to women’s participation in the spray campaign.
- *Gender norms survey:* The AIRS project continued to implement the gender norms survey to better understand how working on the AIRS project changes gender norms. The evaluation was conducted among SOPs at the beginning and end of the 2017 IRS campaign. Results of the evaluation will be presented in a separate project report.



# II. CHALLENGES AND RECOMMENDATIONS

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The following challenges, lessons learned, and recommendations were identified during the 2017 spray campaign.

## II.1 CHALLENGES

- The spray campaign had to be extended by one to three days in three districts, mainly due to rains. Other reasons included distribution of maize seed, fertilizer, and food; voter registration activities; rough terrain; the breakdown of trucks; and a relatively large number of new and inexperienced SOPs having challenge of meeting daily spray targets.
- Some homeowners did not remove their belongings from their homes before the spray teams arrived, and so SOPs had to spend a considerable amount of time assisting with the removals. This slowed the pace of spraying and kept SOPs from achieving their daily spray targets. The situation was exacerbated by the inadequate 2017 SBCC budget for AIRS Zimbabwe and the delayed funding from the NMCP for IRS-related SBCC activities.
- Locked structures: The onset of the rains in October interfered with SOP movement into the field and made households prioritize farming operations, leaving no one at their homes to participate in IRS operations. IRS operations in all four districts were adversely affected by voter education and registration activities, as well as agricultural and food distribution exercises, which caused homeowners to be absent from their homes at the time of spray.
- Refusals: High refusals were noted in peri-urban areas and growth points, especially Nyanyadzi in Chimanimani district and Nyanga town in Nyanga district. There was about 4.4% refusal rate in Nyanga in 2016 compared to 3.6% in 2017. These communities have been a challenge as they usually refuse IRS. Some fear theft of their household goods if they move them outside the house, and some claim that the IRS insecticide damages the wall surfaces of the homes.
- In 2017, fewer structures were found than in 2016 mainly because SOPs missed the structures. This is because this year's budget did not allow the project to recruit VHWs and local headmen, who complained about not having received meaningful incentives for the help they provided in 2016. Hence, most homes with owners not present were not recorded as SOPs failed to get anyone with data for the homes. Last year, data recorded on locked homes were mostly provided by VCWs and headmen.
- AIRS Zimbabwe project approached the NMCP to cover PPE gaps experienced in 2017. The boots the NMCP supplied to the project for use by SOPs were low cut (just above the ankle) and did not provide adequate protection of the SOPs' legs. Similarly, the NMCP gave the project latex gloves rather than the heavy-duty rubber gloves needed for the SOPs. The gloves were not usable for the intended purpose, requiring the project to procure the correct gloves. AIRS Zimbabwe distributed the low-cut boots to the team leaders and supervisors.
- Due to budgetary challenges, in 2017, the project did not procure spray pumps. However, all four IRS districts experienced a shortage of spray pumps and spare parts. Most of the spray pumps

procured by the government were more than 15 years old and frequently needed repair. Spare kits procured by the project in 2017 were grossly inadequate for the number spray pump repairs needed.

- Most of the newly hired supervisors and team leaders had no experience using a smart phone. Although the project conducted formal training for team leaders and supervisors on the use of smart phones in supervision of the spray campaign, the 2017 AIRS Zimbabwe budget could not afford to formally train all the team leaders and supervisors. To alleviate the situation, the project members together with those team leaders and supervisors who had had formal training conducted on-the-job training to those who did not attend the formal training. In addition, the number of available smart phones was not adequate, even with the additional phones procured in 2017; hence, some team leaders and IRS coordinators were not allocated a smart phone, adversely affecting the program.
- There was limited network coverage in some areas and technical problems with Econet, the service provider, and the smart phones. Also, problems with the ODK and CommCare systems impeded completion of mHealth supervisory checklists in a number of cases.
- The NMCP is requesting increased entomological monitoring data throughout the country, particularly outside of Manicaland. Current resources are inadequate to incorporate additional sentinel sites or increase the sampling frequency.

## 11.2 RECOMMENDATIONS

- The project will strengthen collaboration with the NMCP over the course of 2018 and before the campaign starts to coordinate funding and implementation of SBCC activities.
- The project will consider re-engaging VHWs and headmen during 2018 IRS campaign to improve uptake of the program. Incentives should be set aside for strengthening the involvement of VHWs for effective mobilization of communities and homeowners. An additional solution to this challenge would be to strengthen collaboration with the NMCP, Manicaland province MOHCC staff, and other malaria partners.
- The project will strengthen the training of SOPs, supervisors, and team leaders on importance and requirements for home owner preparation. An additional solution to this problem would be strengthening SBCC, stressing the roles of communities in IRS operations.
- To reduce the number of refusals and locked structures and rooms at peri-urban and growth points, the project, in partnerships with the NMCP and Manicaland province MOHCC staff will improve advocacy through engagement of politicians and senior administrators such as Members of Parliament, local councilors, District Administrators, and the Chief Executive for local authorities.
- The project should consider geo-mapping in 2018 to strengthen baseline data on targeted and eligible structures in respective districts.
- The project should consider procuring additional and adequate spray pumps and spare parts for use in the 2018 IRS campaign. Also, procurement of adequate PPE is key for smooth implementation of IRS program.
- The project should consider procuring adequate smart phones and conduct formal training on the use of smart phones for all supervisors, team leaders, and IRS coordinators.
- AIRS Zimbabwe will engage other network service providers with wider coverage to access remote and inaccessible areas given the challenges experienced with Econet.

# ANNEX A. INVENTORY OF STOCK AND QUANTITIES POST-SPRAY

**TABLE A-1. IRS 2017 INTERNATIONALLY PROCURED ITEMS**

Item	Balance from 2016	Quantity procured	Total	Quantity used	Quantity damaged	Quantity remaining
<b>Pesticide</b>						
Actellic 300CS	11,046	93,000	104,046	99,148	0	4,898
<b>PPE</b>						
Coverall	602	722	1 324	1,324	116	1,208
Boots	407	538	945	945	407	693
Face Shield	0	610	610	610	545	65
Hand Gloves	456	504	960	960	456	504
Hard Hat	729	0	729	729	20	709
Respirators	8,580	5,040	13,620	13,620	13,620	0
<b>Pumps and Accessories</b>						
Hudson (10 ltr)	284	0	284	284	16	268
Goizper pump	245	0	245	0	123	122
Constant flow valve	0	350	350	0	0	350
Seal (16.5mmx9mmx2mm)	0	350	359	0	0	350

**TABLE A-2. IRS 2017 LOCALLY PROCURED ITEMS**

Item	Balance from 2016	Quantity procured	Total	Quantity used	Quantity damaged	Quantity remaining
<b>PPE</b>						
Apron	37	0	37	37	28	9
Cotton Socks	0	1,357	1,357	1,357	0	0
Raincoats	379	150	529	529	0	529
Face Shield Brackets	653	170	823	457	0	823
<b>IRS Reusable</b>						
Calculator	14	0	14	14	3	11
Fire Extinguisher	16	14	30	30	16	14
Padlock	11	10	21	21	11	10
Tool Kit	5	5	10	10	4	6

Item	Balance from 2016	Quantity procured	Total	Quantity used	Quantity damaged	Quantity remaining
Rinsing Cup	546	0	546	546	171	375
Spray Bag	640	0	640	457	0	640
Pvc Spread Sheet	28	30	58	58	58	0
Laptop	4	0	4	4	0	4
Spill Storage Clear Bags	0	557	557	457	457	100
Progresive Rinsing Drums 200l	19	0	19	19	0	19
Water Buckets	406	0	406	406	0	406
Spray Operator Matresses	687	20	707	707	0	707
Shovels	13	27	40	40	0	40
Spill Kits	40	0	40	40	40	0
Solar Lamp	6	8	14	14	8	6
First Aid Kits	0	14	14	14	0	14
Loud Hailers	26	12	38	38	8	30
Tents	82	0	82	81	1	81
Tarpaulin	9	0	9	9	2	7
Nylon Rope	7	5	12	12	8	4
Petrol Can 20litre	2	0	2	2	2	0
Scissors	2	0	2	2	1	1
Nozzles	0	0	0	0	0	0
Torchlights	353	0	353	353	69	284
Black Pvc Bins 50 Litres	85	0	85	85	81	4
Electricity Adaptors	11	23	34	34	14	20
<b>IRS Consumables</b>						
Towel	0	704	704	704	704	0
Mutton Cloth	4	477	481	457	461	20
<b>Print Materials</b>						
Team Leader Summary Books	0	30	30	30	30	0
Daily Spray Operator's Books	248	221	469	457	457	12
Spills Response Procedures	10	0	10	10	10	0
End-of-Day Clean-Up Checklist	100	0	100	100	100	0
Error Eliminator/ Team Leader Card	100	0	100	100	100	0
Homeowner Prep. Checklist	200	0	200	200	200	0
Storerom Danger Warning Signs	9	50	59	59	59	0
Temperature Recording Sheets	40	0	40	40	40	0
Motorcycle Log Sheets	80	0	80	80	80	0
Vehicle Hire Log Book	5	16	21	17	17	4

Item	Balance from 2016	Quantity procured	Total	Quantity used	Quantity damaged	Quantity remaining
IRS Mobilizer Book	225	60	285	285	285	0
A3 Stickers	7	0	7	7	7	0
Material Safety Data Sheets	15	0	15	15	15	0
Storekeeper Performance Checklist	400	0	400	400	400	0
<b>Mobile Phone For Reporting</b>						
Huawei Ascend Y511	65	0	65	65	6	59
Huawei Ascend Y5c	71	0	71	71	6	65
Nokia Asha	8	0	0	8	0	8
Huawei Ascend Y li	0	10	10	10	0	10

# ANNEX B. 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 2017 -28 February 2018

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
<b>Ia. Pre-contract inspection and certification of vehicles used for pesticide or spray team transport.</b>	Pre-contract inspection and certification of vehicles was conducted in October 2017. Initial inspections by the AIRS ECO, ECA, Provincial Coordinator and Ministry of Health officials. Government of Zimbabwe Vehicle Inspection Department found defects on all vehicles during the initial stage which were later fixed to meet all certification criteria. A total of 14 lorries were certified for the 2017 spray operations.	No outstanding issues	After repairs to the vehicles in total compliance.
<b>Ib. Driver training</b>	All 14 drivers, IRS supervisors, coordinators, and DEHOs were trained in Mutare on October 3 2017. 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.

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
<b>Ic. Cell phone, personal protective equipment (PPE) and spill kits on board during pesticide transportation.</b>	All 14 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 transportation of pesticides was equipped with a spill kit. A total of 342 morning mobilization vehicle inspections were conducted during the 2017 spray campaign. On 338 occasions, the vehicle had all required PPE and spill kits.	No outstanding issues	Spill kits were provided after certification and training. There was total compliance.
<b>Id. Initial and 30-day pregnancy testing for female candidates for jobs with potential pesticide contact.</b>	Before Level 3 training, 92 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.
<b>Ie. Health fitness testing for all operators</b>	All 704 spray personnel candidates had the required pre-spray general physical/ medical examination on October 16-17; 3 candidates who did not pass the medical exams were replaced. 701 candidates and the 3 replacements were declared to be medically fit for training as spray team members. The medical examination 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 except 3 who were replaced passed the medical examination. The physical examination records are available on file.
<b>If. Procurement of, distribution to, and training on the use of PPE for all workers with potential pesticide contact.</b>	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.

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
<b>Ig. Training on mixing pesticides and the proper use and maintenance of spray pumps.</b>	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 DEHOs in the targeted districts) were trained, and a total of 746 people were covered.	No outstanding issue	There was total compliance.
<b>Ih. Provision of adequate facilities and supplies for end-of-day cleanup,</b>	A total of 19 campsites were used. 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 376 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 supervisors were provided at all campsites for total compliance.
<b>Ii. Enforce spray and clean-up procedures.</b>	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 of spray operators were supervised by team leaders and field supervisors. ECOs, COP, DEHOs, and operations managers supervised clean-up procedures when present at any operations site. A total of 376 end-of-day inspections conducted and 7 incidences of non-compliant during clean-up procedures were identified. Appropriate advice regarding identified defects was given to SOPs. The major defects noted during end of day clean-up, was those who were drinking while still in some PPE.	No outstanding issues	

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
<b>2a. IEC campaigns to inform homeowners of responsibilities and precautions.</b>	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.
<b>2b. Prohibition of spraying houses that are not properly prepared.</b>	Nearly all structures (99.99%, [11,587/11,598]) 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 11,598 homeowner preparation inspections carried out, only 14 indicated that homeowners and SOPs were non-compliant with preparations of houses before they are sprayed.	No outstanding issues	There was total compliance
<b>2c. Two-hour exclusion from house after spraying</b>	SOPs reminded households to wait two hours after spraying before they opened the rooms to allow circulation of air. 11,598 Homeowners were advised to bury dead insects and wash their hands with soap and water after cleaning.	No outstanding issues	There was total compliance.
<b>2d. Instruct homeowners to wash itchy skin and go to health clinic if symptoms do not subside.</b>	All 11,598 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	
<b>3a. Packaging for pesticide shipments over water</b>	No insecticides were transported over waster body in the 4 PMI/AIRS supported districts	No outstanding issues	N/A
<b>3b. Protection of bees/pollinators</b>	Spraying was done indoors only and also at least 30 meters away from sensitive areas including bee hives.		

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
<b>3c. Use of proper spray techniques</b>	All 457 SOPs and 114 team leaders were trained on standard spray techniques during Level 3 training. This included emphasizing standing one meter away from the “sprayable” surface, keeping the nozzle tip 45 cm from the sprayable surface, and spraying at the correct speed. There was constant supervision in the field to ensure that SOPs adhered to all BMP standards.	No outstanding issues	The major issue noted was that the type of nozzle (8002E) that the NMCP directs does not require an overlap. Yet the checklist based on the BMP requires an overlap of 5 cm.
<b>3d. Indoor spraying only.</b>	457 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.
<b>3e. Maintenance of pumps</b>	601 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, 139 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.
<b>4a. Choose sites for disposal of liquid wastes, including mobile soak pit sites, according to PMI BMPs.</b>	All 20 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.
<b>4b. Maintain soak pits as necessary during season.</b>	All 20 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.
<b>4d. Inspection and certification of solid waste disposal sites before spray campaign.</b>	All combustible solid waste generated was incinerated at Hwange Colliery, and empty bottles were recycled by David Tebogo Investments formerly Go Green, Harare, in collaboration with its South African partner. These facilities are certified by Environmental Management Agency. Incineration and recycling was done in January 2018.	No outstanding issues	There was total compliance

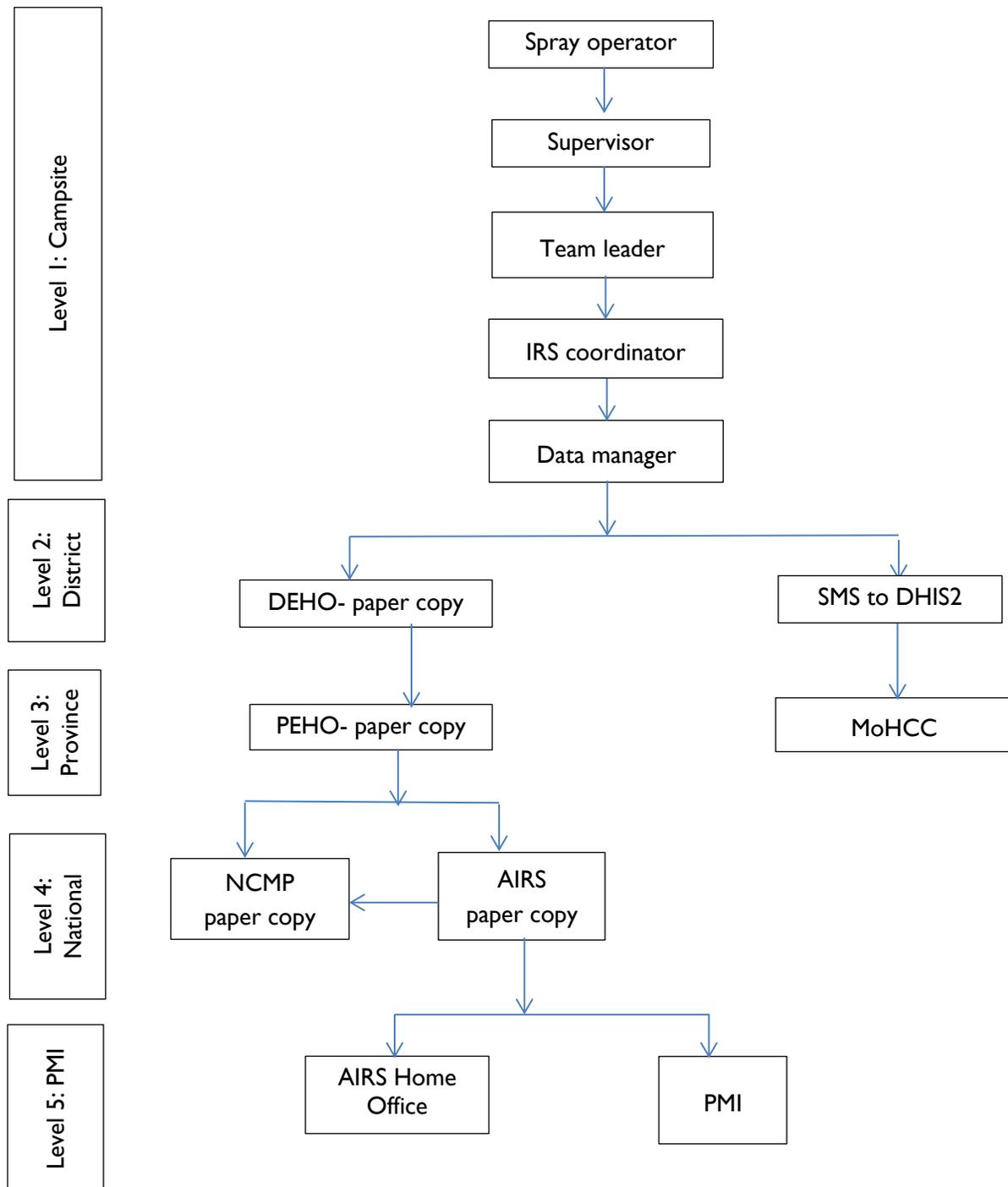
Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
<b>4e. Monitoring waste storage and management during campaign.</b>	All waste materials were stored and managed according to PMI BMPs during the spray campaign. Generally, there was clear labeling 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. A total of 159 storekeeper performance monitoring visits were done during the course of the IRS season and only 12 incidences were noted.	No outstanding issues	There was total compliance
<b>4f. Monitoring disposal procedures post-campaign.</b>	Waste disposal was done at Hwange Colliery, which has already been inspected and meets requirements for waste disposal. The ECO and MOHCC officials monitored the post-spray campaign solid waste management procedures. A total of 2700kg of solid waste were incinerated.		All solids including triple-rinsed empty Actellic 300 CS bottles were baled at the provincial warehouses in Mutare. Recycling was done in January 2018.
<b>5a. Maintain records of all pesticide receipts, issuance, and return of empty sachets/bottles.</b>	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. A total of 159 storerooms inspections were done with 12 incidences of non-compliance noted.	No outstanding issues	There was total compliance.
<b>5b. Reconciliation of number of houses sprayed vs. number of sachets/bottles used.</b>	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.
<b>5c. Visual examination of houses sprayed to confirm pesticide application.</b>	Team leaders, field supervisors, senior supervisor, operations manager, and COP performed a total of 11,598 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.

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
<b>5d. Perform physical inventory counts during the spray season.</b>	The ECO, Provincial Coordinator, storekeepers, operations manager, and COP performed regular inventory counts throughout the spray campaign across all the operations sites. Two improperly managed stocks were observed and the storekeepers were advised to regularly update their inventories. A total of 159 storerooms inspections were done with 12 incidences of non-compliance noted.	No outstanding issues	All inventory stock cards are available and were used for final inventory reconciliation.

# ANNEX C. SPRAY CAMPAIGN SUPERVISORY TOOLS

Supervisory Checklist	Purpose and Person Responsible for Completing Checklist
Morning mobilization and transport	<p>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.</p> <p>Person responsible: IRS coordinator, ECA, and ECO</p>
End-of-day clean-up	<p>Aim: To ensure spray teams correctly follow EC standard procedures for cleaning IRS equipment, and account for insecticide stocks and safe storage of equipment.</p> <p>Person responsible: IRS coordinator, ECA, and ECO</p>
Homeowner 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: IRS field supervisors, team leaders, IRS coordinators, ECA, and ECO</p>
Directly observed spraying	<p>Aim: To ensure that SOPs are following the prescribed spray techniques and can show spray skills and achieve high quality of spray. SOPs have adequate PPE and properly use it.</p> <p>Person responsible: IRS field supervisors, team leaders, IRS coordinators, ECA, ECO, operations manager, and the AIRS COP</p>
Storekeeper performance checklist	<p>Aim: To ensure that storekeepers are following the prescribed best warehousing practices and can account for stocks and equipment in their stores at any time.</p> <p>Person responsible: IRS coordinator, ECA, ECO, warehouse manager, operations manager, and COP</p>

# ANNEX D. AIRS ZIMBABWE DATA FLOW PLAN



# ANNEX E. MONITORING AND EVALUATION PLAN INDICATOR MATRIX

UPDATED: January 11, 2018

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%	I; 100%	0; 0%
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%	I; 100%	1; 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%	I; 100%	I; 100%

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
1.1.4 Number and percentage of local procurements for PPE delivered 14 days before the start of spray operations	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	1; 100%	1; 100%	2; 100%	2; 100%	1; 100%	1; 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	Completed
<b>1.2 In-Country Exemption and Custom Clearance Process</b>								
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	Completed
<b>1.3 In-Country Logistics, Warehousing, and Training</b>								
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 <sup>1</sup> ; 100% (8 Males, 2 Females)	12; 100%	12; 100%	12; 100%	12; 100% (all males)
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 <sup>2</sup> ; 100%	21; 100%	21; 100%	23; 100%	23; 100%

<sup>1</sup> 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.

<sup>2</sup> While the project inspected 23 only 20 stores were used.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
1.3.3 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	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	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% <sup>3</sup>	5%	-10%	5%	TBD
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	Completed
2.2.2 Number of spray personnel trained in EC and personal safety standards in IRS implementation	<i>Data source:</i> Project records – Training reports <i>Reporting frequency:</i> Each spray season	By Spray Campaign  By Gender	388	415 (354 males, 61 females)	689	704 (620 males, 84 females)	745 (640 males, 105 females)	745 (640 males, 105 females)

<sup>3</sup> 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.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
2.2.3 Number of health workers receiving insecticide poisoning case management training	<i>Data source: Project records – Training reports</i>  <i>Reporting frequency: Each spray season</i>	By Spray Campaign By Gender	38	11 <sup>4</sup> (1 male, 10 females)	43	34 (16 males, 18 females)	20	20 (7 males, 13 females)
2.2.4 Number of adverse reactions to pesticide exposure documented	<i>Data source: Incident report forms</i>  <i>Reporting frequency: Each spray campaign</i>	By Spray Campaign  By Residential/occupational exposure	0	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: Project records – Reports submitted by district environmental officers</i>  <i>Reporting frequency: Each spray season</i>	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	57; 100%	54; 100%  Fixed soak pits: 19 Mobile soak pits: 15 Storerooms: 23
<b>2.3 Conduct Communications Activities and Community Mobilization</b>								
2.3.1 Number of radio spots and talk shows aired	<i>Data source: Project records</i>  <i>Reporting frequency: Per spray campaign</i>	By Spray Campaign	30,000	0 <sup>5</sup>	TBD	43	36	0

<sup>4</sup> 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.

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

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
2.3.2 Number of IRS print materials disseminated	<i>Data source:</i> Project records  <i>Reporting frequency:</i> Semi-annually	By Spray Campaign  By Type of printed material and message(s)	70,000	30,510 <sup>6</sup> (30,000 brochures; 200 posters; 310 calendars)	20,000	39,960 (39,000 pamphlets, 960 posters)	20,000	43,790 (43,000 pamphlets, 790 posters)
2.3.3. Number of people reached with IRS messages via door-to-door mobilization	<i>Data source:</i> Mobilization Data Collection Forms  <i>Reporting frequency:</i> Daily per mobilization conducted	By Spray Campaign  By Gender	N/A <sup>7</sup>	13,006 (8,007 females 4,999 males)	182,713	241,200 <sup>8</sup>	94,200 (65,847 females 28,353 males)	206,950 (144,865 females 62,085)
<b>2.4 Spray Targeted Structures According to Technical Specifications</b>								
2.4.1 Number of structures targeted for spraying	<i>Data source:</i> Previous spray campaign data, enumeration data (targets); Daily Spray Operator Forms (results)  <i>Reporting frequency:</i> Daily per spray campaign	By Spray Campaign	163,922	171,736	256,478	240,044	240,044	216,864
2.4.2 Number of structures sprayed with IRS	<i>Data source:</i> Daily Spray Operator Forms  <i>Reporting frequency:</i> Daily per	By Spray Campaign	139,334	162,127	218,006	229,377	204,037	209,055

<sup>6</sup> PMI budget for print materials was predominantly allocated to PSI.

<sup>7</sup> 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.

<sup>8</sup> The result is comprised of an estimate of 94,200 that Environmental Health Technicians 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
	spray campaign							
2.4.3 Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	<i>Data source:</i> Daily Spray Operator Forms <i>Reporting frequency:</i> Daily per spray campaign	By Spray Campaign	85%	94.4%	85%	95.6%	85%	96.4%
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)	550,475 (257,576 males, 292,899 females)	517,374 (245,024 males, 272,350 females, 8,121 pregnant women, 87,279 children <5)
<b>Component 3: Ongoing Monitoring and Evaluation and Quality Control Measures</b>								
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
<b>Component 4: Contribute to Global and Country-Level IRS Policy Setting and Develop and Disseminate Experiences and Best Practices</b>								
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)	2	0

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
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	1	1 (success story)
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	4	5 5
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 <sup>9</sup>	8	25 <sup>10</sup>

Component 5: Contribute to the collection and analysis of routine entomological and epidemiological data

5.1 Support entomological monitoring activities and insecticide resistance strategies

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

<sup>10</sup> Tip Top Engineering, HEDEC, Tebogo Investments, Hwange Colliery, Mutare Dry Port, Megaview Investments, Block Team Investments; 18 Catering Clubs breakfast vendors

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
5.1.1 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: Entomological reports</i> <i>Reporting frequency: Annually</i>	By Spray Campaign	20	20	20	20	20	20
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 (100%)	3 (4%)	4 (100%)	3	3 (100%)
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 <sup>11</sup>	8 (40%)	20	8 (40%)
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 (40%)	20	2 (10%)	20	10 (50%)

<sup>11</sup> 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

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
5.1.5 Number of wall bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS <sup>12*</sup>	<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	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)	19
5.1.7 Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites <sup>13*</sup>	<i>Data source: Entomological reports</i> <i>Reporting frequency: Per spray campaign</i>	By Spray Campaign By Type of Insecticide	60	21	80	6	32	22
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	Completed
Component 6 (Cross-cutting): Capacity Building, Knowledge Transfer, Gender Inclusion								

<sup>12</sup> Pirimiphos-methyl an organophosphate type of insecticide, was assessed during the bioassay tests

<sup>13</sup> Insecticides belonging to four classes were tested during Year 1 and Year 2, namely, i) organophosphate (OP) class: pirimiphos-methyl; ii) organochlorine (OC) class: DDT; iii) carbamate class: bendiocarb and iv) pyrethroid class: lambdacyhalothrin. In Year 3, the project included two additional classes of insecticide: v) neonicotinoid class: clothianidin and vi) pyrrole class: chlorfenapyr. The project expanded the range of pyrethroids tested by including permethrin, deltamethrin in addition to lambdacyhalothrin.

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
<b>6.1 Increasing the Role of Women and Addressing Gender Barriers</b>								
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 14.2% female	677	687 600 males, 87 females 12.7% female	687	649 557 males, 92 females 13.7% female
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  By Gender  Percentage of women trained	392	415 354 males, 61 females 15% female	734	763 658 males, 105 females 13.8% female	763	746 639 males, 107 females 14.3% female
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%	105	107; 14.3%
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	87	56 46 males, 10 females	88	49 45 males, 4 females	45	53 44 males, 9 females

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
		Percentage of women trained		17.9%		8.2%		17.0%
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 12.5% female	518	704 620 males, 84 females 11.9% female	704	701 610 males, 91 females 13.0% female
6.1.6 Number of women hired in supervisory roles in target districts (this number includes site supervisors, team leaders, M&E assistants and others who supervise seasonal staff)	<i>Data source: Project records – Contracts signed</i>  <i>Reporting frequency: Semi-annually</i>	By Spray Campaign  Percentage of women hired	N.A. <sup>14</sup>	28; 32%	60	41; 25.6%; (41/160)	45	42; 26.3% (42/160)
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 12.5% female	734	763	763	746 639 males, 107 females
<b>6.2 Capacity Building</b>								
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	91	105 76 males, 29 females 27.6% female	160	160 119 males, 41 females 25.6% female	160	160 118 males, 42 females 26.3%

<sup>14</sup> 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.

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
		Women Trained						
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	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	Completed