



PRESIDENT'S MALARIA INITIATIVE



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

ZIMBABWE
END OF SPRAY REPORT
2015

SPRAY CAMPAIGN:
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CONTENTS

Acronyms	vi
Executive Summary	viii
1. Introduction	11
2. Pre-Spray Activities	13
2.1 Insecticide Selection	13
2.2 Micro-planning	13
2.3 Logistical Needs Assessment	14
2.4 Procurement	14
2.5 Distribution of IRS Materials	15
2.6 IRS Training	15
2.7 Human Resources	19
2.8 Medical Examination of Spray Teams	19
3. Information, Education and Communication Activities	21
3.1 Introduction	21
3.2 Information, Education, and Communication Training	21
3.3 Distribution of IEC Materials	21
3.4 Community Meetings	22
3.5 Door-to-Door Mobilization	23
4. Implementation of IRS Activities	24
4.1 Spray Campaign	24
4.2 Monitoring and Supervision	24
4.3 Mobile Data Collection and Reporting (mHealth Tools)	27
4.4 Logistics	28
4.5 IRS Payments	30
4.6 Cost-efficiency of Spray Operations	30
5. Post-Spray Activities	31
5.1 Post-spray Stakeholder Meetings	31
5.2 Demobilization	31
6. Entomology	33
6.1 Sentinel Sites	33
6.2 Insecticide Susceptibility Tests	34
6.3 Spray Quality Tests and Residual Efficacy of Sprayed Insecticide	35
6.4 Indoor and Outdoor Resting Density	37
6.5 Human-seeking Behavior	43
6.6 National Entomological Survey	44
6.7 Strengthening Vector Surveillance in Zimbabwe	45
6.8 DDMS Training	45

6.9 Entomological Staffing of the Project.....	45
6.10 Challenges and Plans	46
7. Environmental Compliance	47
7.1 Pre-Season Assessment.....	47
7.2 Mid-term Environmental Compliance Assessments.....	48
7.3 Incidents	49
7.4 Post-Season Environmental Compliance Assessment.....	49
7.5 Waste Disposal	49
8. Monitoring and Evaluation.....	51
8.1 2015 Hybrid M&E System: Standard NMCP M&E Methods with AIRS Components.....	51
8.2 Results of 2015 IRS Campaign	51
9. Capacity Building.....	54
10. Gender Integration.....	56
11. Challenges and Recommendations	57
11.1 Challenges	57
11.2 Recommendations	57
Annex A. Inventory of Stock and Quantities Post-Spray.....	59
Annex B. IRS Supervisory Results.....	62
Annex C. IRS Environmental Mitigation and Monitoring Report.....	65
Annex D. Weekly Spray Reports	70
Annex E. AIRS Zimbabwe Data Flow Plan	90
Annex F. Monitoring and Evaluation Plan Indicator Matrix.....	91

LIST OF TABLES

Table ES I. 2015 AIRS Zimbabwe at a Glance	viii
Table 1. Structures and Population for 2015 IRS Campaign	12
Table 2. Distribution of Major IRS Commodities, 2015.....	15
Table 3. Summary of 2015 IRS Trainings	16
Table 4. Number of People Trained.....	18
Table 5. Positions Engaged for 2015 Campaign, by District.....	19
Table 6. Medical Check-up for IRS Staff.....	20
Table 7. Distribution of IEC Materials for 2015 IRS Campaign.....	22
Table 8. 2015 Community Sensitization in Mutare District,* by Site, Population, and Gender	22
Table 9. Summary of 2015 Sensitization Meetings in Hard-to-Reach Wards, by District and Gender	23
Table 10. Supervision of 2015 IRS Campaign.....	25
Table 11. Spray Campaign Supervisory Tools.....	25
Table 12. District Distribution of IRS Operational Transport	29
Table 13. PMI Supported Sentinel Sites, 2015	33
Table 14. NMCP Sites Supported by AIRS Zimbabwe, 2015.....	33

Table 15. Indoor Resting Density, <i>An. funestus</i> , PSC, Burma Valley, Manicaland, March-December 2015	39
Table 16. Indoor Resting Density, <i>An. funestus</i> , Prokopack Aspirator, Burma Valley, Manicaland, March-December 2015	40
Table 17. Indoor Resting Densities, <i>An. gambiae</i> s.l. Seven Sentinel Sites Outside Manicaland, 2015 Baseline.....	40
Table 18. Indoor and Outdoor Collections, <i>Anopheles</i> , CDC Light Traps, Burma Valley, 2015.....	41
Table 19. Indoor and Outdoor Collections, <i>Anopheles gambiae</i> s.l. CDC Light Traps, Chakohwa, 2015.	42
Table 20. Indoor and Outdoor Collections, <i>Anopheles gambiae</i> s.l. CDC Light Traps, Seven Sites Outside of Manicaland, 2015.....	43
Table 21. Summary of Spray Coverage during the 2015 IRS Campaign.....	52
Table 22. Summary of Insecticide Usage during the 2015 IRS Campaign	52
Table 23. Summary of ITN Findings during the 2015 IRS Campaign.....	53
Table A-1. IRS 2015 Internationally Procured Items.....	59
Table A-2. IRS 2015 Local Procurement Items	60

LIST OF FIGURES

Figure 1. Insecticide Susceptibility Results of <i>An. gambiae</i> s.l. Mosquitoes, Six PMI-supported Sites.....	35
Figure 2. Spray Quality Results, <i>An. gambiae</i> s.l. (Wild) and <i>An. arabiensis</i> (KGB Strain), One and Five Days after Spray, Burma Valley and Chakohwa	36
Figure 3. Decay Rate, <i>An. gambiae</i> s.l. (Wild) and <i>An. arabiensis</i> (KGB strain), Eight Weeks after Spray, Burma Valley	37
Figure 4. Decay Rate, <i>An. gambiae</i> s.l. (Wild) and <i>An. arabiensis</i> (KGB strain), Four Weeks after Spray, Chakohwa.....	37
Figure 5. Host-seeking Behavior Results, <i>An. funestus</i> , from Burma Valley.....	44

ACRONYMS

AIRS	Africa IRS
BMP	PMI's Best Management Practices Manual
CDC	U.S. Centers for Disease Control and Prevention
COP	Chief of Party
CS	Capsule Suspension
DDMS	Disease Data Management System
DEHO	District Environmental Health Officer
DHIS2	District Health Information System 2
EC	Environmental Compliance
ECO	Environmental Compliance Officer
ECA	Environmental Compliance Assistant
HLC	Human Landing Catch
IEC	Information, Education, and Communication
IRS	Indoor Residual Spraying
ITN	Insecticide-treated Net
KGB	Kanyemba Gambiae Strain
LLIN	Long-lasting Insecticidal Net
MOHCC	Ministry of Health and Child Care
M&E	Monitoring and Evaluation
NIHR	National Institute for Health Research
NMCP	National Malaria Control Program
OP	Organophosphate
PEHO	Provincial Environmental Health Officer
PFO	Provincial Field Officer
PMI	President's Malaria Initiative
PPE	Personal Protective Equipment
PSC	Pyrethrum Spray Collection
PSECA	Pre Spray EC Assessment
SBCC	Social and Behavior Change Communication
SOP	Spray Operator

TOT	Training of Trainers
USAID	United States Agency for International Development
USG	United States Government
WHO	World Health Organization

EXECUTIVE SUMMARY

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

The major focus of the AIRS Zimbabwe program under Task Order 6 is to implement safe and effective IRS, improve the environmental compliance (EC) and safety of the country’s own IRS operations and conduct and build capacity in entomological surveillance. In December 2014, AIRS Zimbabwe completed its first full PMI-funded IRS campaign in the high malaria-burdened districts of Chimanimani, Mutare, Mutasa, and Nyanga in Manicaland province, using organophosphate (OP) insecticide.

In 2015, the PMI AIRS project in Zimbabwe continued working with provincial and district health officials in Manicaland to lead, implement, and manage the IRS campaign in the same four districts. The AIRS Zimbabwe also continued nationwide entomological surveillance in 19 sites and supplied entomological equipment to these sites. Additionally, AIRS Zimbabwe provided assistance to various national-level IRS campaign issues, when requested. The Project recruited and trained seasonal staff for the spray operations before the start of the campaign; procured insecticide, personal protective equipment (PPE), and IRS equipment; made logistical arrangements; and did EC preparation and monitoring before, during, and after the IRS campaign to ensure that the standard operating procedures and protocols from the Best Management Practices (BMP) Manual were consistently adhered to. The Project held stakeholder and partner planning meetings, as well as community sensitizations in order to create the necessary awareness and service demand by the beneficiaries for successful spray operations. Key results are presented in Table ES 1.

TABLE ES 1. 2015 AIRS ZIMBABWE AT A GLANCE

Number of districts covered by PMI-supported IRS in 2015	4 districts: Chimanimani, Mutare, Mutasa, Nyanga
Insecticide	Organophosphate (Actellic 300 CS)
Number of structures targeted by PMI-supported IRS	163,922
Number of structures found by spray operators during PMI-supported IRS spray season	171,736
Number of structures sprayed by PMI-supported IRS	162,127
Spray coverage	94.4%
Population protected by PMI-supported IRS	365,425 (including 5,763 pregnant women and 62,937 children under 5 years old)
Dates of PMI-supported IRS campaign	October 11 to November 25, 2015
Length of campaign	38 days
Number of people trained with U.S. Government (USG) funds to deliver IRS*	351 (301 men, 50 women)

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

To strengthen AIRS Zimbabwe operations, an Outline of Agreed Activities was signed by the Permanent Secretary, Ministry of Health and Child Care (MOHCC) and AIRS Zimbabwe Chief of Party (COP) on August 13, 2015. The document outlined the key activities to be implemented by AIRS Zimbabwe in collaboration with the National Malaria Control Program (NMCP), MOHCC, and Manicaland provincial and district health executives in the four districts during fiscal year 2015/2016.

For the 2015 campaign, AIRS Zimbabwe used pirimiphos-methyl capsule suspension (CS) formulation (Actellic 300CS), an OP class insecticide in all four districts. The selection of pirimiphos-methyl CS was based on its long residual effect on the sprayed surfaces and evidence indicating vector resistance to other classes of insecticide in the spray areas.

In comparison to 2014, there was high community acceptance of IRS using OPs in 2015 as evidenced by decrease in locked/refused rates from 9.7 percent (15,973/163,922) in 2014 to 5.6 percent (9,609/171,736) in 2015.

CHALLENGES AND LESSONS LEARNED

- Spray operators (SOPs) each carry a bag with the nine OP bottles in addition to a 10-liter pump to meet their daily target of structures sprayed. This slows down SOP performance and tires them out faster. To alleviate the weight issue, AIRS Zimbabwe will have a team leader or supervisor provide bottles for the spray operators at the place of spraying.
- Lack of storage space and washing facilities for spray teams remains a major challenge. The team will look for local solutions to identify additional storage space and construct temporary washing facilities.
- Although a lot was done in 2015 to sensitize the community about the campaign, there is still a need to strengthen community mobilization and social and behavior change communication (SBCC) activities to enhance community acceptance and program coverage. To address this, the team will involve more community leaders long before the campaign, conduct regular community meetings, and use “warners.” A day before spraying takes place, they will place information, education and communication (IEC) materials in public places to remind ward residents of the spraying. Use of such activities increased acceptance of IRS in targeted areas and the project will continue this combined mobilization approach in 2016.
- Supervisors and SOPs well accepted the mHealth tools including smartphones to complete supervisory and EC inspections and short message service (SMS) messaging. More intensive training in use of smartphones will be required to improve the competence and confidence of supervisors and team leaders to strengthen supportive supervision at all levels.
- Joint support and supervision visits and close monitoring of spray operations by teams drawn from NMCP, from the MOHCC, and from among provincial and district health executives ensured better performance by spray teams.
- The lack of mosquitoes to assess vector susceptibility to insecticides at all three sites in Manicaland remains an acute issue. Previous tests were done on adult mosquitoes collected by the battery powered Prokopack aspirator before the introduction of pirimiphos methyl during 2014 IRS campaign. The same collection method has not yielded sufficient numbers of mosquitoes for resistance testing after 2014.

Due to limited capacity and desire for incentives, the National Institute of Health Research (NIHR) is lagging behind with producing results from mosquito specimens sent to them in 2014. However, in February 2016, NIHR submitted the first results for i) species identification, ii) blood meal, and iii) sporozoite analysis. Tests to determine resistance mechanisms were not done. NIHR indicated that they will provide outstanding results on mechanisms of resistance by May 2016. AIRS Zimbabwe with full support from PMI and NMCP will continue exploring alternative options for analyzing specimens locally and regionally.

I. INTRODUCTION

Malaria in Zimbabwe is a serious public health problem, causing morbidity, mortality and poverty. Presently, IRS and long-lasting insecticidal nets (LLINs) are the two main vector control strategies that contribute to the prevention and control of malaria transmission in Zimbabwe. Indoor spraying of houses with residual insecticides can reduce the longevity of indoor resting anopheline mosquitoes, greatly limiting the probability of malaria transmission. The National Malaria Strategic Plan for 2008-2013 (extended to 2015, with addendum covering through 2017) aims to provide nearly universal access to malaria prevention and protection with 90 percent of the at-risk populations covered by IRS.

Following discussions between PMI and NMCP, AIRS Zimbabwe was directed to support IRS implementation in four districts in Manicaland province, guided by the following objectives:

- Spray at least 85 percent of the 163,922 structures found in 2014 in the four targeted districts.
- Protect at least 85 percent of the population found (351,575) in 2014 in the four districts.
- Develop capacity for provincial and district health staff to organize, plan, implement, monitor, and evaluate IRS through joint planning meetings, joint supervision, monitoring and evaluation (M&E) activities during the IRS campaign, and data collection and analysis that involve local counterparts in the IRS campaign.
- Ensure spray campaign data are entered daily into Microsoft Excel spreadsheets in accordance with NMCP's M&E and data collection system, to allow AIRS Zimbabwe to report on spray campaign progress weekly.
- Complete high-level entomological surveillance nationally, to ensure data are available for future IRS decision making, programming, and campaign planning.

In addition to the NMCP, AIRS Zimbabwe worked closely with the provincial and district health offices in Manicaland province to support their implementation of the 2015 IRS campaign. AIRS Zimbabwe project continued its focus on strengthening environmental management and safety of the IRS campaigns. Other areas that AIRS Zimbabwe supported during the 2015 campaign included: co-facilitation and logistics of trainings, support for data collection and reporting, procurement of insecticide, spray materials, and equipment, and monitoring of spray operations using the PMI AIRS project-wide supervision forms. In addition, the Project worked with the NIHR to complete entomological monitoring activities nationwide.

In 2014, the NMCP switched from pyrethroids to an OP in four districts in Manicaland province, which was observed in susceptibility tests to be effective against malaria vector mosquitoes in Zimbabwe. The Project used Actellic 300 CS for the 2015 spray campaign. Table 1 shows the numbers of targeted structures and population by district in 2015. All districts achieved the 85 percent PMI spray coverage target. Two (Mutasa and Nyanga) of the four districts achieved above the 95 percent the NMCP spray coverage target and, overall, the project achieved 94.4 percent spray coverage. AIRS Zimbabwe provided technical support to the IRS campaign and entomological activities led by the NMCP. AIRS also actively participated in the Vector Control Sub-Committee and supported the 19 nationwide entomological sentinel sites. The project distributed entomological kits to 19 sentinel sites, which was greatly appreciated by the NMCP and the provinces, as the kits will go a long way in strengthening entomological surveillance in Zimbabwe.

TABLE I. STRUCTURES AND POPULATION FOR 2015 IRS CAMPAIGN

District	Target Structures	Found Structures	Sprayed Structures	Target Population		
				Males	Females	Total
Chimanimani	26,922	28,746	24,495	28,667	33,809	62,476
Mutare	48,887	53,306	50,199	51,802	56,373	108,175
Mutasa	40,245	42,688	42,426	37,729	43,167	80,896
Nyanga	47,868	46,996	45,007	39,557	43,642	83,199
Total	163,922	171,736	162,127	157,755	176,991	334,746

2. PRE-SPRAY ACTIVITIES

2.1 INSECTICIDE SELECTION

The results of susceptibility monitoring were instrumental in guiding the policy change for the choice of insecticide for the 2015 IRS campaigns in two districts, namely, Sanyati and Beitbridge, where the OP class insecticide pirimiphos-methyl replaced lambda-cyhalothrin (a pyrethroid class insecticide) and DDT (an organochlorine class insecticide) owing to vector resistance to these insecticides, respectively. Pirimiphos-methyl remains the insecticide of choice in the four districts supported by PMI/AIRS in Manicaland as bioassay tests indicate the continuous effectiveness of OP class insecticide. Susceptibility tests could not be performed at all the sentinel sites in Manicaland owing to inadequate mosquitoes.

2.2 MICRO-PLANNING

AIRS Zimbabwe conducted micro-planning meetings with national, provincial, and district government stakeholders to effectively plan for a successful 2015 IRS campaign in four districts of Manicaland province: Chimanimani, Mutare, Mutasa, and Nyanga. The team also held a national meeting with the members of the NMCP. The aim of the meeting was to share and review the operational plan and targets for 2015 IRS campaign, and review and agree on stakeholder roles, responsibilities, and obligations. The national planning meeting was followed by a provincial meeting that included Manicaland provincial and district health officials. The major items discussed included:

- National and international procurement of IRS commodities, insecticide, and equipment
- Hiring of eight lorries and 246 spray operators
- Length of spray campaign
- Daily spray targets
- Training of campaign staff and spray teams
- IRS data management and reporting frequency
- Support and supervision
- Roles and obligations of stakeholders
- EC activities before, during, and after the campaign
- Camp sites and storage facilities
- Entomological monitoring activities
- SBCC activities and gender mainstreaming
- Phone-based data collection for EC and spray operations

2.3 LOGISTICAL NEEDS ASSESSMENT

The aim of the logistical needs assessment was to conduct an inventory of storage facilities, supplies, and materials required for the smooth and cost-efficient implementation of the 2015 IRS campaign. The process, which was carried out in July and August 2015, included field visits to the central and district warehouses, as well as all ward operational sites. The following activities were carried out:

- National level: The project held a brief meeting with the NMCP to discuss IRS logistical arrangements. They included a spray plan, IRS commodity distribution plan, hiring of lorries, engagement of the province to facilitate servicing of motorcycles, and joint field monitoring visits. During the meeting, participants also clarified their roles and responsibilities in facilitating provision of storage spaces for IRS commodities in government institutions where possible during the campaign.
- Provincial and district levels: A series of meetings was held with provincial and district health personnel to gain their support in providing facilities for the storage of insecticides and other IRS commodities at operational sites. Following these meetings, the MOHCC donated 12 rooms to the project for the period of spray campaign to store IRS commodities, including insecticides, at operational sites.
- Quantification of IRS commodities: This was mainly based on the number of structures targeted for spraying in the four districts as well as the inventory balance from 2014. AIRS Zimbabwe project officers stationed in Mutare physically counted IRS commodities available in the central warehouse. The team used this information to quantify PPE, pumps, tents, and other supplies needed. The 12,543 OP bottles of insecticide left over from 2014, though counted, were not included in the quantification because all the bottles had expired and laboratory tests confirmed their un-useable status for IRS. The manufacturer replenished the stock for the amount of the expired bottles at no cost to the project.
- The project used the results from this assessment and quantification exercise to develop a logistics distribution plan to dispatch local and internationally procured IRS commodities from Harare to the central warehouse in Mutare and then to district stores and operational sites.

2.4 PROCUREMENT

Procurement of IRS commodities consisted of international and local purchases. International procurement began in April including 74,700 bottles of Actellic 300 CS. The team planned for no buffer with this order due to budget constraints and last year's stock experience. As noted above, the 12,543 bottles of Actellic 300 CS left from the 2014 campaign expired in June 2015 and could not be used for the campaign that started in October 2015. Other international procurements included Hudson pumps and spares, face masks, and face shields.

Procurement of local IRS commodities was initiated in August and ended in September 2015. It was an open and competitive selection process in compliance with USAID and Abt policies and procedures. The AIRS Zimbabwe procurement committee opened the bids and evaluated vendors using specifications listed in the advertisement and ability to offer a competitive price and capacity to deliver within a reasonable time frame. The key services/commodities locally procured included:

- Transportation for the IRS campaign, which included: lorries to ferry PPE and IRS commodities from Harare to Mutare; insecticide from Mutare to operational site stores; SOPs to and from the field; 4X4 vehicles for monitoring, and motorcycles for community mobilization.
- Vendors to service motorcycles for the warners.
- Printing of IEC materials and M&E tools (data collection tools, performance tracker).

- Materials and services for refurbishment/screening of IRS storerooms and soak pits.

The local and international procurement items were received in good working condition and distributed to various operational sites before the start of the 2015 spray operations.

Annex A provides more information on IRS commodities procured locally and internationally for use during the 2015 campaign.

2.5 DISTRIBUTION OF IRS MATERIALS

A month prior to commencement of the 2015 IRS campaign, all PPE, equipment, and commodities that had been delivered to the AIRS Zimbabwe office were transferred and stored in the central warehouse in Mutare. A week before the start of the IRS campaign, the project distributed the commodities to the warehouses in the districts and to the operational sites. As shown in Table 2, 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.

TABLE 2. DISTRIBUTION OF MAJOR IRS COMMODITIES, 2015

Item*	Chimanimani	Mutare	Mutasa	Nyanga	Total
Overalls	149	228	202	194	773
Gumboots	120	103	104	95	422
Hard hats	76	112	99	95	382
Face shields	53	79	70	68	270
Brackets	53	79	70	68	270
Insecticide carrier bags	46	76	67	85	274
Insecticide bottles	12,650	24,758	18,790	18,422	74,620
Tents	6	7	6	7	26
Mattresses	67	112	95	90	364
Spray pumps	20	30	25	25	100

* Unit is one except gumboots are pairs

2.6 IRS TRAINING

Table 3 lists the types of training that AIRS Zimbabwe conducted in 2015 to give participants knowledge and skills that enabled them to effectively implement IRS operations. For the training of SOPs, the project followed NMCP's established three-level system of training. Table 4 presents data on the people trained for all IRS positions in 2015. The project trained a total of 415 people (354 males, 61 females) with 351 of them trained to deliver IRS. The percentage of females trained increased from 5.6 percent in 2014 to 14.2 percent in 2015. The increase is largely the result of intensive gender inclusion activities by AIRS Zimbabwe staff prior to the 2015 IRS campaign.

TABLE 3. SUMMARY OF 2015 IRS TRAININGS

Type of Training	Dates	Length (days)	Location	Description of Training
Level 1 training (National training of trainers (TOT))	17-21/08/15	5	Sungano Training Centre-Shurungwi	Challenges observed during the previous IRS campaign, IRS targets and plans for 2015, insecticide management, community mobilization, spraying techniques, data tools and collection, support and supervision, EC issues and entomological monitoring
Level 2 training (Provincial TOT)	07-11/09/15	5	Kujokochera Hotel-Chipinga	Handling of insecticides and spray pumps, spraying techniques and practicals, effective community mobilization, management of call backs, daily targets, data cleaning, analysis and utilization, importance of checklists in IRS, gender integration, IRS reporting frequency, supervision of spray operations, the importance of EC in IRS, entomological monitoring and management of IRS resources
SBCC training (TOT)	11/09/15	1	Kujokochera Hotel-Chipinga	Strategies to reduce locked rooms and refusals, and to improve IRS warning/mobilization, district schedules for road shows and sensitization meetings, drama groups shortpresentations, demonstrations, role plays, distribution of IEC materials and planning for mobilization at district levels and implementation of community mobilization before and during spray campaign
Guards, storekeepers and drivers training	16-17/09/15	1	Mount View-Mutare	Roles and responsibilities of drivers, guards, and storekeepers, code of conduct, handling of insecticides (types) and PPE, insecticide poisoning, signs and symptoms and first aid, spills response procedure, transportation of IRS commodities, firefighting theory and demonstrations, storeroom standards, stock management, and security of IRS commodities
Insecticide poisoning training	17-18/09/15	1	Mount View-Mutare	Roles and responsibilities of nurses in IRS, chemical handling and safety, hazard analysis, hazard mitigation plans, management of pesticide poisoning, management of snake bites, and contingency planning
M&E training	03/10/15	1	Christmas Pass hotel- Mutare	Overview of the IRS campaign, M&E, IRS M&E tools, EC monitoring Indicators, data management and reporting deadlines
mHealth training	04/10/15	1	Christmas Pass hotel- Mutare	Familiarization with the smartphone, getting started with the CommCare software, opening the CommCare application on the phone's home screen, login to the application, diagram of the application and guidelines for data collection, how to move through the application, completing the supervisory

				checklists using the smartphone, registering information and answering questions, and adding comments to the checklist; SMS job aids
Level 3 training (training of SOPs).	06-10/10/15	5	Chitakatira- Mutare Nyamaropa- Nyanga Chisuko- Mutasa Ngorima- Chimanimani	Mixing insecticide, use of PPE, spraying techniques, dismantling and assembling of sprayers, trouble shooting, maintenance and cleansing of sprayers, spray targets, data collection tools and recording data, community information after spraying, and community mobilization

TABLE 4. NUMBER OF PEOPLE TRAINED

Categories of Persons Trained	Training on IRS Delivery								Other Trainings				Total Participants		
	TOT: Spray Ops		Spray Ops		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
Spray operators			236	10									236	10	246
Team Leaders			16	1									16	1	17
Data Manager					3	1							3	1	4
Washers			-	9									0	9	9
Transport Officer	-	1											0	1	1
Store Keepers											7	-	7	0	7
Nurses/ Clinicians									1	10			1	10	11
Spray Pump Technicians			4	-									4	0	4
IEC Implementers, Mobilizers							16	1					16	1	17
Field Supervisors			36	26									36	26	62
IRS district coordinators	4	-											4	0	4
Drivers											10	-		0	10
Guards											13	-	13	0	13
<i>TOTAL trained with USG funds to deliver IRS</i>	12	3	288	37	0	0	0	0	1	10	0	0	301	50	351
TOTAL M/F	12	3	292	46	3	1	16	1	1	10	30	0	354	61	415

*Positions highlighted in light blue are reported in the PMI indicator 6.1.1 "Number of people trained to deliver IRS in target districts."

2.7 HUMAN RESOURCES

The human resources requirements were grouped into three categories: 1) AIRS staff, 2) government staff, and 3) seasonal workers (SOPs, washers, guards, and storekeepers). On average, the seasonal workers were hired for a period of 37 days (range 36-38 days). The government employees served as IRS coordinators, data managers, warners/community mobilizers, supervisors, and team leaders. The Project worked with these officials for 37 days on average. In addition, the M&E Specialist and a consultant from the technology partner Dimagi provided short-term technical assistance on data collection and reporting, and mHealth supervisory checklists and SMS job aids, respectively. Table 5 shows the distribution of human resources by district and gender. Mutare had the largest staff, Chimanimani the smallest, due to the number of targeted structures in the two districts.

A total of 383 temporary staff were engaged to deliver services during the 2015 IRS campaign; 335 were male, 48 were female. The majority of seasonal workers hired in 2015 were SOPs. The number of females hired for the position of SOP in 2015 increased to 10 (4.1 percent of total SOPs) from 2 (0.8 percent) in 2014

TABLE 5. POSITIONS ENGAGED FOR 2015 CAMPAIGN, BY DISTRICT

Position	Chimanimani		Mutare		Mutasa		Nyanga		Total			% Females
	M	F	M	F	M	F	M	F	M	F	Both	
District coordinator	1	0	1	0	1	0	1	0	4	0	4	0
Team leader	2	2	5	0	4	0	3	1	16	1	17	5.8
Field supervisor	10	3	6	12	11	5	9	6	36	26	62	41.9
SOP	45	0	68	5	64	1	59	4	236	10	246	24.6
Washers	0	2	0	3	0	2	0	2	0	9	9	100
Pump technicians	1	0	1	0	1	0	1	0	4	0	4	
Storekeeper	2	0	1	0	2	0	2	0	7	0	7	0
Guards	3	0	4	0	3	0	3	0	13	0	13	0
Mobilizers	4	0	5	0	4	0	3	1	16	1	17	5.9
Data managers	1	0	1	0	0	1	1	0	3	1	4	25
Total	69	7	92	20	90	9	82	14	335	48	383	13

2.8 MEDICAL EXAMINATION OF SPRAY TEAMS

In early October 2015, just prior to the start of spray operations, all SOPs and supervisors had a medical examination to assess their health and fitness to participate in the IRS campaign (Table 6). District Medical Officers in liaison with the DEHOs carried out the examinations, which consisted of a routine physical check-up and a pregnancy test for all female workers including storekeepers and IRS

supervisors. Anyone who was found unfit could not participate in the operations. Two SOPs (both in Mutasa district) were found unfit, one for general physical reasons and the other for a history of allergy to OPs. They were replaced immediately. No women were found pregnant.

TABLE 6. MEDICAL CHECK-UP FOR IRS STAFF

District	SOPs, Supervisors, and Storekeepers Examined		SOPs, Supervisors, and Storekeepers Found Unfit	
	Male	Female	Male	Female
Chimanimani	69	7	0	0
Mutare	92	20	0	0
Mutasa	90	9	2	0
Nyanga	82	14	0	0
Total	335	48	2	0

3. INFORMATION, EDUCATION AND COMMUNICATION ACTIVITIES

3.1 INTRODUCTION

AIRS Zimbabwe employed several IEC strategies to ensure successful spray operations in 2015. These strategies included IEC training, distribution of IEC materials, community meetings, and door-to-door mobilization. More so, the project also worked with MOHCC and PSI to conduct roadshows.

It is important to note that the AIRS Zimbabwe project did not have a budget for communication activities, except for IEC training, as other partners such as Population Services International and the MOHCC led those aspects. Nevertheless, a lot of activities need to be done prior to IRS to ensure that the communities are well informed about and sensitized to the program to avoid high refusals and locked rooms.

AIRS Zimbabwe used results from the Beneficiary Satisfaction Assessment conducted after the 2014 campaign to inform the messaging and door-to-door strategies for community and household mobilization in 2015.

3.2 INFORMATION, EDUCATION, AND COMMUNICATION TRAINING

The experience of having relatively large numbers (10%) of locked rooms and refusals in 2014 affected the IRS program achievements. Hence, IEC training that AIRS Zimbabwe conducted in September 2015 for all seven districts of Manicaland had an enhanced agenda to address those issues. Specifically, some training sessions aimed at identifying the reasons for such a high rate of refusals and locked rooms in 2014 and devised strategies to address the problems.

In response, district representatives came up with schedules for roadshows and community sensitization meetings. The trainees agreed that there is need for good IRS programming and a need to strengthen community meetings for effective IRS sensitization. Involving local leaders and other influential people was also noted as a good practice to avoid refusals and locked rooms. Loudhailers (megaphones) also were noted to be very effective when doing warning, especially in areas where the terrain is very bad.

A total of 56 people (46 males, 10 females) from the MOHCC and partners benefited from the training.

3.3 DISTRIBUTION OF IEC MATERIALS

After completing the IEC training, AIRS Zimbabwe distributed IEC materials to all four PMI-supported districts to ensure that the communities receive adequate information about the upcoming 2015 IRS campaign, and to equip the communities with the steps required and prohibited after their households have been sprayed. The project also distributed IRS brochures, posters, and calendars with malaria control messages, as shown in Table 7.

TABLE 7. DISTRIBUTION OF IEC MATERIALS FOR 2015 IRS CAMPAIGN

District	IRS Brochures	IRS Posters	Calendars
Mutare	9 000	60	90
Mutasa	6 000	40	80
Nyanga	9 000	60	80
Chimanimani	6 000	40	60
Total	30 000	200	310

On September 28-30, the AIRS Zimbabwe provincial coordinator and environmental compliance officer (ECO) teamed up with IRS coordinator and health promotions officer for Mutare district and continued with IRS sensitization and distribution of IEC materials in the rural health centers in the district. These centers were targeted to ensure that all the clinic staff and community members found on site were well sensitized to the 2015 IRS season. Table 8 shows population reached at the health centers.

TABLE 8. 2015 COMMUNITY SENSITIZATION IN MUTARE DISTRICT,* BY SITE, POPULATION, AND GENDER

Site	Village Health Workers		MOH Staff		Community		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
Burma Valley	0	2	1	2	4	13	5	17
Manzununu Outreach	0	2	0	2	0	0	0	4
Mambwere Outreach	0	0	2	0	38	129	40	129
Mambwere clinic	1	1	0	2	0	0	1	3
Chitora Clinic	0	0	1	3	0	0	1	3
Chipendeke Clinic	0	0	0	4	0	0	0	4
Gutaurare Clinic	1	3	0	4	0	0	1	7
Muromo Clinic	0	2	2	3	0	0	2	5
Takunda Clinic	0	2	2	1	2	6	4	9
Odzi Clinic	0	2	2	0	3	9	13	3
Mushunje Clinic	0	9	2	5	4	11	6	25
Bezel Bridge	0	0	2	4	0	0	2	4
Arda	0	0	1	2	70	5	7	72
Total	2	23	15	32	121	173	82	285

* The materials were distributed to all four districts using various channels. However, in Mutare district AIRS Provincial Coordinator and DHPO carried out the distribution and managed to collect comprehensive data. Despite distribution by MOHCC staff in other three districts, the reports were not so detailed.

3.4 COMMUNITY MEETINGS

Based on lessons learned from 2014, the project noted that most of the refusals and locked rooms were found in hard-to-reach wards within the four PMI-supported districts. The project worked with the districts to target the wards for an intense and massive community sensitization prior the 2015 IRS season. District environmental health technicians conducted these community sensitization meetings in

all identified wards within their respective districts from September 28 through October 2, just a week before the IRS campaign began. The main objectives of the meetings were to: gain community endorsement of the IRS campaign; make villagers aware of spraying schedules so that they would prepare; and instill community confidence in the IRS. Table 9 shows the population reached and number of wards covered.

TABLE 9. SUMMARY OF 2015 SENSITIZATION MEETINGS IN HARD-TO-REACH WARDS, BY DISTRICT AND GENDER

District	Wards	Population Reached		Total
		Females	Males	
Chimanimani	4	2,284	1,786	4,070
Mutare	8	1,792	1,245	3,037
Mutasa	4	3,064	1,520	4,584
Nyanga	5	582	366	948
Total	21	7,722	4,917	12,639

3.5 DOOR-TO-DOOR MOBILIZATION

The warners were tasked with carrying out door-to-door mobilization a day before an area was sprayed. Motorized MOHCC environmental health technicians on motorcycles would visit village heads and households, sensitize them in preparation for spray operations the following day, and distribute IEC materials to household members. Village health workers and representatives of village headmen assisted the warners to ensure the door-to-door mobilization was comprehensive. This greatly helped to inform households on when spray teams would be in their village, organize water supply for spray pumps, and inform people on what to do to prepare their households for spraying. To ensure that all the community members were reached, the warners used loudhailers.

Overall, to ensure an enhanced and targeted approach for mobilization through community meetings and door-to-door mobilization, the project carried out the following changes in 2015:

- Increased the number of community meetings organized through ward community leaders
- Held special sensitization meetings in the wards that had low coverage in 2014, targeting specific homes in specific villages
- Brought loudhailers on the very first days of the door-to-door mobilization and consistently used them throughout the campaign
- Closely cooperated with village heads and village health workers who identified and assigned village volunteers to walk SOPs from house to house to minimize refusal rates
- Focused on gender inclusion, especially allowing women to take influential roles in IRS.

While many efforts were made to improve IRS acceptance, there is still more to be done in the future campaigns to continue increasing the spray coverage.

4. IMPLEMENTATION OF IRS ACTIVITIES

4.1 SPRAY CAMPAIGN

AIRS Zimbabwe implemented the 2015 IRS campaign in four districts (Chimanimani, Mutare, Mutasa, and Nyanga) in Manicaland province. Following a series of dialogues during micro-planning meetings, spray operations began on October 11 in Chimanimani and Mutare, and on October 12 in Mutasa and Nyanga districts. The spray campaign was scheduled to last for 35 days with a seven-day break in between. However, due to the increased number of structures found, and competing public health programs that increased the number of call backs for the government staff supporting the campaign, the 2015 IRS campaign took 36-38 days. Spray teams operated from 23 camp sites during the campaign using eight lorries to ferry SOPs to and from targeted areas daily in the respective districts and wards.



A spray operator approaching homestead in Burma Valley, Mutare District

4.2 MONITORING AND SUPERVISION

To improve spray performance, the project strengthened supervision by assigning one or two AIRS technical staff to each of the four districts. Joint supervisory field trips were conducted with the provincial and district MOHCC staff, and this approach improved teamwork and collaboration with provincial and district health personnel (Table 10). The regular field monitoring enabled early identification of challenges on-the-spot, and on-site corrections were made where possible, resulting in improvements of overall outputs.

TABLE 10. SUPERVISION OF 2015 IRS CAMPAIGN

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

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

All IRS supervisors, team leaders, IRS Coordinators, as well as AIRS Zimbabwe staff, used standardized AIRS supervision and monitoring tools to evaluate the spray quality, EC, and spray data collection. The tools are briefly described in Table 11.

A monitoring and supervision schedule with the roles and responsibilities of each type of campaign supervisor, the type of supervisory checklists, and the frequency of use were developed and used during the 2015 IRS campaign, though the schedule was not readily available during the spot checks. AIRS Zimbabwe plans to distribute the schedule widely to all four districts a week before the 2016 IRS campaign begins. The schedule included AIRS staff and MOHCC personnel at the provincial and district level.

TABLE 11. SPRAY CAMPAIGN SUPERVISORY TOOLS

Supervisory Checklist	Purpose and Person Responsible
Morning mobilization and transport	<i>Aim:</i> To ensure spray teams leave for the day with adequate and appropriate PPE and clothing, insecticide, as well as other supplies, and are safely transported to the spray areas. <i>Person responsible for completing this checklist:</i> IRS coordinator, ECO, and Environmental Compliance Assistant (ECA)
End-of-day clean-up	<i>Aim:</i> To ensure spray teams correctly follow EC standard procedures for cleaning IRS equipment, account for insecticide stocks and safe storage of equipment. <i>Person responsible for completing this checklist:</i> IRS coordinator, ECA, and ECO
Home owner preparation and SOP performance checklist	<i>Aim:</i> To ensure that SOPs spray houses that have been correctly prepared for spraying and that they use correct spraying techniques.

	<i>Person responsible for completing this checklist:</i> IRS field supervisors, team leaders, IRS coordinators, ECA, and ECO
Storekeeper performance checklist	<p><i>Aim:</i> To ensure that storekeepers are following the laid down best warehousing practices and can account for stocks and equipment in their stores at any time</p> <p><i>Person responsible for completing this checklist:</i> IRS coordinator, ECA ECO, warehouse manager, operations manager, and COP</p>

The AIRS ECO, COP, operations manager, ECA, provincial coordinators, DEHOs, provincial field officer (PFO), and PEHOs conducted regular IRS support and supervision visits which included EC monitoring of IRS operations. The teams visited all sites to assist district supervision teams to ensure full compliance. Each supervisor was given a smartphone loaded with IRS supervisory checklists. The following checklists were used for IRS/EC support and supervision: Morning mobilization; Home owner preparation and spray operator performance; Storekeeper performance, and End of day checklist. In the morning, every team leader or the IRS coordinator would fill in the morning mobilization checklist paving way for the start of the IRS day. The focus of the morning mobilization was to check on the preparedness and health of the SOPs, and safety of the vehicles. The other important checklist all team leaders and supervisors used was the home owner preparations and SOP performance checklist. It focused on the following key areas:

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

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

The other areas that were monitored during the IRS campaign were:

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

Generally, the supervisors demonstrated high compliance during the spray campaign as 13,209 supervision contacts were made with homes and SOPs ensured safety and compliance among them.



Morning mobilization of spray teams at Nyamaropa Camp Site, Nyanga district

4.3 MOBILE DATA COLLECTION AND REPORTING (MHEALTH TOOLS)

Mobile phones for data collection and reporting were used for the first time in Zimbabwe during the 2015 IRS campaign. Since its inception, mHealth has become an integral part of IRS monitoring. Prior to the campaign, a technology expert from Dimagi conducted a one-day training in October 2015 in Mutare district, on use of the phones and mobile applications for supervision for PEHO, DEHOs, IRS coordinators, data managers, and supervisors.

AIRS project implemented two activities with the use of mobile devices:

- SMS job aid messaging
- Field supervision using phone-based supervisory checklists

The first tool, the SMS job aid messaging, was used largely to remind spray teams of standard spraying procedures and basic but important EC requirements to be adhered to during spraying. With the SMS job aid messaging system, important IRS notices and information were sent to all SOPs, IRS team leaders, and supervisors at least three times a week throughout the spray campaign in all four districts. The messages received on personal phones included the following:

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

Receipts of SMS-based job aid messages for IRS were monitored by AIRS Zimbabwe staff, PEHOs, DEHOs, PFOs, and IRS coordinators through interactions with spray team members during field monitoring and supervision. The majority of the recipients acknowledged the value added with the

messages. However, messages were sometimes received late, due primarily to frequent power cuts, an inadequate number of electrical sockets available, or total lack of electricity at the site, preventing SOPs from charging their phones. The team will consider solar charger as additional power supply source.

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

Upon submission of data to a server, an email was generated and sent to selected recipients, including the COP, operations manager, ECO, ECA, provincial coordinator, and home office team, as well as MOHCC staff including Vector Control Officer, PEHO, PFO, DEHOs, and IRS coordinators. Immediate follow-up was done on any non-



Participant demonstrates use of a smartphone for IRS supervision during mHealth training, Mutare City

compliance that was reported through email. Some of the actions taken based on the reports from the mobile data supervisory tool included supplying flashlights to all SOPs, ensuring that all lorries used during spray were adequately supplied with documentation on safety procedures, and ensuring that no SOP ate while still wearing PPE.

Within the first two weeks of spray operations, it was observed that some supervisors were not at ease using smartphone and the mobile-based checklists, hence some sent incorrect reports. It was also noted that some field supervisors and IRS coordinators did not understand questions well, resulting in coding incorrect or inconsistent data, which at times gave a wrong perspective of what exactly would be happening in the field. The AIRS Zimbabwe project team addressed all the issues fully during the first part of the campaign using on-the-job trainings and on-site feedback to spray teams.

4.4 LOGISTICS

4.4.1 IRS STORAGE AND INSECTICIDE STOCK MANAGEMENT

The Mutare warehouse was the central storage facility and served as a distribution center for the four districts, while district storage facilities worked as distribution centers for all IRS commodities. A short-term warehouse manager (a temporary hire of AIRS Zimbabwe) managed the central warehouse, while storekeepers managed district and campsite storage facilities to ensure distribution and tight supervision of IRS commodities at all levels. The warehouse manager supervised and monitored management of IRS stocks at district and campsite levels.

There were 26 storage facilities at 26 operation sites previously established in the four districts and 23 sites were used during the campaign. The MOHCC did not camp in the other six sites as previously planned to reduce time while setting up and dismantling camp sites. Of the 23 sites, MOHCC provided

12 stores at the health center level at no cost to the project, while AIRS Zimbabwe rented the remaining stores from private owners at business locations near the IRS operational sites. The AIRS Zimbabwe team closely supervised and monitored the performance of the storekeepers and provided guidance and coaching on the spot when required. In 2015, the project rented a larger space at Mutare Dry Port to use as a provincial warehouse. An enhanced ventilation system was installed to comply with insecticide storage and safety requirements. It should be noted that securing adequate storage facilities remains a challenge at district and operational levels as the space provided is often too small to accommodate all the insecticide, PPE, and IRS equipment.

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

4.4.2 IRS VEHICLES

The project hired various vehicles from the private sector for use during the 2015 IRS campaign. Eight lorries were rented from the private transport companies. Seventeen motorcycles provided by the MOHCC were serviced and repaired for use by warners (Table 12). The lorries were used to dispatch PPE, insecticide, and other IRS commodities from Harare to the Mutare central warehouse, to district stores in the four districts and to the district campsites. Lorries also transported spray teams from the campsites to the field and back, as well as empty OP bottles, cardboard boxes, and other IRS materials from the campsites to the central warehouse. Motorcycles were used by warners for their daily community mobilization work.

The project also hired four-by-four trucks to transport AIRS Zimbabwe staff, the NMCP, and provincial and district spray campaign supervisors to monitor IRS operations throughout the campaign. AIRS Zimbabwe requested transport vendors to send their vehicles for inspection by the Vehicle Inspection Department, and where applicable, modify their vehicles to ensure that safety components were in place during transportation of spray teams, IRS equipment, and insecticide. In some cases, AIRS Zimbabwe provided fuel support to district teams to strengthen routine supervision and close monitoring of the campaign. The MOHCC provincial office provided vehicles and fuel for provincial supervisory teams.

TABLE 12. DISTRICT DISTRIBUTION OF IRS OPERATIONAL TRANSPORT

District	Lorries	Motorcycles
Chimanimani	2	4
Mutare	2	5
Mutasa	2	4
Nyanga	2	4
Total	8	17

4.5 IRS PAYMENTS

In 2015, AIRS Zimbabwe team managed the following activities to ensure financial issues did not delay the spray campaign:

- The team ensured that all the seasonal staff (SOPs, storekeepers, security guards, and breakfast caterers) had contracts and the project obtained signed copies for the records.
- The project established and maintained log sheets for the IRS lorries, trucks, and motorcycles.
- The team maintained daily registers for the SOPs, lorry drivers, and breakfast caterers that were approved by the IRS coordinators on a regular basis.
- The AIRS team verified and collected the daily registers for the breakfast caterers and IRS spraying teams before preparing payrolls.
- An agreement was reached with a reputable mobile banking system through the ECOCASH service provider used to pay, through mobile money, the seasonally hired personnel.
- Allowances for government employees were paid through their bank accounts.
- All breakfast service providers were paid through their bank accounts.
- Fixed price contracts were signed with lorry and trucks service providers who were paid through their bank accounts after their log sheets had been verified and reconciled.
- All payments were approved by finance and administration staff and the COP.

4.6 COST-EFFICIENCY OF SPRAY OPERATIONS

- As was the case in 2014, AIRS Zimbabwe hired eight lorries for the 2015 IRS campaign season through a competitive bidding process. The response rate to the call for a cost proposal was very low with only four vendors participating. Before the final selection of the lorry vendors the AIRS team negotiated with the service providers and managed to reduce the daily rate from \$300 to \$270. The approved budget for the lorries was \$117,000, while the final negotiated price came down to \$88,560, a saving of \$28,440. Although the 2015 spraying period was extended by two to three days, the contract value of the lorries did not change.
- The spraying teams completed all call-backs to locked houses before moving from one campsite to another and this saved time and transport costs. In addition, handling call-backs while still on location may improve SOPs recall of locked houses.
- The AIRS Zimbabwe also negotiated the price of the 4x4 trucks that were used by the supervisory teams to monitor IRS operations. The initial budget for the Harare-based truck rental was calculated at \$71,550, with a daily rate of \$265. The team was able to negotiate with suppliers a daily rate of \$140 for a saving of \$23,405. The approved budget for the Mutare-based truck rentals was \$20,410. The team negotiated with the suppliers the total of \$13,530, saving \$6,880. The approved daily rate was \$130, whereas the negotiated rate was \$110 per day.

5. POST-SPRAY ACTIVITIES

5.1 POST-SPRAY STAKEHOLDER MEETINGS

The post-spray review and planning meeting will be held during the last week of January 2016, based on consultations with the NMCP and provincial and district health personnel. The objectives are primarily to:

- Review progress, performance, challenges, and opportunities during the implementation of 2015 IRS campaign.
- Share experiences in strengthening IRS operations, EC, and entomological monitoring.
- Strengthen linkages for sustaining gains and developments in IRS operations through strong partnerships.
- Develop a preliminary 2016 IRS provincial implementation plan.

Expected outcomes:

- 2015 IRS performance feedback, and shared lessons learned, best practices/experiences on delivery of 2015 IRS program.
- Clear analysis of IRS data collection, cleaning and reporting system.
- Consolidated IRS operations and waste disposal management plans for 2016.
- Recommendations for improving 2016 IRS campaign.

5.2 DEMOBILIZATION

Following the successful completion of 2015 IRS campaign, the project team moved all equipment from the camp sites to the four district storerooms. The equipment was retrieved using a checklist to guide and ensure the items tallied with quantities indicated in issue vouchers. Retrieved items included overalls, gumboots, helmets, rubbers gloves, satchels, mattresses, tents, and sprayers. AIRS Zimbabwe handed over to SOPs 346 pairs of coveralls and 246 pairs of gumboots that were found unusable after strict inspection by the team and thorough washing with soap and clean water. The project hired 10 casual workers, who under the supervision of AIRS Zimbabwe staff and provincial health officers cleaned all the equipment at Dora IRS camp site in Mutare district, selected for its proximity to Mutare central warehouse. The clean equipment and leftover OP bottles were separately transported to Mutare central warehouse for safe keeping, while overalls were sent to a private launderer for further cleaning before safe storage at the central warehouse.

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

An inventory of items retrieved and brought back to the central warehouse in Mutare was compiled and verified (Annex A).

6. ENTOMOLOGY

This chapter summarizes activities conducted between March 2015 and December 2015. The AIRS entomology team worked closely with the NIHR and staff from the Provincial Medical Director offices as well as youths from the local communities to implement all planned field activities. Specimens still await analyses at the NIHR laboratory.

6.1 SENTINEL SITES

Ten districts are being used as entomological monitoring districts in 2015. Three districts are in Manicaland province while seven are in other provinces. Table 13 presents the districts and the sentinel sites that are under entomological surveillance.

TABLE 13. PMI SUPPORTED SENTINEL SITES, 2015

No.	Sentinel Site	District	Province	Insecticide Sprayed in Area
1	Burma Valley	Mutare	Manicaland*	OP
2	Chakohwa	Chimanimani*		OP
3	Mukamba	Makoni		Nil (control)
4	Kawere	Mutoko	Mashonaland East	Pyrethroids
5	Chakari	Sanyati	Mashonaland West	Pyrethroids
6	Chilonga	Chiredzi	Masvingo	DDT
7	Manjolo	Binga	Matabeleland North	DDT
8	Makakavhule	Beitbridge	Matabeleland South	DDT
9	Kamhororo	Gokwe South	Midlands	DDT
10	Old Mazowe Bridge	Rushinga	Mashonaland Central	DDT

PMI/AIRS also supports routine entomological monitoring in Mutare City, Manicaland province, in order to determine malaria transmission in this urban setting.

Nine other sentinel sites (Table 14) did not perform monthly collections. A new, Entomological Officer position, seconded to NMCP, is not currently filled. The Entomological Officer will be responsible for coordinating partner entomological data and assisting in the support of sentinel sites.

TABLE 14. NMCP SITES SUPPORTED BY AIRS ZIMBABWE, 2015

No.	Site	District	Province
1	Jotsholo	Lupane	Matabeleland North
2	Tshelanyemba	Matobo	Matabeleland South
3	Mashoko	Bikita	Masvingo
4	Muzarabani	Guruve	Mashonaland Central

5	Zindi	Mutasa	Manicaland
6	Kasimure	Hurungwe	Mashonaland West
7	Sidhakeni	Kwekwe	Midlands
8	Kotwa	Mudzi	Mashonaland East
9	Maramba	UMP (Uzumba Maramba Pfungwe)	Mashonaland East

Activities conducted during March 2015-December 2015 included:

- Vector susceptibility to insecticides.
- Cone bioassay tests for quality assurance of the IRS program and residual efficacy of the sprayed Actellic 300 CS formulation of pirimiphos-methyl (an OP).
- Mosquito collections to identify species of malaria vectors in targeted districts and assess the impact of the IRS campaign on vector density and behavior.
- PMI/AIRS-supported national vector surveillance.

6.2 INSECTICIDE SUSCEPTIBILITY TESTS

The susceptibility of local *An. gambiae* s.l. species collected from the sentinel sites to selected World Health Organization (WHO)-approved insecticides for IRS was assessed using the WHO tube assay method.

6.2.1 TESTED INSECTICIDES

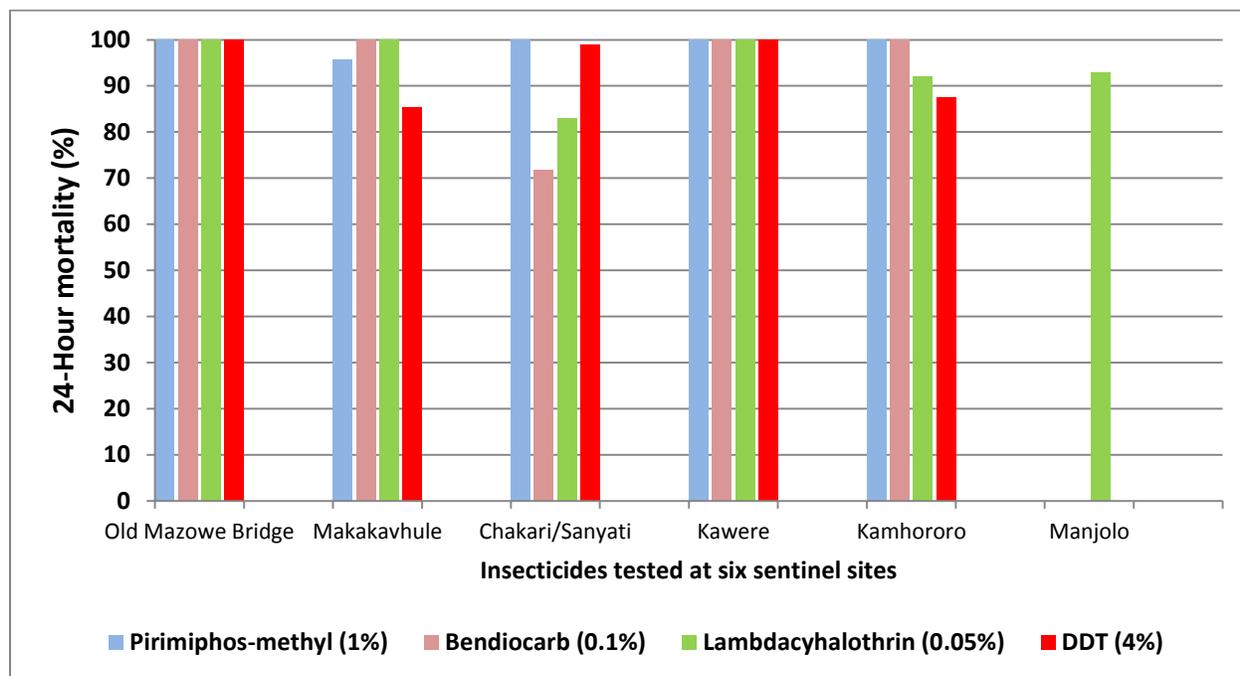
The four insecticides tested were bendiocarb (0.1%), dichlorodiphenyltrichloroethane (DDT) (4%), lambda-cyhalothrin (0.05%) and pirimiphos-methyl (1%). *An. gambiae* s.l. species collected were exposed to these insecticides for 60 minutes after which the mosquitoes were held for 24 hours to record the 24-hour mortality. The tests were completed at the following sites: Old Mazowe Bridge, Makakavhule, Chakari/Sanyati, Kawere, Manjolo, and Kamhororo. 100 mosquitoes were tested for each of the four insecticides at most sites (Old Mazowe Bridge, Makakavhule, Kawere, Kamhororo and Chakari/ Sanyati) in accordance with the WHO protocol, while 75 mosquitoes were tested on lambda-cyhalothrin at Manjolo because there were inadequate mosquitoes.

6.2.2 RESULTS

The results of the insecticide susceptibility tests conducted at six sentinel sites between April and December 2015 are presented in Figure 1. They show that the local vector species from Old Mazowe Bridge and Kawere were susceptible to all four insecticides tested. At Chakari/Sanyati, the local vector was susceptible to pirimiphos-methyl and DDT but resistant to bendiocarb and lambda-cyhalothrin. At Kamhororo, the local vector was resistant to DDT, possibly resistant to lambda-cyhalothrin but susceptible to pirimiphos-methyl and bendiocarb. At Manjolo, possible resistance to lambda-cyhalothrin was detected; susceptibility to three other insecticides could not be ascertained owing to inadequate mosquitoes available for the tests in 2015. Further work will be done during the first quarter of 2016. At Makakavhule, the local vector was resistant to DDT and possibly resistant to pirimiphos-methyl but susceptible to bendiocarb and lambda-cyhalothrin. The tests are ongoing and results will be updated when completed, especially concerning the possible resistance to pirimiphos-methyl at Makakavhule. Insecticide susceptibility tests could not be completed at other sites owing to lack of adequate mosquitoes during the monitoring period. At Jotsholo site in Lupane district (Matebeleland North

province), susceptibility tests could not be done since *An. pretoriensis* was collected by the new insectary manager instead of *An. gambiae* s.l. This shortcoming highlights the need for entomological training for both new and old cadres who are involved in routine surveillance in 2016.

FIGURE 1. INSECTICIDE SUSCEPTIBILITY RESULTS OF AN. GAMBIAE S.L. MOSQUITOES, SIX PMI-SUPPORTED SITES



6.3 SPRAY QUALITY TESTS AND RESIDUAL EFFICACY OF SPRAYED INSECTICIDE

As part of the PMI AIRS Project spray quality check standards, WHO cone bioassays were conducted to test the quality of work by the different spray teams and to evaluate the residual effect of the sprayed insecticide (Actellic 300 CS). The team conducted tests on four main types of sprayed surfaces: mud from traditional houses, brick painted, cement plaster, and painted plaster from modern houses.

6.3.1 SETTINGS FOR THE TESTS

Quality assurance tests were conducted at two communities in a farming compound at the Burma Valley site, and in a rural community at the Chakohwa site. This section reports on the current cone bioassay tests following the 2015 IRS campaign in Manicaland. The standard WHO cone bioassay tests were conducted on recently sprayed wall surfaces. Tests were done in 10 houses at each site with three cones per room set at top, middle, and bottom positions roughly 1.5, 1.0, and 0.5 m from the floor. Ten 2-5 day old female *An. gambiae* s.l. or *An. arabiensis* (susceptible *Kanyemba gambiae* (KGB) strain) were put per cone and the number of mosquitoes knocked down after 30 minutes exposure were recorded. Later, the number of mosquitoes knocked down after 60 minutes, and the number dead after the standard 24-hour observation period were recorded. Controls involved exposing 10 mosquitoes – both wild and colony, separately per cone – onto unsprayed surfaces and recording the knockdown rates at 30 and 60 minutes and the final mortality after the 24-hour observation period under the same

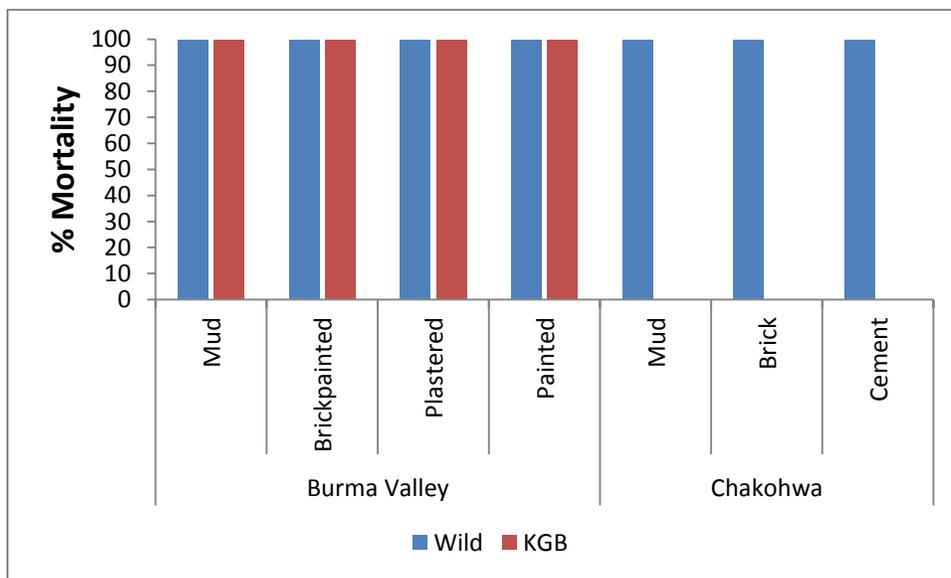
environmental conditions. The susceptibility of the wild *An. gambiae* s.l. was established prior to their use in the bioassay tests. Ideally, laboratory-reared susceptible mosquitoes should be used for the cone bioassay tests. Wild mosquitoes were used since the NIHR insectary could not produce adequate mosquitoes to meet the needs for 20 rooms (10 rooms per site for two sites) for consecutive months.

6.3.2 RESULTS

6.3.2.1 QUALITY ASSURANCE OF THE IRS PROGRAM

The quality of spraying was considered satisfactory with 100% mosquito mortality observed within one week of spraying at both Burma Valley and Chakohwa (Figure 2). Both wild and colony mosquitoes were used for the tests at Burma Valley whereas only wild mosquitoes were used at Chakohwa. The NIHR encountered technical challenges and therefore could not supply sufficient colony mosquitoes for spray quality checks at Chakohwa in November 2015. This has however improved since December 2015 and NIHR has been consistently providing adequate colony mosquitoes since then.

FIGURE 2. SPRAY QUALITY RESULTS, AN. GAMBIAE S.L. (WILD) AND AN. ARABIENSIS (KGB STRAIN), ONE AND FIVE DAYS AFTER SPRAY, BURMA VALLEY AND CHAKOHWA



Note: Burma Valley: sprayed on 10/13/2015 and tested on 10/14/2015

Chakohwa: sprayed on 11/12/2015 and tested on 11/17/2015.

6.3.2.2 RESIDUAL EFFICACY OF ACTELIC 300CS

The residual efficacy of pirimiphos-methyl is still showing high efficacy: 100% mosquito mortality was recorded eight weeks after spray at the Burma Valley site (Figure 3) and four weeks after spray at the Chakohwa site (Figure 4).

FIGURE 3. DECAY RATE, *AN. GAMBIAE* S.L. (WILD) AND *AN. ARABIENSIS* (KGB STRAIN), EIGHT WEEKS AFTER SPRAY, BURMA VALLEY

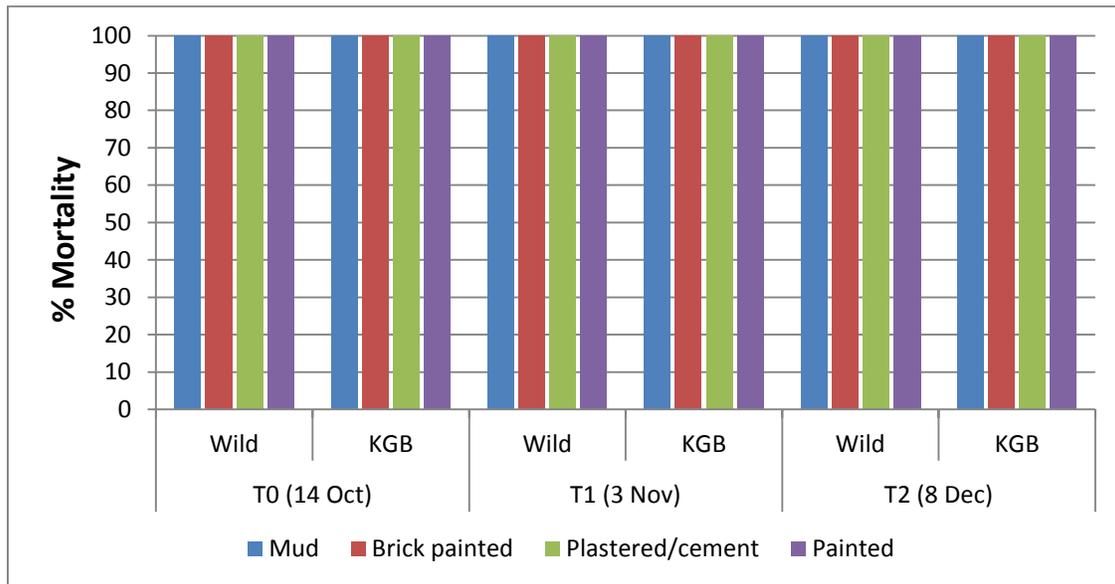
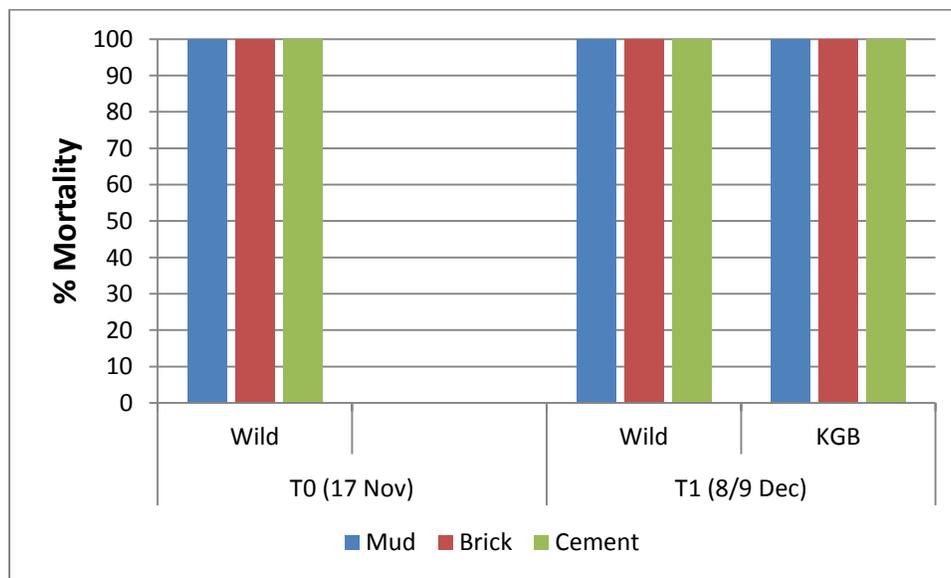


FIGURE 4. DECAY RATE, *AN. GAMBIAE* S.L. (WILD) AND *AN. ARABIENSIS* (KGB STRAIN), FOUR WEEKS AFTER SPRAY, CHAKOHWA



Note: the susceptible 'KGB' strain *An. arabiensis* was not available from the insectary at NIHR for the T0 cone bioassay tests at Chakohwa.

6.4 INDOOR AND OUTDOOR RESTING DENSITY

Indoor resting densities of malaria vectors were assessed using two methods: the pyrethrum spray collection (PSC) and the battery-powered Prokopack Aspirator (see photo) at the three sites in Manicaland. The team used CDC light traps in the same three sites to do indoor and outdoor mosquito

collections. Only the PSC method was used to estimate vector densities at the seven other sites outside Manicaland.

6.4.1 PSC AND PROKOPACK ASPIRATOR SAMPLING METHODS

PSC collections were done in at least 25 rooms at each sentinel site. The rooms included living structures (bedrooms, living rooms, and kitchens) and non-living structures (toilets, bathrooms, and animal shelters). The distinction between living and non-living structures was made in order to gather evidence to determine the necessity to spray or not the non-living structures during routine IRS. The PSC was conducted between 06:00 and 10:00 hours using ready-made aerosol multi-purpose insect spray that contained pyrethroids (imipothrin, prallethrin, and tetramethrin) and a synergist (piperonyl butoxide). After laying white calico cloth on the floor and furniture, the insecticide was sprayed and the room was left closed for 10 minutes before knocked down mosquitoes were retrieved from the laid cloth. Knocked down mosquitoes were collected and their abdominal condition, recorded as unfed, blood-fed, half gravid, or gravid, before they were preserved for further analysis.

The Prokopack aspirator was used to collect indoor resting mosquitoes from both living and non-living structures. The aspirator was used between 06:00 and 10:00 hours at the three sentinel sites in Manicaland, Burma Valley, Chakohwa and Mukamba, but not at the seven sites outside Manicaland.

6.4.2 CDC LIGHT TRAPS

CDC light traps were set overnight separately indoors and outdoors over three or more days. Ideally, six traps were set in parallel indoors and six outdoors at the same households for two or more consecutive nights. At some sites, fewer traps were set outdoors than indoors after it was established the traps would not be safe if left unguarded outside during the night. Traps indoors were always set alongside a resident sleeping under an LLIN, whereas outdoor traps were not set alongside human bait. The indoor and outdoor light traps were set within 10 to 15 m meters of each at each household.



Technicians using the Prokopack aspirator in Burma Valley, Mutare District

6.4.3 RESULTS

6.4.3.1 VECTOR SPECIES COMPOSITION

The major vector species in Burma Valley is *An. funestus*, while *An. gambiae* s.l. is predominant in Manicaland sites and elsewhere, albeit in low densities. *An. gambiae* s.l. was collected at Chakohwa and Mukamba in contrast to *An. funestus* collected at Burma Valley. However, given the sibling species associated with both vector groups, there is still need to determine the actual species involved in malaria transmission. AIRS Zimbabwe is still waiting for laboratory results from NIHR for specimens submitted in mid-2014. In April 2015, AIRS Zimbabwe explored the possibility of engaging Africa University, an independent institution in Mutare, to conduct the laboratory analyses of the mosquito specimens. PMI/Zimbabwe has agreed and asked the Zimbabwe Assistance Program in Malaria to boost the Africa University laboratory capacity through training and equipment. Africa University laboratory

will be an additional AIRS partner to assist with the examination and analysis of entomological specimens.

6.4.3.2 PSC AND ASPIRATOR RESULTS

Indoor resting densities of the malaria vectors remain low at the three sentinel sites in Manicaland. Tables 15 and 16 summarize the collections made between March 2015 and December 2015 at Burma Valley using the PSC and aspirator methods. There was 25 times more (on average) mosquitoes per room in non-living structures (1.00) compared to living structures (0.04) based on the PSC method (Table 15). No apparent differences were noted in mosquito densities between living and non-living structures (Table 16). Despite the low mosquito densities, there was a shift from mosquitoes found in both living and non-living structures before IRS to predominantly rest in non-living structures after IRS. Burma Valley was sprayed in October 2015. The same behavior was observed following the introduction of pirimiphos-methyl in Burma Valley during the IRS campaign in 2014. Non-living structures (mostly toilets and bathrooms) were not sprayed during the 2014 and 2015 IRS campaigns. Thus, pirimiphos-methyl seems to exhibit an excito-repellent effect on the malaria vector at Burma Valley. All anopheline mosquitoes collected indoors using the PSC and prokopack from Burma Valley were *An. funestus*.

Relatively few mosquitoes were collected resting indoors at Chakohwa and Mukamba, and these were all *An. gambiae* s.l. Only eight *An. gambiae* s.l. were collected over the eight-month period at Chakohwa: two in March, four in September, and one each in October and November. One *An. gambiae* s.l. was collected resting indoors from Mukamba in September. This highlights the scarcity of malaria vectors at this non-sprayed site.

TABLE 15. INDOOR RESTING DENSITY, AN. FUNESTUS, PSC, BURMA VALLEY, MANICALAND, MARCH-DECEMBER 2015

Month (2015)	Type of Structure	No. of Rooms	Total <i>An. funestus</i> Collected					Average <i>An. funestus</i> Collected per Room
			UF	Fed	HG	G	Total	
Mar	Living	15	0	0	1	0	1	0.17
	Non-living	0	0	0	0	0	0	0
Apr	Living	15	0	1	0	0	1	0.17
	Non-living	0	0	0	0	0	0	0
Jun	Living	15	0	0	0	0	0	0
	Non-living	0	0	0	0	0	0	0
Aug	Living	21	2	0	0	0	2	0.10
	Non-living	0	0	0	0	0	0	0
Sep	Living	20	0	0	1	1	2	0.10
	Non-living	13	4	1	0	1	6	0.46
Oct	Living	26	0	0	0	0	0	0
	Non-living	10	0	0	0	0	0	0
Nov	Living	19	0	0	0	0	0	0
	Non-living	4	4	0	0	1	5	1.25
Dec	Living	29	0	0	0	0	0	0
	Non-living	17	25	7	0	1	33	1.94
Total	Living	160	2	1	2	1	6	0.04
	Non-living	44	33	8	0	3	44	1.00

Note: Routine entomological monitoring was not completed in May and July in order to optimize the use of funds.

TABLE 16. INDOOR RESTING DENSITY, AN. FUNESTUS, PROKOPACK ASPIRATOR, BURMA VALLEY, MANICALAND, MARCH-DECEMBER 2015

Month (2015)	Type of Structure	No. of Rooms	Total <i>An. funestus</i> Collected					Average <i>An. funestus</i> Collected per Room
			UF	Fed	HG	G	Total	
Mar	Living	0	0	0	0	0	0	0
	Non-living	0	0	0	0	0	0	0
Apr	Living	0	0	0	0	0	0	0
	Non-living	0	0	0	0	0	0	0
Jun	Living	16	0	0	0	0	0	0
	Non-living	14	1	0	0	0	1	0.07
Aug	Living	33	3	1	0	0	4	0.12
	Non-living	18	0	0	0	0	0	0
Sep	Living	37	2	0	0	0	2	0.05
	Non-living	17	0	3	0	3	6	0.35
Oct	Living	15	3	0	0	0	3	0.20
	Non-living	8	20	0	0	0	20	2.50
Nov	Living	20	0	0	0	0	0	0
	Non-living	10	0	0	0	0	0	0
Dec	Living	3	0	0	0	0	0	0
	Non-living	28	5	0	0	0	5	0.18
Total	Living	124	8	1	0	0	9	0.32
	Non-living	95	26	3	0	3	32	0.34

Note: Routine entomological monitoring was not completed in May and July in order to optimize the use of funds.

Similar low vector densities were observed at the seven sentinel sites outside Manicaland (Table 17). Generally, indoor resting densities of *An. gambiae* s.l. were low at the seven sites, with Makakavhule and Kamhororo showing relatively high numbers, 2.7 and 1.48 *An. gambiae* s.l. per room, respectively. More *An. gambiae* s.l. were collected from living structures compared to non-living structures at four sentinel sites where toilets, bathrooms, and animal shelters were assessed. *An. gambiae* s.l. were found resting in non-living structures only at Kamhororo out of the four sites where this was assessed. All the sentinel sites are under routine IRS using DDT or a pyrethroid. Non-living structures are few and/or are not suitable for assessment using the PSC method at households at some sentinel sites. Most households share toilet facilities, and therefore non-living structures are under-represented.

TABLE 17. INDOOR RESTING DENSITIES, AN. GAMBIAE S.L. SEVEN SENTINEL SITES OUTSIDE MANICALAND, 2015 BASELINE

Site (Insecticide used for 2014 IRS)	Month of Collection	Type of Structure	No. of Rooms	Total <i>An. gambiae</i> s.l. Collected					Average No. of <i>An. gambiae</i> s.l. per Room
				UF	F	HG	G	Total	
Kamhororo (DDT)	August	Living	48	22	32	9	8	71	1.48
		Non-living	10	4	2	1	0	7	0.70
Old Mazowe Bridge	August	Living	32	0	2	0	0	2	0.06

(DDT)		Non-living	3	0	0	0	0	0	0
Manjolo (DDT)	September	Living	28	0	2	0	0	2	0.07
		Non-living	6	0	0	0	0	0	0
Chilonga (DDT)	September	Living	41	2	2	0	0	4	0.09
		Non-living	N/A	0	0	0	0	0	0
Kawere (Deltamethrin)	October	Living	50	0	0	1	0	1	0.02
		Non-living	N/A	-	-	-	-	-	-
Makakavhule (DDT)	October	Living	22	32	16	3	4	55	2.50
		Non-living	7	0	0	0	0	0	0
Chakari/Sanyati (Lambdacyhalothrin)	November	Living	46	2	1	0	0	3	0.07
		Non-living	N/A	-	-	-	-	-	-
Total		Living	267	58	55	13	12	138	0.52
		Non-living	26	4	2	1	0	7	0.27

6.4.3.3 CDC LIGHT TRAP RESULTS

Light trap collections at the three sites in Manicaland yielded a variety of anopheline species. At Burma Valley, four species were collected, namely, *An. funestus*, *An. coustani*, *An. longipalpis* and *An. pretoriensis* (Table 18). An average 2.0 and 23.0 *An. pretoriensis* were collected from outdoor CDC light trap in October and November, respectively, while 0.08 *An. coustani* were collected from CDC light traps set outdoor in November.

TABLE 18. INDOOR AND OUTDOOR COLLECTIONS, ANOPHELES, CDC LIGHT TRAPS, BURMA VALLEY, 2015

Month	Location	No. of Traps	No. Anopheles Collected					Average <i>An. funestus</i> /trap
			UF	Fed	HG	G	Total	
Mar	In	6	2	0	0	0	2	0.33
	Out	6	36	0	0	0	36	6.00
Apr	In	6	2	0	0	0	2	0.33
	Out	6	2	0	0	0	2	0.33
Jun	In	6	2	0	0	0	2	0.33
	Out	6	5	0	0	0	5	0.83
Aug	In	12	1	0	0	0	1	0.08
	Out	12	0	0	0	0	0	0
Sep	In	12	8	0	0	0	8	0.67
	Out	12	81	0	0	0	81	6.75
Oct	In	12	0	0	0	0	0	0
			8	0	0	0	8	0.67
Nov	In	12	10	0	0	0	10	0.83
	Out	12	155	0	0	0	155	12.92
Dec	In	12	2	0	0	0	2	0.17
	Out	14	80	0	0	0	80	5.71
Total	In	78	27	0	0	0	27	0.35
	Out	80	367	0	0	0	367	4.59

Note: Routine entomological monitoring was not completed in May and July in order to optimize the use of funds.

CDC light traps at Chakohwa and Mukamba (control site) collected *An. gambiae* s.l. in low numbers from both traps, indoor and outdoor. At Chakohwa, indoor traps collected relatively more than traps set outdoors (Table 19). Light traps for Chakohwa site were also set at Nyanyadzi Hot Springs area from August in order to increase the catchment area for Chakohwa. Nyanyadzi is 30 km south of Chakohwa.

At Mukamba, outdoor traps collected more than indoor ones (ratio 7:1 mosquitoes); one *An. gambiae* s.l. was collected from a light trap set indoors while seven were from outdoor traps. The *An. gambiae* s.l. were collected between October and December, whereas the traps were unproductive during the other months.

TABLE 19. INDOOR AND OUTDOOR COLLECTIONS, ANOPHELES GAMBIAE S.L. CDC LIGHT TRAPS, CHAKOHWA, 2015

Month	Location	No. of Traps	No. <i>An. gambiae</i> s.l. Collected					Average <i>An. gambiae</i> s.l./Trap
			UF	Fed	HG	G	Total	
Mar	In	6	1	0	0	0	1	0.17
	Out	6	0	0	0	0	0	0
Apr	In	6	1	0	0	0	1	0.17
	Out	6	0	0	0	0	0	0
Jun	In	6	0	0	0	0	0	0
	Out	6	00	0	0	0	0	0
Aug	In	12	1	1	0	0	2	0.17
	Out	12	6	0	0	0	6	0.50
Sep	In	18	2	3	0	0	5	0.28
	Out	18	10	0	0	0	10	0.56
Oct	In	18	0	0	0	0	0	0
		18	8	0	0	0	8	0.44
Nov	In	18	0	0	0	0	0	0
	Out	18	5	0	0	0	5	0.28
Dec	In	18	8	3	0	0	11	0.61
	Out	18	4	0	0	0	4	0.22
Total	In	102	13	7	0	0	20	0.20
	Out	102	33	0	0	0	33	0.32

At sites outside Manicaland, *An. gambiae* s.l. was the main species collected from light traps. Relatively more anopheline mosquitoes were collected outdoors than indoors despite the absence of human bait on the trap set outdoors (Table 20). Only Kawere site recorded no collections from either indoors or outdoors. More mosquitoes were caught from light traps at the sites in 2015 as compared to last year. The increased site yield is attributed to the increased number of days of collection from one day per site last year to three or more days per site this year. The availability of electricity for re-charging batteries for light traps determines the use of the traps over consecutive days. Batteries for light traps need to be re-charged daily to avoid total discharge as this ultimately affects the longevity of the batteries. Solar-powered battery chargers are being considered for sites with challenges in power supply.

TABLE 20. INDOOR AND OUTDOOR COLLECTIONS, ANOPHELES GAMBIAE S.L. CDC LIGHT TRAPS, SEVEN SITES OUTSIDE OF MANICALAND, 2015

Site	Month of Monitoring	Traps (n= x)	Total <i>An. gambiae</i> s.l Collected					Average <i>An. gambiae</i> s.l./Trap
			UF	Fed	HG	G	Total	
Kamhororo	August	IN (18)	47	0	0	0	47	2.62
		OUT (18)	198	0	0	0	198	11.00
Old Mazowe Bridge	August	IN (23)	2	4	0	0	6	0.26
		OUT (23)	3	1	0	0	4	0.18
Chilonga	September	IN (30)	12	0	0	0	12	0.40
		OUT (30)	55	0	0	0	55	1.84
Manjolo	September	IN (25)	11	0	0	0	11	0.44
		OUT (23)	41	0	0	0	41	1.79
Makakavhule	October	IN (30)	24	0	0	0	24	0.80
		OUT (30)	76	0	0	0	76	2.54
Kawere	October	IN (22)	0	0	0	0	0	0
		OUT (23)	0	0	0	0	0	0
Chakari/Sanyati	November	IN (36)	3	1	0	0	4	0.12
		OUT (12)	1	0	0	0	1	0.09
Total		IN (184)	99	5	0	0	104	0.57
		OUT (159)	374	1	0	0	375	2.36

6.5 HUMAN-SEEKING BEHAVIOR

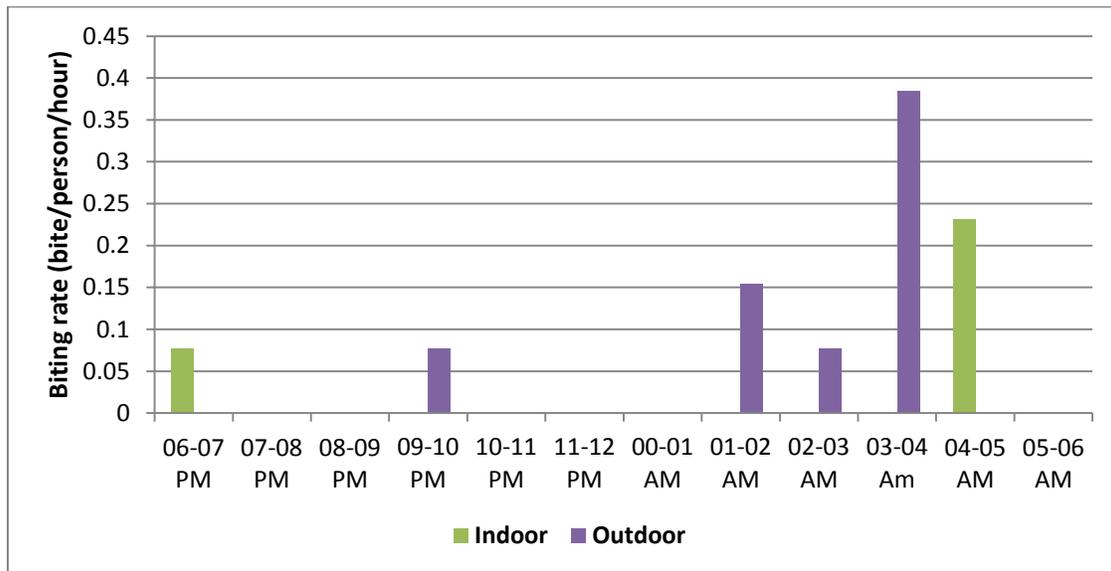
6.5.1 DATA COLLECTION METHODS

The biting rate was estimated from a CDC light trap set alongside human bait as a proxy for the human landing collection (HLC). Two CDC light traps were set alongside human bait each: one trap indoors and the other outdoors. Mosquitoes from each trap were collected and recorded hourly from 18:00 hours (sunset) to 06:00 hours (sunrise). The human bait slept under an LLIN for protection during the collection period. This method was used as a proxy for the HLC method since the method is prohibited in Zimbabwe. The traps were set at the same household every month, but the human bait was switched during the night in order to take into account individual variation in attractiveness to mosquitoes. Mosquitoes were collected over 12 hours over two consecutive nights starting from August to December. Prior to this, collections were done over one night per site per month between March and June. No entomological monitoring was done in May and July owing to budgetary constraints. Traps were not very productive at the three sites under routine monitoring in Manicaland. This method was not used at the seven sites outside Manicaland.

6.5.2 RESULTS

Fourteen *An. funestus* were collected at Burma Valley from all-night collections (HLC proxy) between March and December 2015 (Figure 5). Four *An. funestus* were collected indoors over an eight-month period: one each in August and September and two in December. More mosquitoes were collected after midnight, between 01:00 and 04:00 hours outdoors and between 04:00 and 05:00 hours indoors. Ten *An. funestus* were collected outdoors; one each in June (03:00-04:00 hours) and September (02:00-03:00 hours) and three in November (one at 23:00-24:00 hours and two at 03:00-04:00 hours). Eight were collected in December, two indoors and six outdoors. Despite the scanty evidence, the higher preponderance of the vector outdoors suggests greater risk of human-vector contact outdoors possibly as a result of the excito-repellence of pirimiphos-methyl indoors. Two *An. coustani* were collected outdoors in November and another two *An. coustani* were collected from outdoors in November.

FIGURE 5. HOST-SEEKING BEHAVIOR RESULTS, AN. FUNESTUS, FROM BURMA VALLEY



At Chakohwa site, two *An. gambiae* s.l. were collected in August (20:00-21:00 hours) and December (12:00-01:00 hours), equivalent to 0.09 mosquitoes/person/hour, and one mosquito each in September, October, and November, equivalent to 0.05 mosquitoes/person/hour. Only one mosquito was collected from the CDC light trap indoors in October; the remainder was collected from traps outdoor. This suggests outdoor biting for the *An. gambiae* s.l. at Chakohwa despite the very low numbers of mosquitoes involved.

No mosquitoes were collected by this method at the control (unsprayed) Mukamba over the same monitoring period.

6.6 NATIONAL ENTOMOLOGICAL SURVEY

Staff shortages limited the national entomological survey to 11 sites distributed as follows: four in Manicaland, including Mutare City, and one site each rather than two or three per province. The survey was conducted for eight months. The data on vector distribution are automatically confined to these serviced sites, specifically to within a 10 to 20 km radius of the site. More work should be done to extend vector surveillance beyond established sentinel sites. Health officers who are involved in vector surveillance need support to enhance their mobility to access sampling sites for information on spatial vector distribution to be strengthened. Currently, the Global Fund supports allowances for vector surveillance complementing the equipment and AIRS Zimbabwe provides technical support. The

insectary managers responsible for vector surveillance perform other duties besides entomological monitoring.

Related to the vector distribution exercise is the need for species identification at a laboratory to ensure information on vectors densities and occurrence is accurate. This is particularly so given the occurrence of species complexes for the main malaria vector groups.

6.7 STRENGTHENING VECTOR SURVEILLANCE IN ZIMBABWE

- **Equipment Supply and Training.** AIRS Zimbabwe procured and distributed entomological equipment at sentinel sites to strengthen entomological monitoring in Zimbabwe. This followed the assessment of sentinel sites conducted in 2014, which highlighted how inadequately equipped the sites were. Entomological equipment has been distributed to 14 of the targeted 17 sites. The equipment has been assembled for the three remaining sites and this will be distributed in January 2016.

The AIRS Zimbabwe entomological team provided on-the-job training for the recipients at the sentinel sites to ensure effective and sustainable use of the equipment. At least one person was trained during the distribution of the equipment. More officers were trained at Mutare City during the handover of entomological equipment in August.

- **On-the-job Training in Entomology.** The AIRS team provided continuous on-the-job training for 101 individuals during routine ento monitoring at the three sites in Manicaland, including Mutare City, the sites outside Manicaland and for officers from NIHR/De Beers' Research Laboratory. A quarter of the trained staff were females.
- **Regional Capacity Building.** In July 2015, the project Technical Manager/Entomologist co-facilitated in the regional Malaria Research and Training Capacity Building in Southern Africa for 50 participants from Zambia and Zimbabwe conducted at the University of Zimbabwe. The workshop was a collaborative effort involving the University of Zimbabwe, Tulane University, and the University of Zambia.
- **Demonstration of the Aspirator Use.** In October, PMI/AIRS show-cased the piloting of the Prokopack Aspirator for sampling malaria vectors at the 2nd PAMCA Conference in Dar es Salaam, Tanzania.

6.8 DDMS TRAINING

Edward Thomsen, an expert on data management from the Liverpool School of Tropical Medicine, trained six officers on the disease data management system (DDMS) in December 2015. The trainees included three officers from AIRS, two from the NMCP and one from NIHR. The training was done at Abt offices in Harare over four days for the main group and for a further day for data officers from AIRS and from the NMCP who will be involved in system administration of the database once it is operational. DDMS will serve as a basis of creating a repository of national entomological data in 2016.

6.9 ENTOMOLOGICAL STAFFING OF THE PROJECT

An Entomological Database Officer joined the team in November. The officer was given induction and orientation on entomological monitoring at Burma Valley and Chakohwa. He also spent a week observing IRS operations and EC in the four districts.

AIRS Zimbabwe actively continues the search for an Entomological Officer to be seconded to the NMCP. Three candidates have been shortlisted.

6.10 CHALLENGES AND PLANS

No major constraints were encountered in conducting entomological monitoring in the field. The only challenge involves the delays in obtaining laboratory results on vector species identification, infection rates, and host preferences and related vector distribution.

Most sentinel sites yield inadequate mosquitoes during routine monitoring and for insecticide susceptibility tests on which to make conclusions.

The team plans to determine the intensity of insecticide resistance at sentinel sites where resistance has been detected. The low vector densities remain the major challenge against this being accomplished.

The team is proposing entomological training for insectary managers, and their district and provincial supervisors, to strengthen their skills in vector surveillance.

7. ENVIRONMENTAL COMPLIANCE

7.1 PRE-SEASON ASSESSMENT

For successful implementation of IRS, it is essential that EC procedures are in place to ensure the spray operator and beneficiary community safety, and to protect the environment through appropriate use and disposal of insecticides and other wastes. Prior to the start of any IRS program, an environmental assessment must be conducted to inform the environmental mitigation plan. In 2015 Zimbabwe submitted the “Letter Report” and also conducted Pre-season Environmental Compliance Assessment (PSECA) in all operational sites.

7.1.1 LETTER REPORT

In 2015, AIRS Zimbabwe continued operating under the supplemental environmental assessment (SEA) that the project conducted in 2012 to cover the period of 2012-2016. Two months prior to the initiation of spray activities, the project submitted a letter report that summarized the most current environmental compliance information with regard to the AIRS Zimbabwe program.

The report included information on intended environmental trainings for the IRS campaign; the condition, organization, and schedule for repair or upgrades of district warehouses and operation sites (storerooms and soak pits); and the proposed methods for management of all IRS wastes. The major highlight included in the 2015 letter report was related to insecticide leftovers. AIRS Zimbabwe had a stock of approximately 12,543 bottles of Actellic CS left over from the 2014 campaign that expired in June 2015. The stock was tested and failed recertification and was therefore not eligible for use for IRS in 2015. The supplier has agreed to replace the stock with the new bottles for the 2015 campaign. Discussions are ongoing as to the safe disposal of the expired stock. At the beginning of the IRS season, efforts were being made to find appropriate ways of disposing the expired insecticide.

7.1.2 PRE-SEASON ENVIRONMENTAL COMPLIANCE ASSESSMENT

The 2015 PSECA was done in July. The exercise was done by two teams and each team covered two districts. The assessment teams comprised the AIRS team (ECO, ECA, and provincial coordinator) and representatives from the NMCP, PEHO office, and DEHOs from the four districts. Teams collected the data using smartphone-based application to capture the information on the state of preparedness of the IRS sites.

The broad aim of PSECA was to assess the level of IRS preparedness for 2015 in the four PMI-supported districts in Manicaland Province. Specific objectives were to:

- Check on the status of the soak pits.
- Check on the status of IRS storage facilities.
- Develop the work plan for refurbishment of the soak pits in preparation for the 2015 IRS season.

The following camp sites were inspected during period under review (27 including three district stores):

- Nyanga: Elim, Nyamaropa, Tombo, Matize, Fombe, Avira, Gotekote, Nyautare, Nyatate and Nyanga District hospital (10).
- Mutare District: Chitakatira, Rowa Mutare district storeroom, Marange, Bezel Bridge, St Andrews,

Dora, and Nyagundi (7).

- Chimanimani District: Chakowa, Nyanyadzi, Biriwiri, and Rusitu, (4)
- Mutasa: Chisuko, Gatsi District Storeroom, Mupotedzi, Manica Bridge, and Sherukuru (5).
- Mutare provincial warehouse (1)

The PSECA inspections resulted in the following the major findings and remedial activities that were completed to prepare for 2015 IRS season:

- Fencing poles at most of soak pits were damaged by white ants. All damaged poles were replaced.
- Lines for drying washed spray pumps were in poor condition. Necessary repairs were made prior to the campaign.
- The grit trap screens at most of the progressive rinsing slabs were broken or clogged with debris. The debris was removed and new grit trap screens installed.
- Door screens and burglar bars were already provided at 20 out of 26 proposed storerooms and these storerooms were then provided with pallets, firefighting equipment, and thermometers to make them compliant with BMP. Charcoal and sawdust layers of the soak pits at all the 23 field IRS camp sites were replaced because they had outlived their effectiveness.
- Danger warning signs at 20 soak pits were still in good shape. The project replaced signs at three soak pits.
- Most of the IRS sites did not have stand-alone bathing facilities for SOPs and as a result the project constructed bathing facilities for both males and females at 20 field IRS camp sites used regularly during the 2015 IRS campaign.
- Additional air extraction fans were installed in the new Mutare provincial warehouse to improve the ventilation of the facility.

The AIRS ECO, ECA representative, and DEHOs in the four targeted districts then conducted the final certification of storage facilities and soak pits during the last week of September.

7.2 MID-TERM ENVIRONMENTAL COMPLIANCE ASSESSMENTS

The AIRS ECO, operations manager, COP, DEHOs, ECA, and provincial coordinator visited all 23 sites to assist district teams with EC issues and to ensure full EC. The team also used the visits to conduct mid-season EC assessments for all the sites using supervisory checklists. Emphasis was on the safety of the IRS workers and community members, proper storage of insecticides, stock control and inventory management procedures, effluent waste disposal, proper spill response procedures, and pump maintenance.

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

The inspection team paid special attention to the appropriate use of PPE, proper handling of insecticide, and mixing procedures including the triple rinse process for empty Actellic 300 CS bottles. During the assessments, 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 environmental compliance requirements were always adhered to.

7.3 INCIDENTS

No accidents or incidents were reported during the spray campaign of 2015. Prior to spray start, the project had done contract vehicle inspections for all eight Lorries that we engaged for IRS. The vehicles were first inspected mechanically by the Vehicle Inspection Department and then the AIRS ECO, the operations managers, and the PFO (MOHCC) did the inspections for compliance with BMP.

7.4 POST-SEASON ENVIRONMENTAL COMPLIANCE ASSESSMENT

Post-spray environmental compliance inspections were completed during November 24-27 and the exercise was logged out using smartphones, immediately after the campaign ended. During this period, three storage facilities and 23 soak pits at the operational sites were cleaned. All sites were well cleaned and locked according to BMP standards. The provincial warehouse still has some OP waste and will be thoroughly cleaned once recycling is finished.

7.5 WASTE DISPOSAL

All solid waste materials will be disposed of in accordance with the PMI/IRS BMP. Four main forms of solid waste were generated during the 2015 IRS campaign:

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

The project will incinerate all used disposable respirators at Hwange Colliery in Hwange Town in January 2016. A total of 74,000 triple-rinsed empty OP bottles generated by the 2015 spray campaign were crushed and baled by Clean and Green Company at the project's Mutare warehouse. The crushed empty bottles were sent to a South Africa based company, Lanseria Plastics, in February for recycling into irrigation pipes and refuse bins. The AIRS ECO, an NMCP representative, and one representative each from the Environmental Management Agency and the PMD's office observed the crushing and baling of the empty OP bottles in Mutare. The project gave away as a reward well-washed damaged overalls and punctured boots to SOPs.

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

8. MONITORING AND EVALUATION

8.1 2015 HYBRID M&E SYSTEM: STANDARD NMCP M&E METHODS WITH AIRS COMPONENTS

Prior to the 2014 IRS campaign, AIRS and NMCP worked together to identify ways to combine the successful components of their individual M&E systems for improved M&E methods and data quality. As a start, AIRS and the NMCP merged their standard Daily Spray Operator Form (SO1) template for a comprehensive data collection tool that captures household spray information needed for both NMCP and PMI reporting. Beginning with the 2014 IRS campaign, AIRS and NMCP implemented the Error Eliminator, an AIRS M&E supervisory tool, in all 47 IRS districts, including the four PMI-supported districts.

2015 IRS campaign data were collected on a daily basis by each SOP and verified by supervisors and team leaders with daily summary tools. The data manager gathered all data collection and verification tools, then corrected and entered the data into a daily summary form and completed a paper-based spray performance tracker.

During her technical assistance trip to Zimbabwe during the spray campaign, AIRS Home Office M&E Specialist, Jennifer Burnett-Ziemann, developed a validated Microsoft Excel spreadsheet into which data managers were able to enter aggregated data at the end of each week. These spreadsheets were then collected on a weekly basis by the Zimbabwe M&E manager and analyzed for weekly reporting. All weekly reports are included in Annex D. Although a standard practice in other AIRS countries, individual structure data were not entered or reported, as is typically done in other AIRS countries.

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

The NMCP created a job aid messaging system for data managers in all 47 districts using the messaging platform, *WhatsApp*. The NMCP sent IRS messages to data managers through the application, who then relayed the information to spray teams during morning mobilization at campsites.

AIRS Zimbabwe, in collaboration with the NMCP, created a data flow document that helped to eliminate parallel M&E systems and ensured district and provincial officials reviewed the data before approving and sending to the NMCP and AIRS Zimbabwe. (See *AIRS Zimbabwe Data Flow Plan* in Annex E).

8.2 RESULTS OF 2015 IRS CAMPAIGN

All AIRS Zimbabwe performance indicators are presented in an M&E Plan matrix in Annex F. AIRS Zimbabwe sprayed 162,127 structures out of 171,736 structures found resulting in 94.4 percent spray coverage, protecting 365,425 people in the four PMI-supported districts. A breakdown of the 2015 IRS campaign results by district are noted in Table 21. Tables 22 and 23 provide information on insecticide usage collected during the spraying and insecticide-treated nets (ITNs).

TABLE 21. SUMMARY OF SPRAY COVERAGE DURING THE 2015 IRS CAMPAIGN

District	Structures Found	Structures Sprayed	% of Structures Sprayed	Population Protected					Overall Population		% of Population Protected
				Total	Males	Females	Pregnant Women	Children <5 Years	Total Found	Not Protected	
Chimanimani	28,746	24,495	85.2%	65,345	30,240	35,105	1,158	12,083	71,138	5,793	91.9%
Mutare	53,306	50,199	94.2%	115,166	54,658	60,508	1,952	20,910	117,325	2,159	98.2%
Mutasa	42,688	42,426	99.4%	93,375	43,348	50,027	1,390	15,353	93,625	250	99.7%
Nyanga	46,996	45,007	95.8%	91,539	42,642	48,897	1,263	14,591	93,236	1,697	98.2%
Total	171,736	162,127	94.4%	365,425	170,888	194,537	5,763	62,937	375,324	9,899	97.3%

TABLE 22. SUMMARY OF INSECTICIDE USAGE DURING THE 2015 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	24,495	12,660	12,429	0	231	37	45	2.0	15	7
Mutare	50,199	24,808	23,958	0	850	38	72	2.1	18	9
Mutasa	42,426	18,800	18,764	0	36	37	64	2.3	18	8
Nyanga	45,007	18,432	18,175	0	257	36	62	2.5	20	8
Total	162,127	74,700	73,326	0	1,374	148	243	2.2	18	8

From the total amount left, 1 374 were further distributed to Uniformed Forces
 At present there is zero OP stock

TABLE 23. SUMMARY OF ITN FINDINGS DURING THE 2015 IRS CAMPAIGN

District	Total ITNs Found	Pregnant Women Sleeping Under ITNs	Children <5 Years Sleeping Under ITNs
Chimanimani	18,225	546	5,914
Mutare	30,731	549	8,234
Mutasa	19,189	489	5,769
Nyanga	23,878	559	7,635
Total	92,023	2,143	27,552

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

8.1.1 REASONS STRUCTURES WERE NOT SPRAYED

Although in 2015 AIRS Zimbabwe sprayed 94.4 percent of eligible structures found, exceeding the project goal of 85 percent spray coverage, NMCP spray data reported that 9,609 structures were not sprayed. According to the NMCP, and per discussions with the MOHCC and AIRS field observations, a structure might not have been sprayed for the following reasons:

- Households with only elderly people were not able to remove goods outside the structures and putting them back after spraying.
- Household owners not available, away doing gold panning or cross-border trade.
- Households not warned in time to leave at least one adult to prepare structures for spraying.
- Some people claimed that their religious doctrines do not allow chemicals on their walls.
- Competing programs such as free maize seed distribution or community meetings coincided with spraying in some villages and so residents were not home to comply with spraying preparations.
- From experience participating in previous IRS campaigns, some households reported strong smells after spraying, which adversely affected their health including causing an allergic reaction to insecticide.
- Drought in some areas reportedly prevented residents from supplying water for mixing the insecticide.

8.1.2 CHALLENGES TO HIGH-QUALITY DATA REPORTING

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

9. CAPACITY BUILDING

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

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

Following the experience that AIRS Zimbabwe has gained over the years within the country and from other AIRS country programs, as well as interactions and discussions with local stakeholders, gaps in knowledge and technical skill were identified which required capacity building. Various areas for capacity building were prioritized especially in IRS operations, and entomological surveillance and compliance. In 2015, AIRS Zimbabwe trained MOHCC staff and other malaria stakeholders on new concepts on EC, operations, entomology, and M&E:

- New knowledge was imparted to MOHCC staff on the need to fit and use constant flow valves on Hudson sprayers to improve spray quality,
- IRS supervisors were trained on mHealth, a system that allows for promptly highlighting IRS implementation challenges, triggering quick responses to the issues, and thus helping to improve IRS management in general. The IRS supervisors trained in mHealth were equipped with smartphones, which they used to collect IRS data and upload immediately to the next level for action.
- The nurses, DEHOs, PEHO, PFO, and IRS coordinators were trained in management of patients following insecticide poisoning as well as proper management of snake and insect bites, which SOPs might incur in the field. Fortunately, the project did not experience insecticide poisoning or snake bites during the entire 2015 IRS campaign.
- Similarly, the knowledge and skills imparted to IRS managers during Level 1, 2, and 3 training, SBCC and gender training, and M&E training motivated PEHO, DEHOs, PFOs, data managers, and IRS coordinators, and IRS team leaders and supervisors to scale-up their roles in IRS support and supervision in the targeted districts working closely with the AIRS Zimbabwe staff during the 2015 spray campaign.
- These officials were also helpful in community sensitization and mobilization especially in relatively resistant communities.
- They also managed to conduct some gender campaigns and they are gender campaign champions in Manicaland province moving forward to IRS 2016 and beyond.
- The AIRS project supported the NMCP and Manicaland province by imparting knowledge and skills on the best ways to properly manage OP bottles and related waste through recycling. Having been trained in proper management of OP waste, it is envisaged that staff from the NMCP and Manicaland are able to safely manage OP waste in a friendly environmental manner throughout the country.

- Additionally, the NMCP vector control officer attended an international course in basic entomology in Ethiopia. The course was helpful as the officer is now one of the national trainers in basic entomology and has rejuvenated the supervisory roles to the insectary managers throughout the country. The procurement and distribution of entomological kits for all eight rural provinces capacitate MOHCC personnel to routinely monitor vector behavior and the implementation of IRS in their respective areas of operations in Zimbabwe.

10. GENDER INTEGRATION

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

- *AIRS Zimbabwe gender focal person:* AIRS Zimbabwe selected a female gender focal person who attended the regional PMI AIRS Project training in Rwanda. Following this training, the gender focal person trained all AIRS Zimbabwe project staff on different strategies that can be employed to improve female participation in IRS, especially IRS supervisory positions.
- *Training:* As part of preparation for the 2015 spray campaign, the project conducted several gender integration trainings, which started at the NMCP and cascaded down to provincial and district health personnel. The aim of training these staff was mainly advocacy and seeking support to implement PMI gender equality and female empowerment objectives. In addition, gender integration training was included in Level 2 and 3 trainings, and the following trainings: SBCC, guards and storekeeper, insecticide poisoning management, M&E, mHealth, and all trainings conducted at the community level.
- *Increased women's recruitment:* AIRS Project integrated gender and non-discrimination practices to the recruitment of all personnel involved in different categories in spray operations, including SOPs and washers. AIRS Zimbabwe decided to hire only female washers, and at least one female data manager in one of the four PMI-supported districts. Of the 107 people trained to carry out various IRS supervisory roles, 38 (36 percent) were female. This was an increase of more than 50 percent from the 2014 training, which had 18 females (6 percent).
- *Gender friendly work environment:* In order to strengthen gender integration and female empowerment, the project had well-demarcated accommodations and washing facilities for females and males at camp sites, as well as provision of adequate and safe water supplies to promote female hygiene. Also, light sole rubber boots were procured to ease movement of the female SOPs.
- *Gender norms survey* AIRS project conducted a Gender Norms evaluation among SOPs at the beginning and end of the 2015 IRS campaign. Results of the evaluation will be presented in a separate project report on gender.



Washing facilities for both females and males at Mupotedzi IRS site, Mutasa district

II. CHALLENGES AND RECOMMENDATIONS

The following challenges, lessons learned, and recommendations were identified during the 2015 spray campaign.

II.1 CHALLENGES

- Too many SOPs per team (five per supervisor) continue to reduce the level of supervisory oversight and data verification, which negatively impacted the achievement of daily spray targets. The expected close supervision of SOPs by their respective supervisors did not always occur.
- The daily SOP target is too high (36 rooms/19 structures) compared to a 32-room target by the NMCP. This resulted in most districts failing to complete spray operations within the 35 days budgeted.
- The project found more structures than targeted in the four districts impacting negatively on the resources (insecticide, fuel and time).
- A daily load of OP bottles is too heavy for SOPs to carry as they move from one household to the next. Each bottle weighs approximately 1 kg (in addition to the PPE, a spray pump, and mixed water and insecticide from the previous structure sprayed that the SOP carries), and SOPs need to carry 9-10 OP bottles when they start each day.
- There were instances when SOPs were poorly deployed vis-a vis number of structures found due to uncoordinated village mobilization.
- Periodic malfunctioning of old Hudson spray pumps negatively impacted the daily spray performance, especially during the first week of the campaign.
- Storage space for IRS commodities and camping equipment and washing facilities for IRS campaign teams remain major challenges.
- Recycling and incineration of OP waste such as empty Actellic 300 CS bottles and contaminated cardboard boxes are proving to be difficult; private companies are repeatedly changing requirements.
- Consensus on safe disposal option of the expired OP bottles left over from the 2014 IRS has yet to be reached.
- Critically low numbers of mosquitoes collected do not allow for comprehensive entomological analyses and IR testing.

II.2 RECOMMENDATIONS

- There is need to procure adequate satchels to also supply the team leaders and supervisors to carry extra bottles in the field and resupply SOPs when their allocation is exhausted.
- SOP deployment needs to be closely aligned to structures found in mobilized communities.

- Training of supervisors and team leaders needs to be strengthened to enhance quality of spray operations and data quality.
- To reduce the number of locked rooms and refusals, there is need to allocate adequate resources for SBCC in general and community meetings and door-to-door mobilization in particular and boost acceptance and approval of IRS in hard-to-reach and vulnerable populations.
- Cooperating with other programs, such as National Immunization and Mass Drug Administration campaigns, that occur around the same time as IRS campaigns will also go a long way in expanding community mobilization efforts.
- More adaptors, sockets, and solar panels should be procured to facilitate charging of cellphones and smartphones to strengthen mHealth dissemination and completion of supervisory checklists and SMS messaging.
- In line with NMCP requests, there will be a need to extend vector monitoring beyond the established sentinel sites to other districts without sentinel sites.
- Evidence gathered so far, in spite of limitations due to paucity of mosquitoes found, indicates there will be a need to spray non-living structures in 2016. In the medium term there will be need to continue monitoring malaria vector resting behavior in non-living structures.
- As suggested by PMI, AIRS Zimbabwe is producing a separate report on two seasons of observations of mosquito density in non-living structures. This will support the decision on spraying or not spraying those structures in the next IRS campaign.
- To obtain concrete data and specific information on the reasons of not-sprayed structures, the project will add a column on this into the SOP data collection form in the next IRS campaign.

ANNEX A. INVENTORY OF STOCK AND QUANTITIES POST- SPRAY

TABLE A-I. IRS 2015 INTERNATIONALLY PROCURED ITEMS

Item	Balance from 2014	Quantity procured	Total	Quantity used	Quantity damaged	Quantity remaining after campaign	Remarks
Pesticide							
Actellic 300 CS	12,543	74,700	87,243	73,326	0	13,917	12,543 bottles of insecticides in stock expired in June 2015
PPE							
Coverall	286	508	794	775	346	429	
Boots	171	392	563	444	246	177	
Face Shield							
Hand Gloves	224	259	483	259			
Hard Hat	412	0	412	371	0	371	
Respirators	14750	17240	31990	19380	0	12610	
Pumps and Accessories							
Hudson (10 ltr)	0	100	100	100	0	100	
Goizper pump	245	0	245	0	0	245	

TABLE A-2. IRS 2015 LOCAL PROCUREMENT ITEMS

Item	Balance from 2014	Quantity procured	Total	Quantity used	Quantity damaged	Quantity remaining after campaign
PPE						
Apron	0	30	30	20	20	10
Cotton Socks	40	784	824	764	764	60
Raincoats	0	334	334	334	57	277
Face Shield	276	270	546	270	15	531
Face Shield brackets	245	270	515	270	11	504
IRS Reusable						
Calulator	0	24	24	24	10	14
Fire Extinguisher	16	0	16	16	2	14
Padlock	0	20	20	20	7	13
Tool kit		8	8	8	0	8
Rinsing Cup	161	392	553	382	182	371
Spray Bag	248	254	502	274	3	499
PVC Spread Sheet	0	40	40	26	26	14
Laptop	4	0	4	4	0	4
Spill storage clear bags	0	350	350	350	350	0
Progresive Rinsing Drums 200l	28	0	28	28	0	28
Water Buckets	219	195	414	414	8	406
Spray operator mattresses	350	20	370	363	2	368
Shovels	24	10	34	34	0	34
Spill kits	8	10	18	18	8	10
Solar Lamp		8	8	8	8	8
First Aid Kits	6	16	22	16	0	22
Loud hailers	10	12	22	22	0	22
Tents	16	10	26	26	0	26
Tarpaulin	0	4	4	4	0	4
Nylon Rope	0	8	8	8	0	8
Petrol Can 20Littre	2	0	2	2	0	2
Scissors	2	0	2	2	0	2
Nozzles	0	100	100	100	100	100
Torches	92	179	271	271	0	271
Black Pvc Bins 150 Litres	4	0	4	4	4	4
Electricity Adaptors	0	13	13	13	2	11

Item	Balance from 2014	Quantity procured	Total	Quantity used	Quantity damaged	Quantity remaining after campaign
<i>IRS Consumables</i>						
Nozzle Brush						
Towel	0	392	392	383	383	9
Mutton Cloth	10	270	280	252	0	28
<i>Print Materials</i>						
Team leader summary books	0	25	25	21	0	4
Daily Spray Operator's books	27	266	293	254	0	39
Spills response Procedures	40	50	90	48	0	42
End of Day Clean-up Checklist	0	595	595	400	0	195
Error Elimination/ Team Leader Card	0	1000	1000	800	0	200
Home Owner Prep. Checklist	200	2180	2380	2100	0	280
Storerom Danger Warning Signs	4	26	30	24	0	6
Temperature Recording sheets	0	100	100	75	0	25
Motor cycle Log Sheets	10	30	40	40	0	0
Vehicle Hire log book	6	16	22	16	0	6
IRS Mobiliser Book	92	200	292	120	0	172
A3 stickers	0	20	20	20	0	0
PPE distribution forms	0	1000	1000	800	0	200
Material safety Data sheets	0	75	75	52	0	23
Performance Tracker	0	8	8	8	8	0
Stock Card	0	1000	1000	998	0	2
Storekeeper Performance Checklist	487	595	1082	600	0	482
<i>Mobile Phone For Reporting</i>						
Huawei Ascend Y51 I	0	66	66	66	1	65
Nokia Asha	0	8	8	4	0	8

ANNEX B. IRS SUPERVISORY RESULTS

I. Storekeeper Performance Form

District	Targeted number of forms	Number of forms filled	Non-compliance Observations
Chimanimani		13	
Nyanga		12	
Mutasa		14	
Mutare		16	
Total	216	54	35/2,268 (1.5%)

Originally, the team planned that AIRS team members, DEHOs and IRS coordinators will fill out at least two phone-based forms per day. However, only 54 forms were filled electronically because IRS supervisors, who play the role of team leaders in Zimbabwe IRS system, were the main users of the smartphones and they did not have a need to visit stores every day. For the 2016 campaign, the project will make sure that the appropriate IRS personnel have the smartphones to meet the inspection targets. The DEHOs used the paper forms to do the inspections. These results are not included in the current report. The following major non-compliance issue stood out as the most frequently observed:

- Unavailability of OP poisoning management antidotes at nearby health centers stood at 45 percent (16/35). The policy of MOHCC on usage of antidotes is that they should only be kept at national, provincial and district hospitals.

2. Morning Mobilization and Transportation Vehicle Inspection Form

District	Targeted number of forms	Number of forms filled	Non-compliance Observations
Chimanimani		80	
Nyanga		40	
Mutasa		44	
Mutare		24	
Total	216	188	69/4,136 (1.7%)

For this form, the reporting level was significantly higher due to continuous efforts of AIRS team, which were present on the ground and working with the supervisors. Occasional lack of connectivity and access to power prevented from reaching the target number of forms completed. The major non-compliance issues noted on morning mobilization and transportation vehicle inspection were:

- Failure to display accident reporting procedures by drivers (28 percent, 20/69).
- Transporting additional OP bottles (not for use by spray operators during that day) in a lorry that was transporting spray operators to the field (1.3 percent, 9/69).

3. Homeowner Preparation and Spray Operator Performance Form

District	Targeted number of forms	Number of forms filled	Non-compliance Observations
Chimanimani		3,075	
Nyanga		5,228	
Mutasa		2,446	
Mutare		3,928	
Total	17856	14,617	4,538/438,510 (1.0%)

For this form, each IRS supervisor had a target of two forms per SOP per day. A supervisor had an average of four SOPs spray operators to monitor for the average spraying period of 36 days. As a result, 81 percent of the target number of forms was filled. Of these, 26 percent (3748/14617) forms included some non-compliant issues. The 3748 forms accounted for 4538 non-compliance issues in total. The following were the major non-compliance issues observed:

- Failure to observe a 5cm overlap when spraying with an 8002E nozzle was noted 53 percent (2,393/4,538). The action by spray operators was in line with NMCP policy of not leaving an overlap when using an 8002E, while the BMP Manual has a different guidance.
- Failure to regularly pressurize the sprayers was 8.6 percent (394/4,538).
- Leaking sprayers observed were 5.4 percent (249/4,538) and repairs were then instituted.
- Failure to put on full PPE was 5.3 percent (240/4,538).
- Refusal to accept IRS by the household owners was 2.9 percent (136/4,538).
- Approximately 2.8 percent (130/4538) incidences of spraying rooms without removing food were recorded. These could be some of the examples where IRS supervisors did not really understand the question or ticked the smartphone wrongly as any trained supervisor and spray operator is expected to check the room for any food or movable items before commencing spraying.

4. End-of-day Cleanup Form

District	Targeted number of forms	Number of forms filled	Non-compliance Observations
Chimanimani		55	
Nyanga		36	
Mutasa		53	
Mutare		125	
Total	216	269	123/11,029 (1.1%)

This target was surpassed because more supervisors filled the forms, while they all congregated at the campsite after a day of operations. The following was the major noncompliance issue observed:

- Eating or drinking whilst in PPE was 59 percent (70/123).

General Comments

The 2015 campaign was the first time when the use of smartphones was introduced for IRS in Zimbabwe. As a new tool, most of the supervisors were not familiar with the concept and made numerous mistakes or wrong entries at the beginning of the campaign. It was also noted that some field supervisors and IRS coordinators did not understand questions well. It resulted in coding incorrect or inconsistent data, which, at times, gave a wrong perspective of what exactly was happening in the field.

The AIRS Zimbabwe project team addressed all issues fully during the campaign using on-the-job trainings and on-site feedback to spray teams.

It should be noted that the established high targets on supervising homeowner preparation and spray operators' performance created intensive monitoring and presences on the ground on a daily basis, which contributed to increased IRS coverage.

ANNEX C. IRS ENVIRONMENTAL MITIGATION AND MONITORING REPORT

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
Ia. Pre-contract inspection and certification of vehicles used for pesticide or spray team transport	Pre-contract inspection and certification of vehicles was conducted during the last week of September 2015. All vehicles that were contracted met all criteria after the initial inspections by the AIRS ECO, operations manager, and Government of Zimbabwe Vehicle Inspection Department had highlighted defects which needed attention. A total of 8 lorry vehicles were later certified as fit for the 2015 spray operations.	No outstanding issues	After repairs to the vehicles there was total compliance.
Ib. Storekeeper training	All storekeepers, IRS coordinators, DEHOs, and team leaders were trained on how to handle IRS equipment stocks and health and safety issues.	No outstanding issues	The training was combined with guard and driver training. There was total compliance.
Ic. Guard training	All security guards, IRS coordinators, DEHOs, and team leaders were trained on how to handle IRS equipment stocks, security, and health and safety issues.	No outstanding issues	The training was combined with storekeepers and driver training. There was total compliance.
Id. Driver training	All drivers, IRS supervisors, coordinators, and DEHOs were trained in Mutare on September 16. Topics included safety measures for transporting insecticides and safe driving techniques.	No outstanding issues	The training was combined with guard and storekeeper training. There was total compliance.
Ie. Training of clinical health workers in insecticide poisoning management	Training was done on roles and responsibilities of clinicians in IRS, chemical handling and safety, hazard analysis, hazard mitigation plans, pesticide poisoning, poisoning management, management of snake bites, and contingency planning.		There was total compliance.

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
If. Cell phone, PPE, and spill kits on board during pesticide transportation.	All drivers had cell phones as a pre-requisite before their vehicles were rented. Also, drivers were given a set of PPE to use when transporting insecticides and/ or spray team members. Each vehicle used for the transport of pesticides was equipped with a spill kit. A total of 188 morning mobilization vehicle inspections were conducted throughout the 2015 spray campaign. On 188 occasions, the vehicle had all required PPE and spill kits.	No outstanding issues	Spill kit were provided after certification and training. There was total compliance.
I g. Conduct initial and 30-day pregnancy testing for female candidates for jobs with potential pesticide contact	Before Level 3 Training, 48 females (SOPs, washers and supervisors) were initially screened for pregnancy. A second screening for pregnancy was done before embarking on the second phase of IRS (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.
I h. Conduct medical examination to spraying teams for health fitness testing for all operators	Passing a pre-spray general physical/ medical examination is required for spray personnel. All spray personnel candidates had such an exam, on October 5, where 391 were examined and 389 were declared to be medically fit for training as spray team members. The exam included checking blood pressure, respiratory system, pulse, vision, ear nose and throat, chest condition, allergies to Organophosphates and Locometer system. The exam was conducted by qualified Medical Officers from government health facilities.	No outstanding issue	Candidates who did not pass were not hired. All physical examination records are available on file.
I i. Procurement of, distribution to, and training on the use of PPE for all workers with potential pesticide contact	Both international and local procurements for PPE were done on time. The PPE were received and distributed to all operations sites on time before the start of spray campaign. Also, all candidates with potential pesticides contact were fully trained on correct PPE use.	No outstanding issue	There was total compliance.
I j. Training on mixing pesticides and the proper use and maintenance of spray pumps	At both TOT (Level 2) and district-level 3 SOP trainings, the trainers demonstrated the proper mixing of pesticides including triple rinse of the Actellic 300 CS bottles. The trainings also demonstrated the proper use and maintenance of spray pumps. All supervisors, IRS coordinators, team leaders, SOPs, and government officials (field officers and ECOs in the targeted districts) were trained. A total of 405 people were trained.	No outstanding issue	There was total compliance.
I k. Provision of adequate facilities and supplies for end-of-day clean-up	Each IRS camp site had an adequate storage facility that was either provided by the MOHCC, health centers, or rented from an individual. All facilities were compliant, and had the materials required for clean-up. A total of 269 end-of-day inspections were conducted and all were compliant. 246 SOPs and supervisors were issued with 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 spray

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
			operators and supervisors were provided at all camp sites for total compliance.
11. Enforce clean-up procedures	All clean-up procedures were inspected as scheduled. Sprayer clean-up procedures were done in the soak pits as required and supervised by the IRS coordinators every day throughout the spray campaign. Washing or bathing were supervised by team leaders and field supervisors. ECOs, COP, DEHOs, and operations managers supervised clean-up procedures when present at any operations site. The 269 end-of-day inspections conducted identified 123 instances of non-compliant clean-up procedures and the appropriate advise was given to SOPs, who were drinking while still in some PPE.		
2a. IEC campaigns to inform homeowners of responsibilities and precautions	Homeowners were fully informed about their roles, responsibilities, and precautions mainly through house-to-house mobilization. In addition, community meetings and discussions highlighted the roles, responsibilities, and precautions for homeowners before, during, and after their homes are sprayed.	No outstanding issues	There was total compliance.
2b. Avoidance of spraying houses that are not properly prepared	All houses/structures that were sprayed were properly prepared. All homeowners, SOPs, team leaders, and field supervisors were trained on how to prepare structures before spraying is done. None of 14,617 homeowner preparation inspections carried out indicated that homeowners and SOPs were non-compliant with preparations of houses before they are sprayed.	No outstanding issues	There was total compliance.
2c. Check for two-hour exclusion from house after spraying	SOPs reminded households to wait two hours after spraying before they open the rooms to allow circulation of air for at least 30 minutes before cleaning. Homeowners were advised to bury dead insects and wash their hands with soap and water after cleaning.	No outstanding issues	There was total compliance.
2d. Instruct homeowners to wash itchy skin and go to health clinic if symptoms do not subside	All homeowners were instructed to wash with plenty of water and soap if any household member experienced itching skin, and to visit the nearest clinic if itching persisted. No incidences of itchness were reported.	No outstanding issues	
3a. Indoor spraying only	SOPs sprayed only the indoor of sleeping rooms. This included inner walls, ceiling, and eaves of all sleeping rooms.	No outstanding issues	There was total compliance.

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
3b. Training on proper spray technique	All SOPs and team leaders were trained on standard spray techniques during Level 3 Training. This included emphasizing 1 meter distance away from the “sprayable” surface, keeping the nozzle tip 45cm from the “sprayable” surface, and spraying at the correct speed. There was constant supervision in the field to ensure that SOPs adhere to all BMP standards.	No outstanding issues	The major issues noted on IRS technical support were on the type of the nozzle (8002E) which the NMCP dierects does not require an overlap. Yet the checklist based on the BMP requires an overlap of 5 cm.
3c. Maintenance of spray pumps	SOPs, supervisors, and team leaders were trained in pump maintenance during Level 3 Training. Pumps were checked daily before use by the spray pump technician. During the supervision of spray operators 249 incidences of leakages were observed and the parts of pumps that were found to be faulty were replaced.	No outstanding issues	There should be at least one spray pump technician in each district to service the pumps on weekly basis.
4a. Disposal of IRS liquid wastes according to PMI BMPs	All IRS camp sites 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 selected camp sites to facilitate their decent bathing.	No outstanding issues	There was total compliance.
4b. Provision of soak pits with charcoal to adsorb pesticide from rinse water	Each camp was provided with a soak pit. All soak pits had five layers of sawdust, charcoal, bigger stones, smaller stones, and gravel as the top layer with the appropriate dimension of 2 × 1 × 1 meters. The progressive rinsing slab was provided adjacent to the soak pit. All the soak pits that were constructed in 2012/2013 had their layers of aggregate replaced in order to improve their efficiency. They were slopped toward the bio-bed. The repairs were supervised by AIRS ECO and DEHOs.	No outstanding issues	There was total compliance.
4c. Maintain soak pits as necessary during season	All soak pits were either newly constructed or refurbished according to the BMP standards. During the entire spray period, there was no need to do any form of renovation. All soak pits lasted throughout the spray campaign without any problems.	No outstanding issues	There was total compliance.
4d. Inspection and certification of solid waste disposal sites before spray campaign	All solid waste generated will be incinerated at Hwange Colliery, Hwangwe, and at Recycled at Go Green, Harare. The facility is duly certified by Enviromental Management Agency.	No outstanding issues	
4e. Monitoring waste storage and management during campaign	Wastes 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 total compliance.

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
	there were 2/35 situations when such labeling was not done.		
4f. Monitoring disposal procedures post-campaign	Waste disposal will be done at Hwange Colliery, which has already been inspected and meets requirements for waste disposal. The ECO will monitor the post-spray campaign solid waste management procedures.	IRS waste to be sent to Hwange Colliery	All solids including triple-rinsed empty Actellic 300 CS bottles are currently being stored in the provincial warehouses in Mutare. Recycling is in progress and will be completed by January 2016.
5a. Maintain records of all pesticide receipts, issuance, and return of empty sachets/bottles	Records of all pesticides receipts, issuance, and returned empties were kept on stock cards with a backup in a ledger books at the regional, district, and operations site-level.	No outstanding issues	There was total compliance.
5b. Reconciliation of number of houses sprayed vs. number of sachets/bottles used	In Zimbabwe, the average number of structures sprayed per bottle is 2.2. This indicator was calculated daily throughout the spray campaign to ensure that insecticides usage is consistent with number of structures sprayed.		There was total compliance.
5c. Conduct visual examination of houses sprayed to confirm pesticide application	Team leaders, field supervisors, senior supervisor, operations manager, and COP performed regular spot checks in sprayed houses to verify/confirm insecticides application. This was mainly done through visual examination of sprayed walls, eaves, and ceilings.	No outstanding issues	There was total compliance.
5d. Perform physical inventory counts during the spray season	ECO, warehouse consultant, storekeeper, operations manager, and COP performed regular inventory counts throughout the spray campaign across all the operations sites. 2 improperly managed stocks were observed and the storekeepers were advised to regularly update their inventories		All inventory stock cards are available and were used for final inventory reconciliation.

ANNEX D. WEEKLY SPRAY REPORTS

PMI AIRS ZIMBABWE 2015 WEEKLY SPRAY PROGRESS REPORT¹ # 1

The Africa Indoor Residual Spray (AIRS) project is supporting the implementation of IRS in targeted sectors in four districts in Manicaland Province (Chimanimani, Mutasa, Mutare, and Nyanga) with funding from the President's Malaria Initiative (PMI) through USAID. A total of 163,922 structures are targeted to be sprayed, protecting approximately 334,000 people during the 2015 spray campaign. The spray campaign commenced on 11 October 2015 in Chimanimani and Mutasa districts, and commenced in Mutare and Nyanga on 12 October 2015.

The IRS activity is planned to be conducted in 35 operational days in the four districts with organophosphate (OP) insecticide. As of day eight, AIRS Zimbabwe has sprayed 20.1% of the targeted structures in Chimanimani, Mutasa, Mutare, and Nyanga.

The following report provides the spray performance data for a total of eight operational days² of the AIRS Zimbabwe program from October 11 - 18, 2015 in the four districts.

Table 1: AIRS Zimbabwe 2015 Campaign Summary Data

Targeted Structures	163,922
Total Cumulative Structures Found by Spray Operators	35,302
Cumulative Structures Sprayed	32,996
Cumulative Structures Unsprayed	2,306
Population in Sprayed Structures	77,338
Pregnant women	1,250
Children under 5 years	13,180
Spray Progress (%) based on target structures found by SOPs, 2015	20.1%
Spray Coverage (%) based on rooms found by SOPs, 2015	93.5%

¹ All results are provisional; numbers may change following data cleaning and verification.

² Eight operational days in Chimanimani and Mutasa; seven operational days in Mutare and Nyanga.

Figure 1: AIRS Zimbabwe Daily Spray Performance, 8 Operational Days

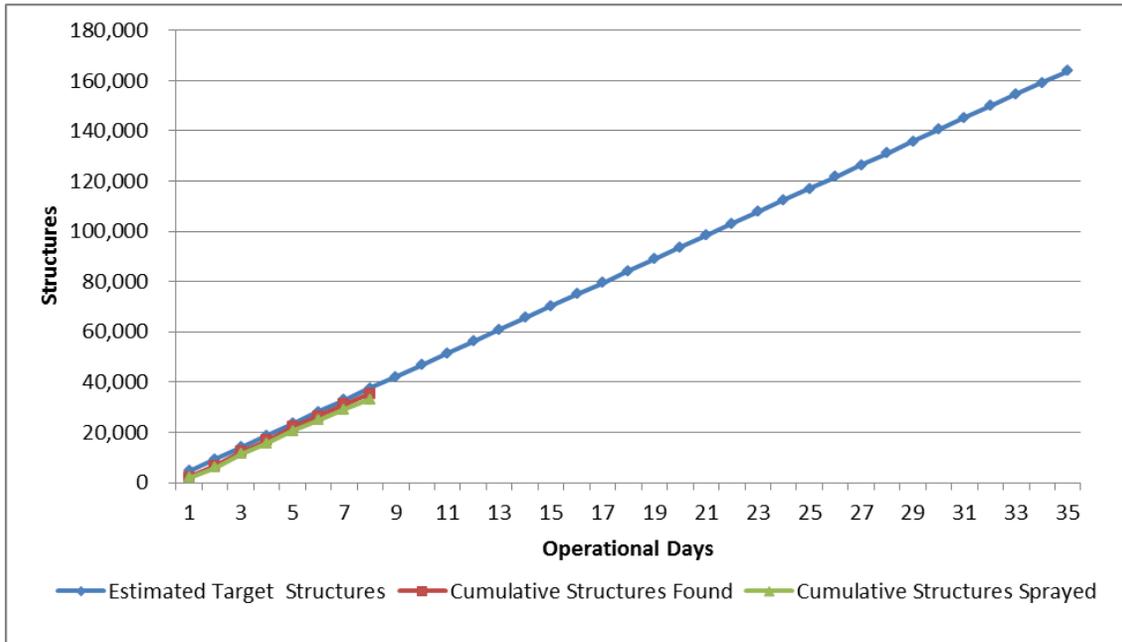


Figure 2: AIRS Zimbabwe Spray Progress Based on Targeted Structures, 8 Operational Days

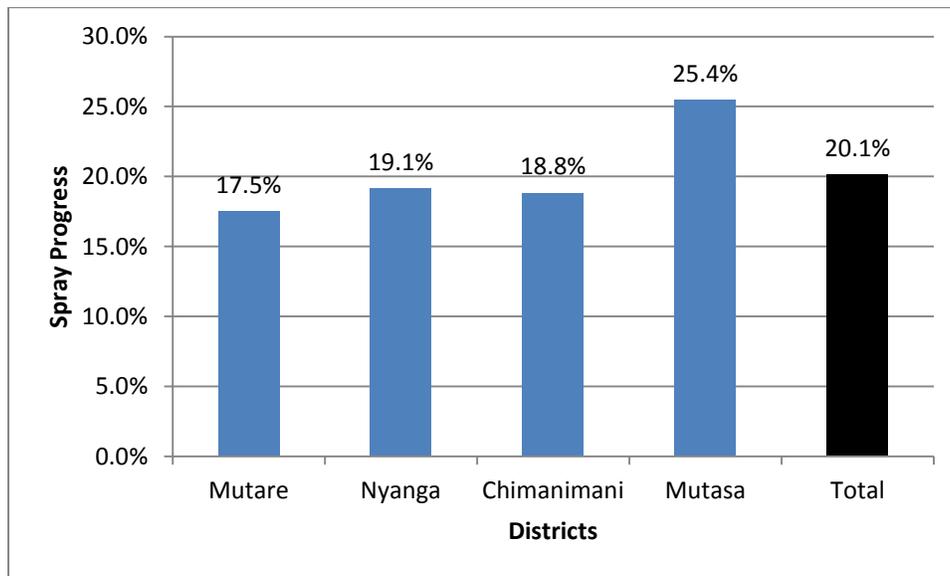


Figure 3: AIRS Zimbabwe Spray Coverage Based on Total Structures found by SOPs, 8 Operational Days

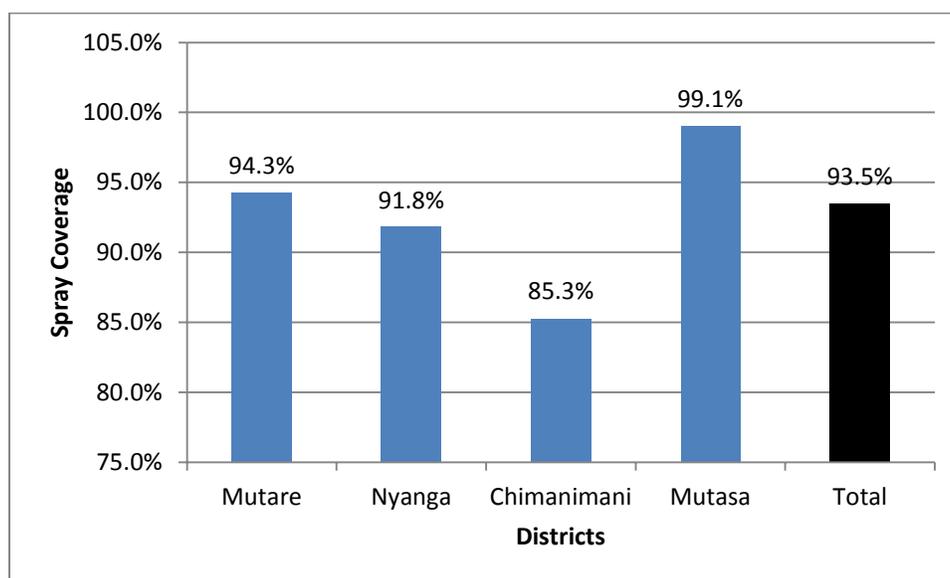


Table 2: Comparison of Targeted Structures and Actual Performance of SOPs, 8 Operational Days

Date	Day of spray operations	Targeted Structures (Cumulative), based on Structures found in November 2014	Structures found by SOPs (Cumulative), 2015	Structures Sprayed (Cumulative), 2015
11/Oct/15	1	4,683	2,065	1,925
12/Oct/15	2	9,367	6,568	6,034
13/Oct/15	3	14,050	12,261	11,294
14/Oct/15	4	18,734	16,796	15,564
15/Oct/15	5	23,417	22,039	20,531
16/Oct/15	6	28,101	26,443	24,749
17/Oct/15	7	32,784	30,992	28,988
18/Oct/15	8	37,468	35,302	32,996

Notes:

- SOPs in Chimanimani and Mutare had the lowest achievements due to the difficult terrain they had to navigate in the two districts during the reporting period.
- The use of smart phones for supervision has greatly improved the IRS operations. However, misunderstandings/misinterpretations of some questions in the supervisory forms and the practical use of the gadgets for the first time in the field, resulted in many red flagged messages which are being acted upon. AIRS Zimbabwe team is finalizing compilation of all questions commonly misinterpreted and is discussing them with the supervisors. One of the examples is using the word “flashlight” instead of “torch,” a common term for the same item in Zimbabwe.
- Chimanimani, Mutare and Nyanga districts experienced challenges with the old Hudson sprayers

obtained from MOHCC. These sprayers have been used for more than five years and some broke down during the first few days of the campaign. This negatively impacted progress, especially in Nyanga district. AIRS Zimbabwe could not do pre-IRS technical maintenance of sprayers because the project did not have Hudson spares and MOHCC had initially said they did not have either. They only released some when districts started having challenges. By now, the project obtained the spare parts and repairs have been made.

**PMI AIRS ZIMBABWE 2015
WEEKLY SPRAY PROGRESS REPORT # 2³**

The Africa Indoor Residual Spray (AIRS) project is supporting the implementation of IRS in targeted sectors in four districts in Manicaland Province (Chimanimani, Mutasa, Mutare, and Nyanga) with funding from the President’s Malaria Initiative (PMI) through USAID. A total of 163,922 structures are targeted to be sprayed, protecting approximately 334,000 people during the 2015 spray campaign. The spray campaign commenced on 11 October 2015 in Chimanimani and Mutasa districts, and commenced in Mutare and Nyanga on 12 October 2015.

The IRS activity is planned to be conducted in 35 operational days in the four districts with organophosphate (OP) insecticide. As of day fifteen, AIRS Zimbabwe has sprayed 38.1% of the targeted structures in Chimanimani, Mutasa, Mutare, and Nyanga.

For the period under review (19-25 October 2015), spray coverage ranged from 88.0% for Chimanimani to 99.5% for Mutasa. The performance indicated a general improvement from week 1 across all districts, with Chimanimani improving from 85.3% recorded in the first week to 88.0% during the second week of the IRS campaign. Overall, average percentage coverage for the four districts stood at 96.1% in week 2, an improvement from 93.5% recorded in week 1.

During the reporting period, the average number of structures sprayed per spray operator varied per district per day. Nyanga and Mutasa districts had the highest achievement, with Nyanga spraying more than the targeted 19 structures per day per spray operator, for an average of five days per seven-day reporting period. Chimanimani and Mutare had the lowest achievement as most spray operators could not achieve the daily target.

The following report provides the spray performance data for a total of fifteen operational days⁴ of the AIRS Zimbabwe program from October 11 - 25, 2015 in the four districts.

Table 1: AIRS Zimbabwe 2015 Campaign Summary Data

Targeted Structures	163,922
Total Cumulative Structures Found by Spray Operators	66,006
Cumulative Structures Sprayed	62,524
Cumulative Structures Unsprayed	3,482
Population in Sprayed Structures	141,994
Pregnant women	2,360
Children under 5 years	25,796
Spray Progress (%) based on target structures found by SOPs, 2014	38.1%
Spray Coverage (%) based on structures found by SOPs, 2015	94.7%

³ All results are provisional; numbers may change following data cleaning and verification.

⁴ Fifteen operational days in Chimanimani and Mutasa; fourteen operational days in Mutare and Nyanga.

Figure 1: AIRS Zimbabwe Daily Spray Performance, 15 Operational Days

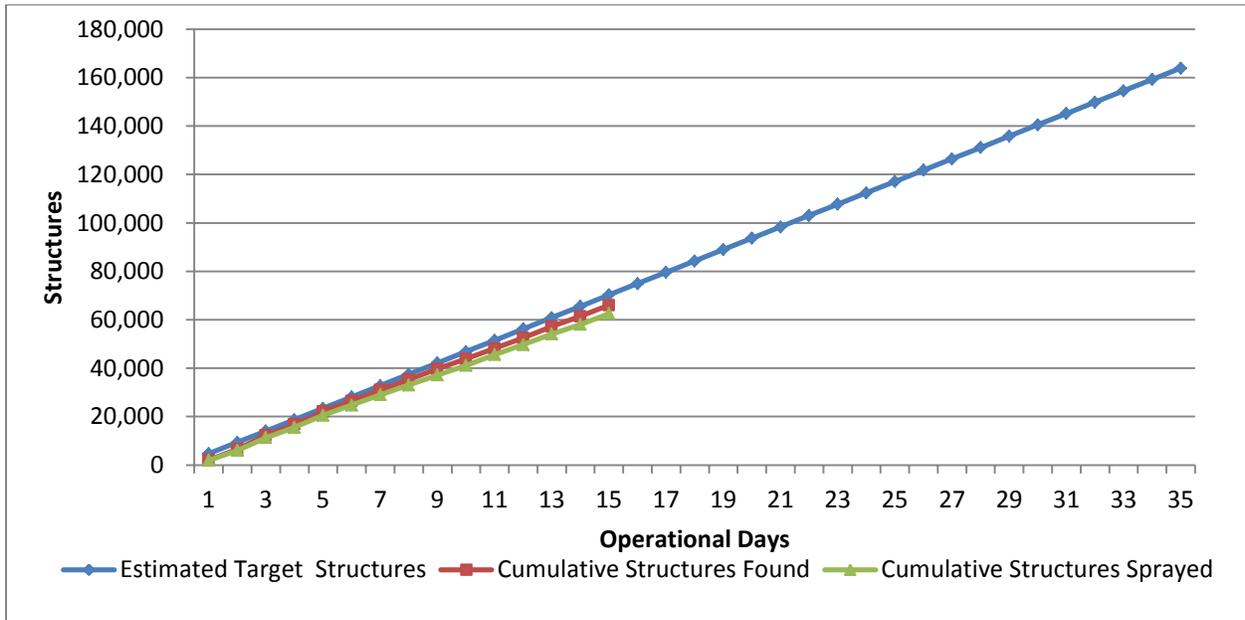


Figure 2: AIRS Zimbabwe Spray Progress Based on Targeted Structures, 15 Operational Days

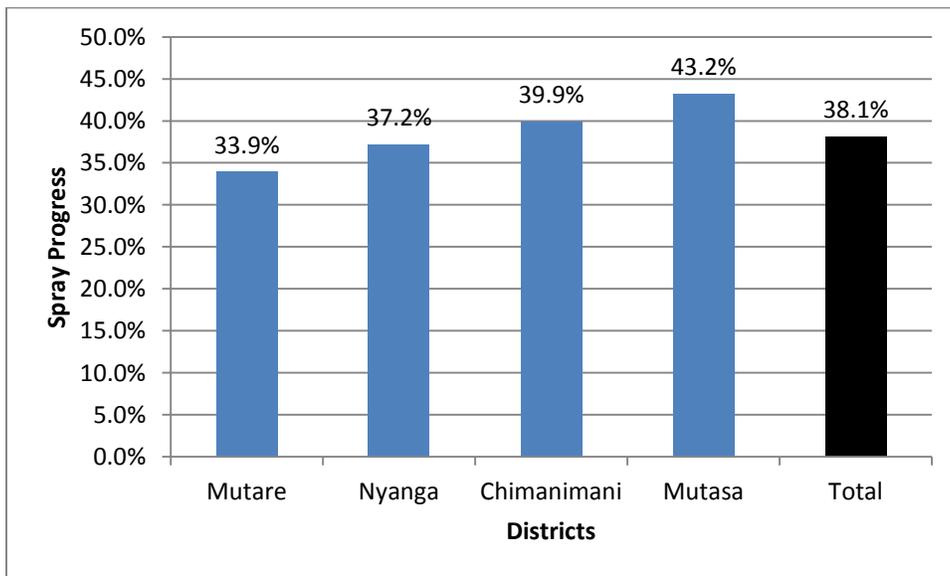


Figure 3: AIRS Zimbabwe Spray Coverage Based on Total Structures found by SOs, 15 Operational Days

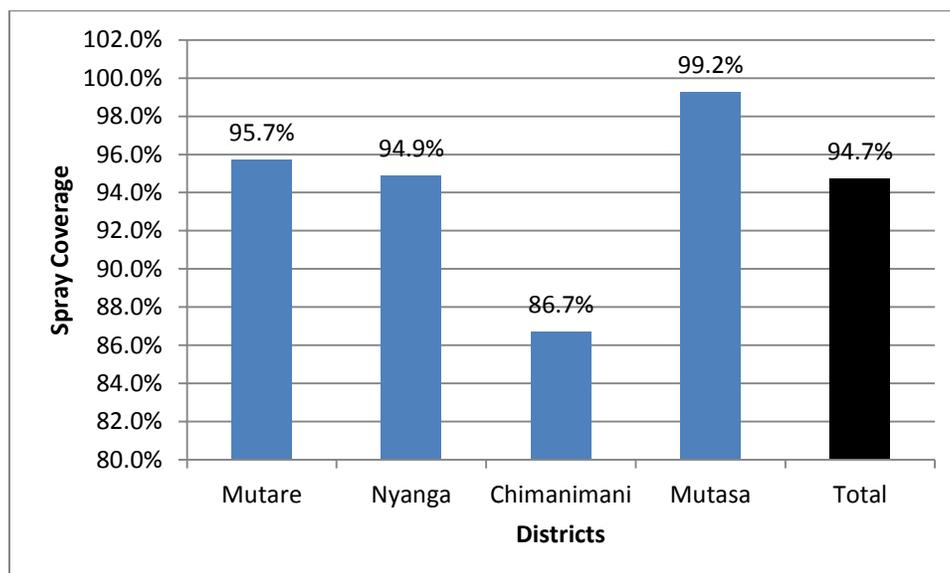


Table 2: Comparison of Targeted Structures and Actual Performance of Spray Operators (SOPs), 15 Operational Days

Date	Day of spray operations	Targeted Structures (Cumulative), based on Structures found in November 2014	Structures found by SOPs (Cumulative), 2015	Structures Sprayed (Cumulative), 2015
11/Oct/15	1	4,683	2,065	1,925
12/Oct/15	2	9,367	6,568	6,034
13/Oct/15	3	14,050	12,261	11,294
14/Oct/15	4	18,734	16,796	15,564
15/Oct/15	5	23,417	22,039	20,531
16/Oct/15	6	28,101	26,443	24,749
17/Oct/15	7	32,784	30,992	28,988
18/Oct/15	8	37,468	35,302	32,996
19/Oct/15	9	42,151	39,712	37,186
20/Oct/15	10	46,835	43,795	41,102
21/Oct/15	11	51,518	48,164	45,565
22/Oct/15	12	56,202	52,485	49,727
23/Oct/15	13	60,885	57,200	54,144
24/Oct/15	14	65,569	61,394	58,082
25/Oct/15	15	70,252	66,006	62,524

Notes:

- SOPs in Chimanimani and Mutare had the lowest achievements due to the difficult terrain they had to navigate in the two districts during the reporting period.
- During the reporting period, meetings were held across all districts with the IRS Coordinators, Data Managers, Team Leaders, Warners and Supervisors in response to challenges faced by Supervisors when completing the CommCare application on the Smartphone, as well as general IRS operations and EC aspects. The following issues were emphasized during the meetings:
 - Supervisors to be very carefully when completing the forms to avoid mistakes, especially entering incorrect responses on the smart phone.
 - Comments to be provided in cases where more information is deemed necessary to make the response more explicit
 - Daily monitoring of spray performance and immediate corrective measures where under performance is observed was re-emphasized during the IRS camp site meetings

**PMI AIRS ZIMBABWE 2015
WEEKLY SPRAY PROGRESS REPORT⁵ # 3**

The Africa Indoor Residual Spray (AIRS) project is supporting the implementation of IRS in targeted sectors in four districts in Manicaland Province (Chimanimani, Mutasa, Mutare, and Nyanga) with funding from the President’s Malaria Initiative (PMI) through USAID. A total of 163,922 structures are targeted to be sprayed, protecting approximately 334,000 people during the 2015 spray campaign. The spray campaign commenced on 11 October 2015 in Chimanimani and Mutasa districts, and commenced in Mutare and Nyanga on 12 October 2015.

The IRS activity is planned to be conducted in 35 operational days in the four districts with organophosphate (OP) insecticide. As of day 21, AIRS Zimbabwe has sprayed 55.8% of the targeted structures in Chimanimani, Mutasa, Mutare, and Nyanga.

For the period under review (19-31 October 2015), spray coverage ranged from 86.6% for Chimanimani to 99.9% for Mutasa. Overall, average percentage coverage for the four districts stood at 96.1% in week three, on par with the coverage recorded in week two.

As with the previous reporting period, Chimanimani continues to record the lowest average number of structures sprayed per spray operator per day (16 structures), whilst Nyanga recorded the highest figure of 25 structures per spray operator per day. As highlighted in Week 1 progress report, difficult terrain in Chimanimani district continues to hamper spray progress. An improvement on spray achievement is anticipated during IRS second phase as Chimanimani will be operating on better terrain with closely populated dwellings.

The following report provides the spray performance data for a total of 21 operational days⁶ of the AIRS Zimbabwe program from October 11 - 31, 2015 in the four districts.

Table 1: AIRS Zimbabwe 2015 Campaign Summary Data

Targeted Structures	163,922
Total Cumulative Structures Found by Spray Operators	96,083
Cumulative Structures Sprayed	91,437
Cumulative Structures Unsprayed	4,646
Population in Sprayed Structures	206,372
Pregnant women	3,466
Children under 5 years	36,547
Spray Progress (%) based on target structures found by SOPs, 2014	55.78%
Spray Coverage (%) based on structures found by SOPs, 2015	95.16%

⁵ All results are provisional; numbers may change following data cleaning and verification.

⁶ Twenty operational days in Chimanimani, Mutare, Nyanga; 21 operational days in Mutasa.

Figure 1: AIRS Zimbabwe Daily Spray Performance, 21 Operational Days⁷

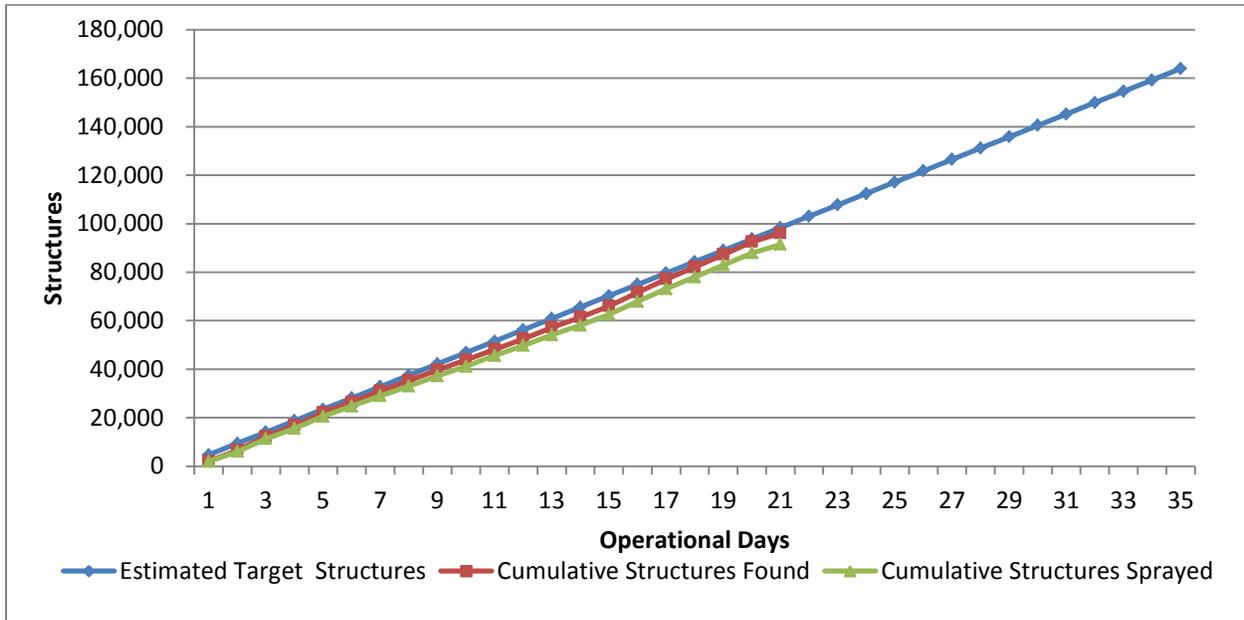
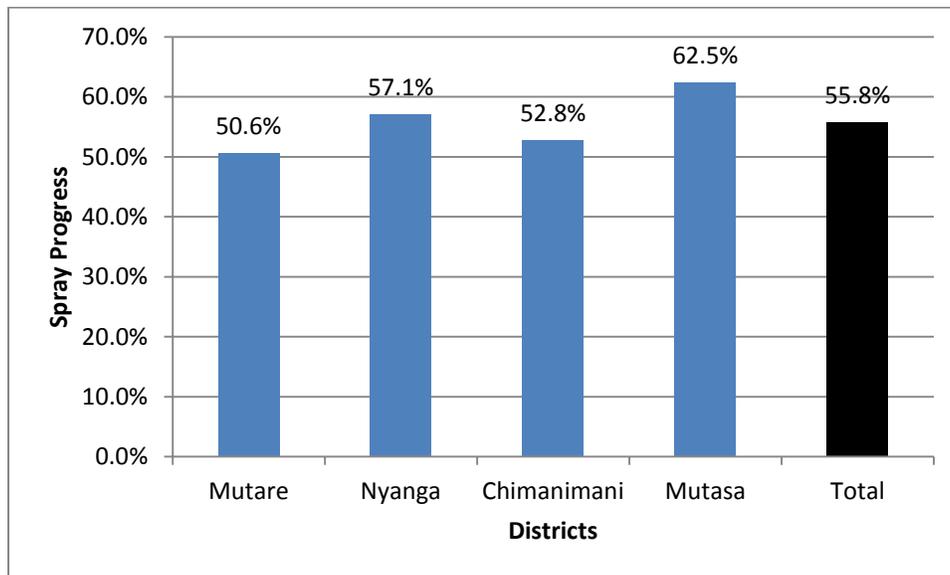


Figure 2: AIRS Zimbabwe Spray Progress Based on Targeted Structures, 21 Operational Days



⁷ All the four districts started off with hard to reach areas, which are believed to have contributed to low coverage as most of these areas are mountainous with sparsely populated households

Figure 3: AIRS Zimbabwe Spray Coverage Based on Total Structures found by SOPs, 21 Operational Days

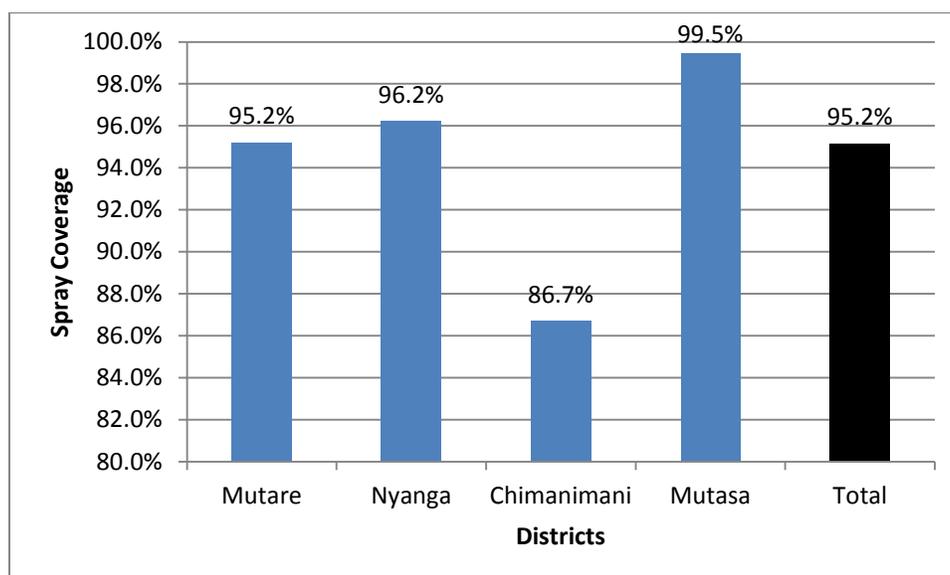


Table 2: Comparison of Targeted Structures and Actual Performance of SOPs, 15 Operational Days

Date	Day of spray operations	Targeted Structures (Cumulative), based on Structures found in November 2014	Structures found by SOPs (Cumulative), 2015	Structures Sprayed (Cumulative), 2015
11/Oct/15	1	4,683	2,065	1,925
12/Oct/15	2	9,367	6,568	6,034
13/Oct/15	3	14,050	12,261	11,294
14/Oct/15	4	18,734	16,796	15,564
15/Oct/15	5	23,417	22,039	20,531
16/Oct/15	6	28,101	26,443	24,749
17/Oct/15	7	32,784	30,992	28,988
18/Oct/15	8	37,468	35,302	32,996
19/Oct/15	9	42,151	39,712	37,186
20/Oct/15	10	46,835	43,795	41,102
21/Oct/15	11	51,518	48,164	45,565
22/Oct/15	12	56,202	52,485	49,727
23/Oct/15	13	60,885	57,200	54,144
24/Oct/15	14	65,569	61,394	58,082
25/Oct/15	15	70,252	66,006	62,524
26/Oct/15	16	74,936	71,628	67,905
27/Oct/15	17	79,619	77,133	73,146

Date	Day of spray operations	Targeted Structures (Cumulative), based on Structures found in November 2014	Structures found by SOPs (Cumulative), 2015	Structures Sprayed (Cumulative), 2015
28/Oct/15	18	84,303	82,156	77,986
29/Oct/15	19	88,986	87,275	82,912
30/Oct/15	20	93,670	92,496	87,897
31/Oct/15	21	98,353	96,083	91,437

Notes:

- Performance progress report for week three covers six days (26 – 31 October), as opposed to seven, for Mutare, Nyanga, and Mutasa districts. This is due to the fact that IRS data managers were not able to summarize data for the last day of operations due to logistical challenges including campsite movements. Remaining data for the seventh day will be included in the week four IRS progress report.
- Performance progress report for week three covers five days (26-30 October), as opposed to seven, for Chimanimani district. This is due to the fact that data manager was not able to summarize data for the two days due to electricity challenges and campsite movements. Remaining data for the last two days for Chimanimani will be included in the week four IRS progress report.
- Phase I of the IRS campaign came to a close on 31 October for Mutasa and 1 November for Nyanga, Chimanimani and Mutare teams. Phase 2 of the campaign will recommence on 7 November and 8 November.

**PMI AIRS ZIMBABWE 2015
WEEKLY SPRAY PROGRESS REPORT⁸ # 4**

The Africa Indoor Residual Spray (AIRS) project is supporting the implementation of IRS in targeted sectors in four districts in Manicaland Province (Chimanimani, Mutasa, Mutare, and Nyanga) with funding from the President’s Malaria Initiative (PMI) through USAID. A total of 163,922 structures are targeted to be sprayed, protecting approximately 334,000 people during the 2015 spray campaign. The spray campaign commenced on 11 October 2015 in Chimanimani and Mutasa districts, and commenced in Mutare and Nyanga on 12 October 2015.

The IRS activity is planned to be conducted in 35 operational days in the four districts with organophosphate (OP) insecticide. To date, AIRS Zimbabwe has sprayed 78.1% of the targeted structures in Chimanimani, Mutasa, Mutare, and Nyanga.

During Week Four of IRS (November 8-16), spray coverage ranged from 84.5% for Chimanimani to 100% for Mutasa. Overall, average percentage coverage for the four districts stood at 95% in Week Four, on par with the coverage recorded in week three.

The following report provides the spray performance data for a total of 30 operational days⁹ of the AIRS Zimbabwe program from October 11 – November 16, 2015 in the four districts.

Table 1: AIRS Zimbabwe 2015 Campaign Summary Data

Targeted Structures	163,922
Total Cumulative Structures Found by Spray Operators	134,632
Cumulative Structures Sprayed	127,986
Cumulative Structures Not Sprayed	6,646
Population in Sprayed Structures	287,941
Pregnant women	4,667
Children under 5 years	51,996
Spray Progress (%) based on target structures found by SOPs, 2014	78.08%
Spray Coverage (%) based on rooms found by SOPs, 2015	95.06%

⁸ All results are provisional; numbers may change following data cleaning and verification.

⁹ 30 operational days in Chimanimani; 29 operational days in Mutare, Nyanga, and Mutasa.

Figure 1: AIRS Zimbabwe Daily Spray Performance, 30 Operational Days

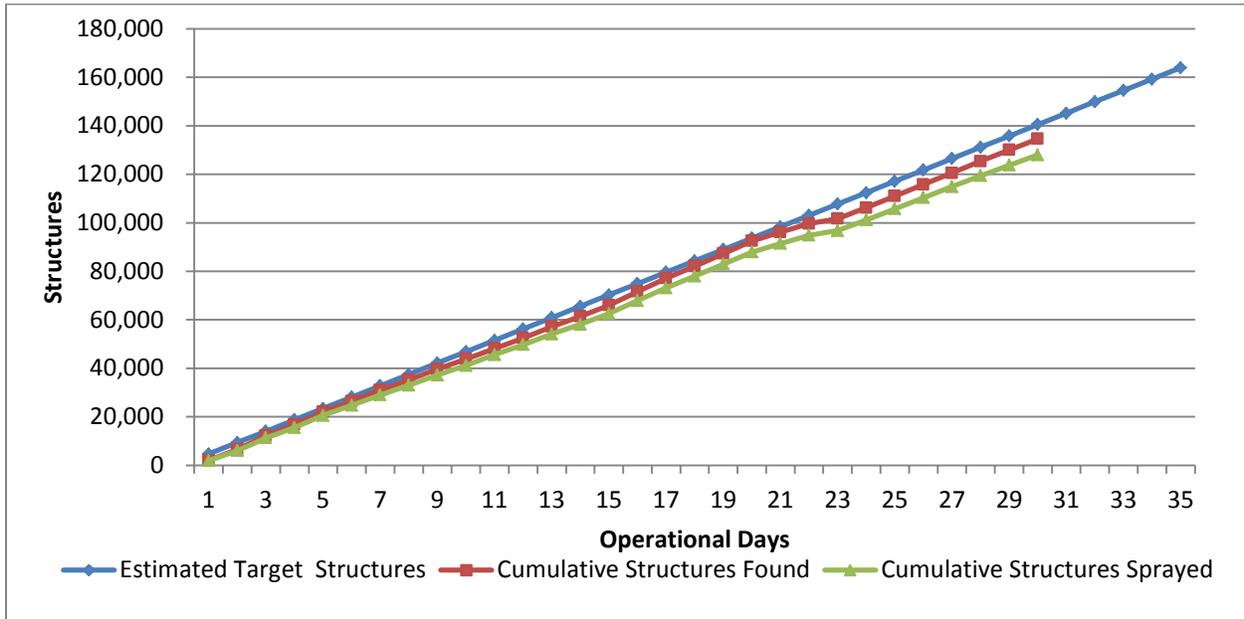


Figure 2: AIRS Zimbabwe Spray Progress Based on Targeted Structures, 30 Operational Days

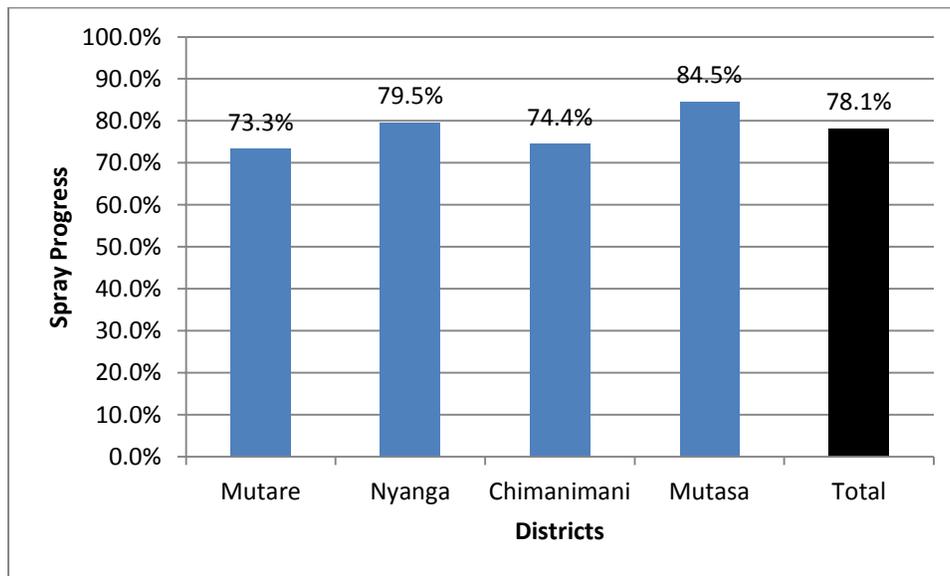


Figure 3: AIRS Zimbabwe Spray Coverage Based on Total Structures found by SOPs, 30 Operational Days

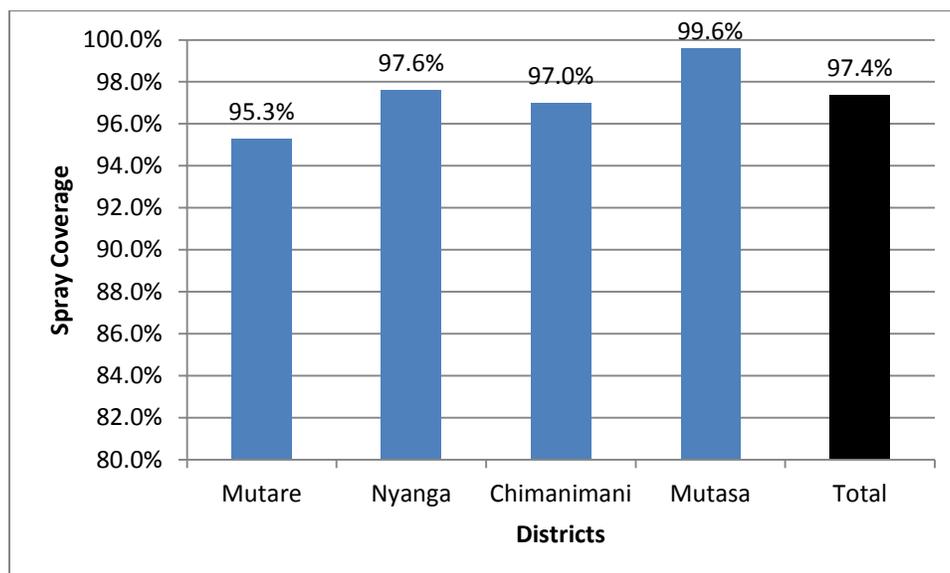


Table 2: Comparison of Targeted Structures and Actual Performance of SOPs, 15 Operational Days

Date	Day of spray operations	Targeted Structures (Cumulative), based on Structures found in November 2014	Structures found by SOPs (Cumulative), 2015	Structures Sprayed (Cumulative), 2015
11/Oct/15	1	4,683	2,065	1,925
12/Oct/15	2	9,367	6,568	6,034
13/Oct/15	3	14,050	12,261	11,294
14/Oct/15	4	18,734	16,796	15,564
15/Oct/15	5	23,417	22,039	20,531
16/Oct/15	6	28,101	26,443	24,749
17/Oct/15	7	32,784	30,992	28,988
18/Oct/15	8	37,468	35,302	32,996
19/Oct/15	9	42,151	39,712	37,186
20/Oct/15	10	46,835	43,795	41,102
21/Oct/15	11	51,518	48,164	45,565
22/Oct/15	12	56,202	52,485	49,727
23/Oct/15	13	60,885	57,200	54,144
24/Oct/15	14	65,569	61,394	58,082
25/Oct/15	15	70,252	66,006	62,524
26/Oct/15	16	74,936	71,628	67,905
27/Oct/15	17	79,619	77,133	73,146

Date	Day of spray operations	Targeted Structures (Cumulative), based on Structures found in November 2014	Structures found by SOPs (Cumulative), 2015	Structures Sprayed (Cumulative), 2015
28/Oct/15	18	84,303	82,156	77,986
29/Oct/15	19	88,986	87,275	82,912
30/Oct/15	20	93,670	92,496	87,897
31/Oct/15	21	98,353	96,083	91,437
1/Nov/15	22	103,037	99,671	94,861
9/Nov/15	23	107,720	101,683	96,733
10/Nov/15	24	112,404	106,231	101,138
11/Nov/15	25	117,087	111,005	105,766
12/Nov/15	26	121,771	115,766	110,339
13/Nov/15	27	126,454	120,479	114,871
14/Nov/15	28	131,138	125,385	119,403
15/Nov/15	29	135,821	130,018	123,725
16/Nov/15	30	140,505	134,632	127,986

Notes:

- Performance progress report for Week Four covers eight days for Mutare and Nyanga districts, comprising one last day of Phase One and seven days of Phase Two. For Mutasa district, the report covers eight days of Phase Two and ten days of Chimanimani (two days of Phase One and eight of Phase Two).
- Phase Two of the IRS campaign came to a close on November 1 for some teams, and November 2 for the rest. Phase Two of the campaign commenced on November 8 in Chimanimani and Mutasa districts, and on November 9 in Nyanga and Mutare districts.
- No significant issues are reported and observed during Week Four.

**PMI AIRS ZIMBABWE 2015
WEEKLY SPRAY PROGRESS REPORT¹⁰ # 5**

The Africa Indoor Residual Spray (AIRS) project is supporting the implementation of IRS in targeted sectors in four districts in Manicaland Province (Chimanimani, Mutasa, Mutare, and Nyanga) with funding from the President’s Malaria Initiative (PMI) through USAID. A total of 163,922 structures are targeted to be sprayed, protecting approximately 334,000 people during the 2015 spray campaign. The spray campaign commenced on 11 October 2015 in Chimanimani and Mutasa districts, and commenced in Mutare and Nyanga on 12 October 2015.

The IRS activity was planned to be conducted in 35 operational days in the four districts with organophosphate (OP) insecticide. At the time of reporting, the campaign has been active for 37 operational days. Chimanimani district is complete after 37 days of spraying, while the other three districts are continuing to spray for one to three extra days¹¹. To date, AIRS Zimbabwe has sprayed 100% of the targeted structures in Chimanimani, Mutasa, Mutare, and Nyanga.

During Week Five of IRS (16 – 22 November 2015), spray coverage ranged from 83% for Chimanimani to nearly 99% for Mutasa. Overall, average percentage coverage for the four districts stood at 92.5% in Week Five, slightly lower than the coverage recorded in Week Four.

The following report provides the spray performance data for a total of 37 operational days¹² of the AIRS Zimbabwe program from October 11 – November 22, 2015 in the four districts.

Table 1: AIRS Zimbabwe 2015 Campaign Summary Data

Targeted Structures	163,922
Total Cumulative Structures Found by Spray Operators	163,913
Cumulative Structures Sprayed	155,064
Cumulative Structures Not Sprayed	8,849
Population in Sprayed Structures	348,475
Pregnant women	5,499
Children under 5 years	62,097
Spray Progress (%) based on target structures found by SOPs, 2014	100.00%
Spray Coverage (%) based on structures found by SOPs, 2015	94.60%

¹⁰ All results are provisional; numbers may change following data cleaning and verification.

¹¹ One extra day for Nyanga, two extra days for Mutasa, and three extra days for Mutare.

¹² 37 operational days in Chimanimani; 36 operational days in Mutasa; 35 operational days in Mutare and Nyanga

Figure 1: AIRS Zimbabwe Daily Spray Performance, 37 Operational Days

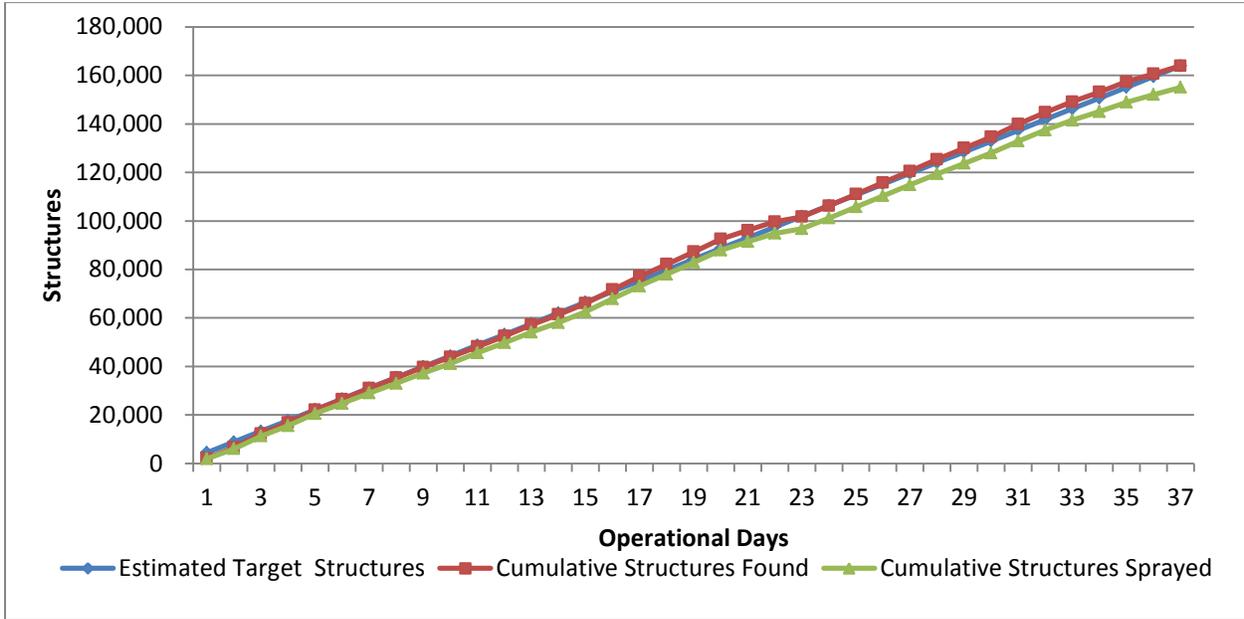


Figure 2: AIRS Zimbabwe Spray Progress Based on Targeted Structures, 37 Operational Days

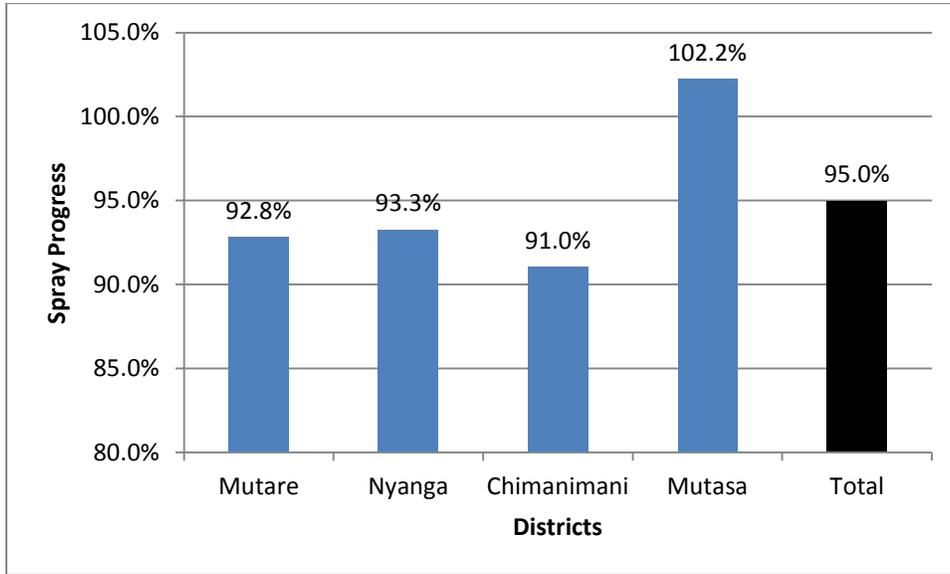


Figure 3: AIRS Zimbabwe Spray Coverage Based on Total Structures found by SOPs, 37 Operational Days

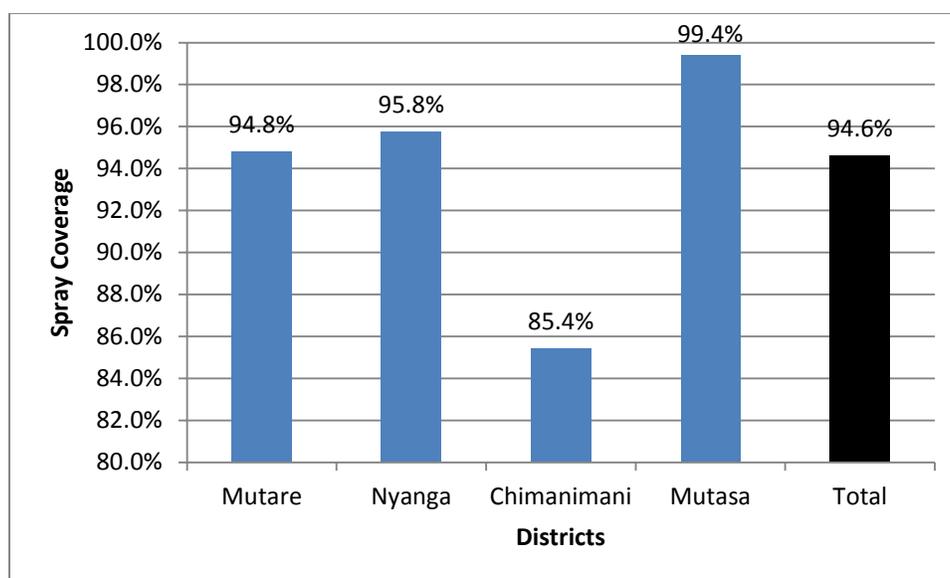


Table 2: Comparison of Targeted Structures and Actual Performance of SOPs, 37 Operational Days

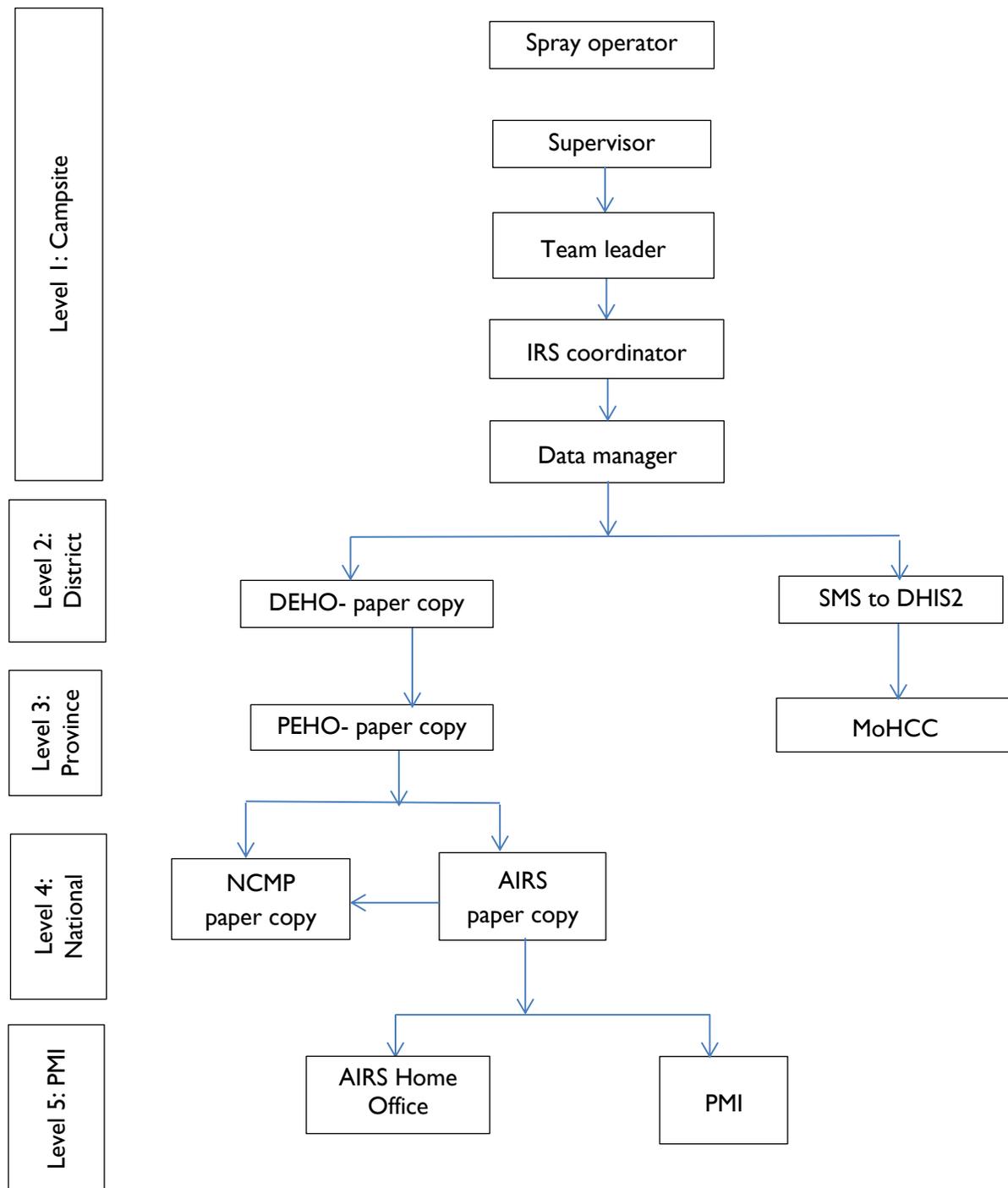
Date	Day of spray operations	Targeted Structures (Cumulative), based on Structures found in November 2014	Structures found by SOPs (Cumulative), 2015	Structures Sprayed (Cumulative), 2015
11/Oct/15	1	4,683	2,065	1,925
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13/Nov/15	28	131,138	125,385	119,403
14/Nov/15	29	135,821	130,018	123,725
15/Nov/15	30	140,505	134,632	127,986
16/Nov/15	31	137,340	139,945	132,941
17/Nov/15	32	141,770	144,739	137,425
18/Nov/15	33	146,201	149,116	141,477
19/Nov/15	34	150,631	153,119	145,060
20/Nov/15	35	155,061	157,359	148,914
21/Nov/15	36	159,492	160,601	152,035
22/Nov/15	37	163,922	163,913	155,064

Notes:

- No significant issues are reported and observed during Week Five.

ANNEX E. AIRS ZIMBABWE DATA FLOW PLAN



ANNEX F. MONITORING AND EVALUATION PLAN

INDICATOR MATRIX

AIRS Project
Zimbabwe Monitoring and Evaluation Plan Indicator Matrix
UPDATED: December 14, 2015

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
Component 1: Establish cost-effective supply chain mechanisms and execute logistical plans								
1.1 Procurement								
1.1.1 Number and percentage of insecticide procurements that had a pre-shipment QA/QC test at least 60 days prior to spray campaign	<i>Data source:</i> Project records – insecticide procurements <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	1; 100%	1; 100%	100%		100%	
1.1.2 Number and percentage of international insecticide procurements delivered in country, at port of entry, at least 30 days prior to the start of spray operations	<i>Data source:</i> Project records – international procurements <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	1; 100%	1; 100%	100%		100%	
1.1.3 Number and percentage of international equipment procurements, including PPE, delivered in country, at port of	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	1; 100%	1; 100%	100%		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
entry, at least 30 days prior to start of spray operations								
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%	100%		100%	
1.1.5 Successfully completed spray operations without an insecticide stock-out	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	Completed	Completed	Completed		Completed	
1.2 In-Country Exemption and Custom Clearance Process								
1.2.1 Complete exemption and clearance process within the minimum 2 weeks	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	Completed	Completed	Completed		Completed	
1.3 In-Country Logistics, Warehousing, and Training								
1.3.1 Number and percentage of logistics and warehouse managers trained in IRS supply chain management	<i>Data source:</i> Training records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign By Gender	38; 100%	10 ¹³ ; 100% (8 Males, 2 Females)	TBD; 100%		TBD; 100%	

¹³ 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.

Performance Indicator			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
			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 ¹⁴ ; 100%	TBD; 100%
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	
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	
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% ¹⁵	5%		5%	
2.2 Support of Safety and Health Best Practices and Compliance with USAID and Host Country Environmental Regulations								
2.2.1 SEA/letter reports submitted on time based on schedule agreed upon with the PMI COR team	<i>Data source:</i> Project records – submitted SEAs/ letter reports <i>Reporting frequency:</i>	By Spray Campaign	Completed	Completed	Completed		Completed	

¹⁴ While the project inspected 23 only 20 stores were used.

¹⁵ 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
	Each spray campaign							
2.2.2 Number of spray personnel trained in environmental compliance and personal safety standards in IRS implementation	<i>Data source: Project records – Training reports</i> <i>Reporting frequency: Each spray season</i>	By Spray Campaign By Gender	388	415 (354 males, 61 females)	TBD		TBD	
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 ¹⁶ (1 male, 10 females)	TBD		TBD	
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	
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 Storehouses: 23	46; 100% Soak pits: 23 Storehouses: 23	TBD; 100%		TBD; 100%	
2.3 Conduct Communications Activities and Community Mobilization								
2.3.1 Number of radio spots and	<i>Data source: Project records</i>	By Spray	30,000	0 ¹⁷	TBD		TBD	

¹⁶ 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.

¹⁷ IRS communication was conducted by another contractor, and AIRS Zimbabwe was only responsible for ensuring the content sufficiently covered IRS, LLIN distribution, and malaria case management. AIRS Zimbabwe was not, however, responsible for the dissemination of the radio spots.

Performance Indicator								
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
talk shows aired	<i>Reporting frequency:</i> Per spray campaign	Campaign						
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 ¹⁸ (30,000 brochures; 200 posters; 310 calendars)	TBD		TBD	
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 ¹⁹	13,006 (8,007 females 4,999 males)	TBD		TBD	
2.4 Spray Targeted Structures According to Technical Specifications								
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	TBD		TBD	
2.4.2 Number of structures sprayed with IRS	<i>Data source:</i> Daily Spray Operator Forms	By Spray Campaign	139,334	162,127	TBD		TBD	

¹⁸ PMI budget for print materials was predominantly allocated to PSI.

¹⁹ 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.

Performance Indicator			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
				<i>Reporting frequency: Daily per spray campaign</i>				
2.4.3 Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	<i>Data source: Daily Spray Operator Forms</i> <i>Reporting frequency: Daily per spray campaign</i>	By Spray Campaign	85%	94.4%	85%		85%	
2.4.4 Number of people residing in structures sprayed (Number of people protected by IRS)	<i>Data source: Daily Spray Operator Forms</i> <i>Reporting frequency: Daily per spray campaign</i>	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)	TBD		TBD	
Component 3: Ongoing Monitoring and Evaluation and Quality Control Measures								
3.1 Submit AIRS Zimbabwe M&E Plan to PMI for approval	<i>Data source: Project records</i> <i>Reporting frequency: Semi-annual</i>	By Spray Campaign	Completed	Completed	Completed		Completed	
3.2 Conduct a post-spray data quality audit within 60 days of completion of spray operations	<i>Data source: Spray operations reports</i> <i>Reporting frequency: Per spray campaign</i>	By Spray Campaign	N/A	N/A	Completed		Completed	
Component 4: Contribute to Global and Country-Level IRS Policy Setting and Develop and Disseminate Experiences and Best Practices								
4.1 Number of guidelines/checklists/tools related to IRS operations developed or refined with project support	<i>Data source: Project records – Activity reports</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign By Guideline/checklist/tool	2	3(Data collection Verification, Error Eliminator, Home	TBD		TBD	

Performance Indicator								
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
				Preparation)				
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	TBD		TBD	
4.3 Number of best practice presentations given at national/ regional/international workshops and conferences	<i>Data source:</i> Project records – Activity reports <i>Reporting frequency:</i> Semi-annually	By Spray Campaign By IRS Technical Area	5	3 (two posters at ASTMH and one APHA presentation)	TBD		TBD	
4.4 Number of enterprises engaged through public-private partnerships	<i>Data source:</i> Project records – Activity reports <i>Reporting frequency:</i> Semi-annually	By Spray Campaign	5	4 (HEDEC, Go Green, ZIMASCO, Tongaart Hullet)	TBD		TBD	
Component 5: Contribute to the collection and analysis of routine entomological and epidemiological data								
5.1 Support entomological monitoring activities and insecticide resistance strategies								
5.1.1 Number of entomological sentinel sites supported by AIRS Zimbabwe established to monitor vector bionomics and behavior (vector species, distribution, seasonality, feeding time, and location)	<i>Data source:</i> Entomological reports <i>Reporting frequency:</i> Annually	By Spray Campaign	20	20	TBD		TBD	

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
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	TBD		TBD	
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	TBD		TBD	
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	TBD		TBD	
5.1.5 Number of wall bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS*	<i>Data source: Entomological reports</i> <i>Reporting frequency: Per spray campaign</i>	By Spray Campaign By Type of Insecticide	2	2	TBD		TBD	
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	TBD		TBD	

Performance Indicator								
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
5.1.7 Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites*	<i>Data source: Entomological reports</i> <i>Reporting frequency: Per spray campaign</i>	By Spray Campaign By Type of Insecticide	60	21	TBD		TBD	
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	N/A	TBD		TBD	
Component 6 (Cross-cutting): Capacity Building, Knowledge Transfer, Gender Inclusion								
6.1 Increasing the Role of Women and Addressing Gender Barriers								
6.1.1 Number of people trained to deliver IRS in target districts	<i>Data source: Project records – Training reports</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign By Spray Campaign By Gender Percentage of Women Trained	388	351 (301 males, 50 females; 14% Female)	TBD		TBD	
6.1.2 Total number of people trained to support IRS in target districts	<i>Data source: Project records – Training reports</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign By Spray Campaign	392	415 (354 males, 61 females; 15% female)	TBD		TBD	

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results						
			Year 1		Year 2		Year 3		
			Target	Results	Target	Results	Target	Results	
		By Gender Percentage of women trained							
6.1.3 Number of women recruited (i.e. number of women on the selection list) for IRS employment	<i>Data source: Project records – Recruitment reports reports</i> <i>Reporting frequency: Semi-annually</i>	By Country By Percentage of women recruited	13	50; 14%	TBD		TBD		
6.1.4 Number of people trained as IRS Training of Trainers	<i>Data source: Project records – Training reports</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign By Gender Percentage of women trained	87	56 (46 males, 10 females); 18%	TBD		TBD		
6.1.5 Total number of people hired to support IRS in target districts	<i>Data source: Project records – Contracts signed</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign Gender Percentage of women hired	284	383 (335 males, 48 females; 13% female)	TBD		TBD		
6.1.6 Number of women hired in supervisory roles in target districts (this number includes site supervisors, team leaders, M&E assistants and others who	<i>Data source: Project records – Contracts signed</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign Percentage of women hired	N.A. ²⁰	28; 32%	TBD		TBD		

²⁰ 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								
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
supervise seasonal staff)								
6.1.7 Number of staff (permanent and seasonal) who have completed gender awareness training	<i>Data source: Project records – Training reports</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign Gender Percentage of women hired	N.A.	383 (335 males, 48 females; 13% female)	TBD		TBD	
6.2 Capacity Building								
6.2.1 Number of government officials trained in IRS oversight	<i>Data source: Project records – Training reports</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign By Gender Percentage of Women Trained	91	105; 76 (68%) males; 29 (32%) females	TBD		TBD	
6.2.2 Implement all activities outlined in their yearly Capacity Building Action Plan	<i>Data source: Project records – Capacity assessment reports</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign	Completed	Completed	Completed		Completed	
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	