



PRESIDENT'S MALARIA INITIATIVE



PMI | Africa IRS (AIRS) Project

Indoor Residual Spraying (IRS 2) Task Order Six

RWANDA

END OF SPRAY REPORT

SPRAY CAMPAIGN: FEBRUARY 15 – MARCH 09, 2016

SUBMITTED: APRIL 21, 2016

Recommended Citation: PMI | Africa IRS (AIRS) Project Indoor Residual Spraying (IRS 2) Task Order Six. *Rwanda End of Spray Report*, Bethesda, MD. Abt Associates Inc.

Contract No.: GHN-I-00-09-00013
Task Order: AID- OAA-TO-14-00035

Submitted to: United States Agency for International Development/PMI

Submitted on: April 21, 2016



Abt Associates Inc. | 4550 Montgomery Avenue | Suite 800 North
Bethesda, Maryland 20814 | T. 301.347.5000 | F. 301.913.9061
www.abtassociates.com

TABLE OF CONTENTS

Acronyms	i
Executive Summary	1
1. Country Background	3
2. Pre-Season Activities	5
2.1 Selection of IRS Districts and Sectors.....	5
2.2 District Planning Meetings.....	6
2.3 Insecticide Selection.....	6
2.4 Logistics Needs and Procurement.....	7
2.5 Human Resource Requirements.....	8
2.6 IRS Trainings	9
3. Information, Education and Communication	15
3.1 Training	15
3.2 Door-to-Door Mobilization	16
3.3 IEC Coordination	17
3.4 Other IEC Activities	17
4. Implementation of IRS Activities	19
4.1 IRS Supervision.....	19
4.2 m-health	20
4.3 Logistics	21
4.4 IRS Payments	22
5. Post-Season Activities	23
5.1 Post Season Review Meetings	23
5.2 Inventory	24
6. Monitoring and Evaluation	25
6.1 Key Objectives	25
6.2 Data Management.....	25
6.3 Data Quality Assurance and Control.....	26
6.4 IRS Results	28
7. Environmental Compliance	31
7.1 Environmental Compliance Documentation	31
7.2 Pre-Season Environmental Assessment.....	31
7.3 Safety and Environmental Compliance during the Spray Campaign	32
7.4 Management of Insecticide Adverse Effects And Other Incidents	33
7.5 Post-Season Environmental Assessment	34
7.6 IRS Waste Disposal.....	34
8. Capacity Building of the Ministry of Health	35
8.1 Capacity Building During IRS Training	35
8.2 Technical Support for MOH IRS operations.....	35
9. Entomology	37
9.1 Vector Species Composition, Densities, Feeding Time and Location	37
9.2 Parity	41

9.3 Wall Bioassays	42
10. Gender.....	45
10.1 Gender inclusion implementation	45
11. Challenges, Lessons Learned and Recommendations	47
11.1 Challenges	47
11.2 Lessons Learned and Recommendations	47
Annex 1: MOH Letter on Insecticide Selection 2013/ 2014	51
Annex 2: Insecticide Resistance Testing Results.....	53
Annex 3: Local Procurement.....	55
Annex 4: SOP Training Program	57
Annex 5: Job Aid Messages that Were Sent to Seasonal Staff	59
Annex 6: Stock Update	61
Annex 7: Waste Disposal Certificates	63
Annex 8: Human Biting Rates (Bites/person/night).....	65
Annex 9: Vector Density.....	67
Annex 10: Parity	69
Annex 11: People Trained to Implement IRs.....	71
Annex 12: Environmental Mitigation and Monitoring Report – The PMI AIRS Project.....	73
Annex 13: Monitoring and Evaluation Plan Matrix – February 2016 Campaign Results	79

LIST OF TABLES

Table 1: AIRS Rwanda IRS Campaign Summary: February 2016	2
Table 2: Spray Campaigns Implemented by AIRS Rwanda Since 2012.....	4
Table 3: Target Structures for IRS Round 15	5
Table 4: International Purchases	7
Table 5: IRS Commodity Distribution To district stores	8
Table 6: Seasonal IRS Staff Hired by Districts	9
Table 7: Number of ToT Participants, by Gender	10
Table 8: Number of Spray Operators and Team Leaders Trained to Implement IRS.....	12
Table 9: Number of Team Leaders Trained, by Gender	13
Table 10: Washers Trained by Gender per District.....	14
Table 11: Number of IEC Mobilizers Trained to Implement IRS	16
Table 12: Results of IRS Mobilization.....	17
Table 13: Mass Media Communication Activities	18
Table 14: Institutions/ Stakeholders that Participated in IRS Supervision	20
Table 15: Distribution of Vehicles in the Districts	22
Table 16: Evaluation Meetings Participants.....	23
Table 17: Number of M&E Forms completed, errors found and measures taken.....	27
Table 18: Summary of Rwanda IRS Results for February 2016 Campaign	28
Table 19: IRS Results for Schools and Prisons in IRS Districts	29
Table 20: Insecticide Usage	30
Table 21: Construction and Refurbishments at IRS Operation Sites	31
Table 22: Medical Checkup for IRS staff	32
Table 23: List of materials lent to MOPDD	36

LIST OF FIGURES

Figure 1: Map of Rwanda Showing the two IRS Target Districts.....	5
Figure 2: IRS TOT Practical Training Session	11
Figure 3: Mobilization	16
Figure 4: Vector abundance.....	37
Figure 5: <i>An. gambiae</i> s.l. Average Monthly Biting Trends.....	38
Figure 6: Average <i>An. gambiae</i> s.l. Hourly Biting.....	40
Figure 7: <i>An. gambiae</i> s.l. Density	41
Figure 8: Parity	41
Figure 9: Wall Bioassay Test Results (September 2015-January 2016).....	42
Figure 10: Wall Bioassay Tests Results (February-March 2016).....	43

ACRONYMS

AIRS	Africa Indoor Residual Spraying
BCC	Behavior Change Communication
CHW	Community Health Worker
COP	Chief of Party
CTC	Client Technology Center
DCV	Data Collection Verification
DEV	Data Entry Verification
ECO	Environmental Compliance Officer
EE	Error Eliminator
EPEDR	<i>Entreprise pour la Protection de l'Environnement et Développement Rural</i>
HLC	Human Landing Catch
IEC	Information, Education and Communication
IRM	Insecticide Resistance Management
IRS	Indoor Residual Spraying
M&E	Monitoring & Evaluation
MOH	Ministry of Health
MOP	Malaria Operational Plan
MOPDD	Malaria and Other Parasitic Diseases Division
MPDD	Medical Procurement and Distribution Division
PERSUAP	Pesticide Evaluation Report and Safer Use Action Plan
PMI	President's Malaria Initiative
PMT	Performance Monitoring Tracking
PPE	Personal Protective Equipment
PSC	Pyrethrum Spray Catch
RBC	Rwanda Biomedical Center
REMA	Rwanda Environmental Management Authority
RHCC	Rwanda Health Communication Center
SACCO	Savings and Credit Cooperatives
SEA	Supplemental Environmental Assessment
SOP	Spray Operator
TL	Team Leader
ToT	Training of Trainers
USAID	United States Agency for International Development
WG	Wettable Granules
WHO	World Health Organization
WP	Wettable Powder

EXECUTIVE SUMMARY

Abt Associates (Abt) supports the implementation of indoor residual spraying (IRS) in Rwanda with the Africa Indoor Residual Spraying (AIRS) project funded by the United States Agency for International Development (USAID) under the President's Malaria Initiative (PMI). The objective of the project is to limit exposure to malaria vectors and reduce the incidence and prevalence of malaria. To achieve this objective, AIRS Rwanda conducted IRS from February 15 – March 9, 2016, with the target set at 144,417 structures in 21 of 26 sectors in two districts, Nyagatare (9 sectors) and Kirehe (12 sectors) using Bendiocarb (a carbamate).

The following are project achievements and key highlights of the February 2016 spray campaign (see Table 1), which lasted 20 operational days:

AIRS sprayed 147,947 structures out of 150,818 structures found by spray operators in the targeted districts, accounting for a coverage rate of 98.1%. In total, 618,696 residents received protection, including 90,089 (14.6 %) children under five and 10,256 (1.7%) pregnant women.

- AIRS Rwanda mobilized 161,645 structures.
- AIRS Rwanda trained 3,814 individuals using PMI funds to support IRS activities in the two districts. Of these, 1,006 were spray operators (SOPs) (428 males and 578 females), 240 were team leaders (TLs) (123 males and 117 females), and 1,893 were village Information, Education and Communication (IEC) mobilizers (1,741 males and 152 females). More than 55.8% of all SOPs trained to implement IRS were female. Overall, 28.4% (n=1,085) of all IRS trained personnel for the February – March 2016 campaign were female.
- AIRS Rwanda used 122,986 sachets of insecticide to spray 147,947 structures in the two AIRS Rwanda districts, with a utilization ratio of approximately 1:1.2 (sachet to structures sprayed).
- AIRS Rwanda sprayed 121 dormitories in 23 schools and three police stations in the target districts, protecting 6,354 residents. Spray operators used 228 sachets of insecticide for these structures.
- AIRS Rwanda incinerated all (1,787 kg) IRS insecticide contaminated wastes, including 123,214 empty sachets and 27,829 used masks, at two different incineration plants: Nyagatare Hospital incineration plant for wastes from Nyagatare and Kirehe Hospital incineration plant for Kirehe. AIRS Rwanda disposed of other wastes, including 488 used gloves and assorted plastics items (damaged torches, barrels, and jerry cans) at the Enterprise pour la Protection de l'Environnement et Development Rural (EPEDR) Recycling plant. AIRS Rwanda donated 1,396 of uncontaminated carton boxes to Cards from Africa Company at Samuduha. AIRS Rwanda disposed of other uncontaminated wastes such as papers and used dried cell batteries at the Nduba dumping site.
- Wall bioassays AIRS Rwanda conducted within one week of spraying in February 2016 to assess the quality of spraying in the target districts recorded 100% mortality rates of susceptible *An. gambiae* s.l. One month post-IRS, AIRS Rwanda recorded average mortality rates of 100% in the two districts.

TABLE 1: AIRS RWANDA IRS CAMPAIGN SUMMARY: FEBRUARY 2016

Number of districts covered by PMI-supported IRS	2 districts (Nyagatare and Kirehe)
Insecticide	Carbamates
Number of structures covered by PMI-supported IRS	147,947
Number of structures targeted by PMI-supported IRS	150,818
Spray coverage	98.1%
Population protected by PMI-supported IRS	618,696 (10,256 pregnant women; 90,089 children less than 5 years old)
Dates of PMI-supported IRS campaign	February 15 - March 09, 2016
Length of campaign	20 days
Number of people trained with USG funds to deliver IRS ¹	1,384

¹ Based on the PMI indicator definition this includes only spray personnel such as spray operators, team leaders, supervisors, and clinicians.

I. COUNTRY BACKGROUND

Rwanda covers an area of approximately 26,338 square kilometers with a population of approximately 11 million people. The entire population is at risk of malaria, including an estimated 1.8 million children under five and 450,000 pregnant women per year.² The country has two distinct malaria epidemiological strata: in two-thirds of the districts, malaria is characterized by seasonal peaks of transmission, and in the remaining one-third of the districts, malaria transmission is comparatively stable year-round.³ Climate and altitude are major factors that influence malaria prevalence in the country. Other contributors are: high human concentration, population movement (especially from areas of low transmission to high transmission), irrigation schemes (especially in the eastern and southern parts of the country), and cross-border movement of people (especially in the eastern and southeast parts of the country). Based on the insecticide resistance management (IRM) plan and the Malaria Strategic Plan 2013-2018, the Malaria and Other Parasitic Diseases Division (MOPDD) intends to target interventions based on the changing malaria epidemiology. The MOPDD based that approach on the significant decline in the burden of malaria in Rwanda and the accompanying high coverage of malaria control interventions nationwide.⁴

Among the malaria control strategies applied in Rwanda, IRS has been featured since 2007. Beginning in 2008, declining malaria incidence in some areas prompted adjustments, from district-wide blanket IRS coverage to more targeted focal spraying to cover high risk areas. Over time, the project reconsidered the focal targets because of generalized increases in malaria caseloads. But the expansion to cover entire districts depended on the availability of resources. PMI has funded much of the IRS in Rwanda.

In August 2011, PMI contracted with Abt to implement IRS in Rwanda under the Africa Indoor Residual Spraying (AIRS) Project for a three years period; this was followed by another three-year Task Order (the PMI AIRS Project) in September 2014.

The February-March 2016 spray campaign was the 15th round implemented since IRS started in Rwanda. In this spray campaign, AIRS Rwanda selected 21 out of 26 sectors in the two districts (all sectors in Kirehe and 9 of 14 sectors in Nyagatare) to spray with a total of 144,417 structures targeted for spray. The project also provided technical support in the following activities:

- Training, capacity building, and advocacy at the national and district level as a means of achieving IRS sustainability. This included building the capacity of government officials and partners to undertake high-quality IRS
- Daily and weekly monitoring of the AIRS Rwanda program via supervision of data collection and data entry using the AIRS monitoring and evaluation (M&E) supervisory tools
- Logistics assessment and coordination of all procurement, shipping, delivery, and storage of spray pumps, spare parts, insecticides, and personal protective equipment (PPE)

² 2012 Population and Housing Census, Nov 2012

³ Trends in malaria cases, hospital admissions, and deaths following scale-up of antimalarial interventions, 2000-2010, Rwanda, (Karema et al, 2012)

⁴ Malaria Strategic Plan 2012-2017

- Safe and correct insecticide application to minimize human and environmental exposure to IRS insecticides, in compliance with the Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP) and Supplemental Environmental Assessment (SEA)
- Coordination of IEC, sensitization, and mobilization activities with other stakeholders to raise the populations' awareness and acceptance of IRS and to encourage ownership
- Entomological monitoring, including assessing malaria vector density and species composition in intervention areas, establishing vector feeding time and location, monitoring the quality of insecticide application and insecticide decay rates, and assessing vector susceptibility and mechanisms of resistance
- Training of sentinel site technicians in entomological techniques
- Promotion of cost efficiency through due diligence and efficiency of operations
- Technical assistance MOH/MOPDD provides during spray rounds

Table 2 below shows a summary of the spray campaigns implemented by AIRS Rwanda since 2012.

TABLE 2: SPRAY CAMPAIGNS IMPLEMENTED BY AIRS RWANDA SINCE 2012

2012	Aug/Sep	3	236,610	1,025,181	Pyrethroid
2013	Feb/Mar	3	121,154	522,315	Pyrethroid
	Sep/Oct	3	224,708	957,027	Pyrethroid/ Carbamate
2014	Feb/Mar	3	123,919	512,789	Carbamate
	Sep/Oct	3	173,086	705,048	Carbamate
2015	Feb/Mar	2	127,150	517,194	Carbamate
	Sep/Oct	4	215,981	889,326	Carbamate
2016	Feb/Mar	2	144,947	618,696	Carbamate

2. PRE-SEASON ACTIVITIES

2.1 SELECTION OF IRS DISTRICTS AND SECTORS

AIRS Rwanda selected two districts, Kirehe and Nyagatare, for IRS during the February 2016 campaign (see Figure 1 below). AIRS Rwanda selected the IRS districts based on the malaria burden as was reported in epidemiological data from health facilities. AIRS Rwanda targeted 144,417 structures for spraying in 21 sectors.

FIGURE 1: MAP OF RWANDA SHOWING THE TWO IRS TARGET DISTRICTS

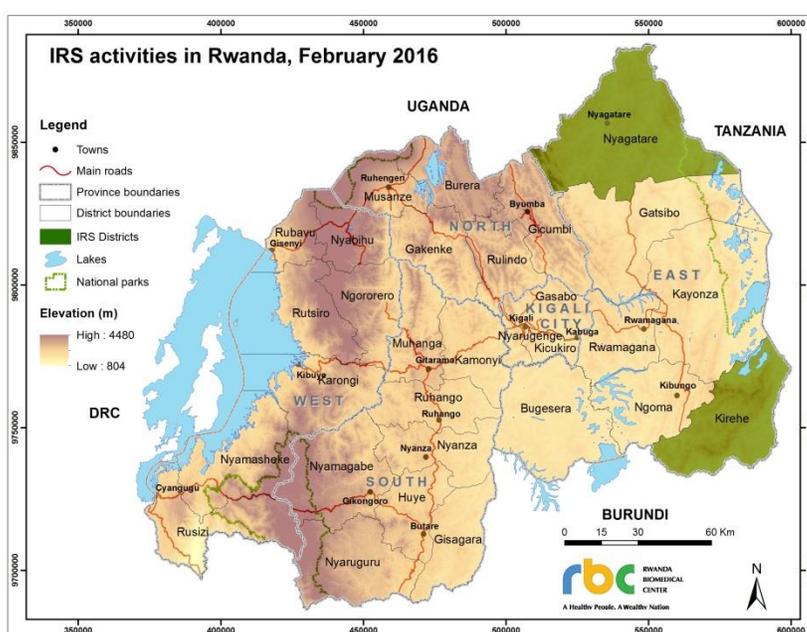


Table 3 shows a summary of the number of target structures and the target population in the 21 sectors.

TABLE 3: TARGET STRUCTURES FOR IRS ROUND 15

District	Number of Sectors	Number of Target Structures	Target Population		Total Target Population
			Females	Males	
Kirehe	12 of 12	82,946	176,219	163,506	339,725
Nyagatare	9 of 14	61,471	134,989	127,484	262,473
Total	21 of 26	144,417	311,208	290,990	602,198

2.2 DISTRICT PLANNING MEETINGS

Following the choice of the target sectors in the two IRS districts, stakeholders intensified collaboration and coordination. In January 2016, AIRS Rwanda held micro-planning meetings with district and sector authorities in the two districts and 21 sectors. AIRS Rwanda collaborated with the MOPDD, which facilitated invitations of counterparts from the local government, district hospitals, and health centers. Among the key issues of discussion was recruitment of IRS seasonal staff, identification of operation sites, provision of storage space for IRS materials at the operation sites and supervision at the sector level. The MOPDD/MOH has to endorse the required support expected from the local government counterparts and in each district so AIRS Rwanda organized a one-day planning meeting to discuss and develop an IRS operational plan with local leaders. In addition, those in attendance agreed on the roles and responsibilities of each of the partners. The issues discussed during the micro-planning meetings included:

- Recruitment of IEC mobilizers and SOPs
- Community mobilization plan for IRS
- Role of districts/sectors in the provision of IRS operational site offices and stores
- Role of local leaders in supervision of IRS activities during the IRS operations
- Participation at weekly meetings at the sector level

The meetings also deliberated to split each of the sectors which had many SOPs and vast distances to cover into two operation sites. In Nyagatare one sector was split into two operation sites while in Kirehe three sectors were split.

In total, 68 participants (49 males and 19 females) attended micro-planning meetings in Kirehe and Nyagatare districts.

2.3 INSECTICIDE SELECTION

AIRS Rwanda used a carbamate, Bendiocarb (Ficam 80 WP), during the February-March IRS campaign in the two districts. AIRS Rwanda based the selection on data from insecticide susceptibility assays in 2014-2015. The susceptibility assays showed that the predominant local vector species (i.e. *Anopheles gambiae*) exhibited varying levels of susceptibility to the different classes of insecticides. Within the carbamate class, the local vector species in the IRS target districts sites showed between 94% and 100% mortality rates.

In addition, the Rwanda IRM⁵ plan states that in a bid to manage the development of insecticide resistance, specifically pyrethroid resistance, AIRS Rwanda will spray in a phased transition to a carbamate for two years followed by a phased transition to organophosphate (pirimiphos methyl, Actellic CS) for two years. Rotation would be the main strategy in the mid-term of four years with a hope that IRS would graduate from sector-wide spraying to focalized cell-level spraying by 2017. A switch to carbamates began in September 2013 in only one district. AIRS Rwanda fully implemented use of carbamate in all IRS districts starting February 2014 and continued in the subsequent IRS campaigns, including the February 2016 IRS campaign. (See Annex 1, MoH Letter on Insecticide Choice for 2013/2014, dated March 22, 2013, and Annex 2, Insecticide Resistance Tests Results).

⁵ Rwanda Strategic Plan for Insecticide Resistance Management in Malaria Vectors (2013–2017)

2.4 LOGISTICS NEEDS AND PROCUREMENT

The central AIRS Rwanda warehouse at the Kicukiro Small Scale Industrial area in Kigali served as the hub for storage of IRS commodities, including housing insecticides before distribution to the target districts. AIRS Rwanda reviewed the inventory records from the previous IRS campaign and assessed logistics needs in November-December 2015, reviewing the following:

- Available stock of materials, consumables, and equipment
- Transport arrangements, including vehicle hiring for spray operations and supervision
- Estimate of insecticide, PPE, and spray equipment required to meet the needs of spraying
- Mobilization and distribution of equipment, materials, and supplies (see Annex 3)

2.4.1 INTERNATIONAL PROCUREMENT

Internationally procured commodities included 122,040 sachets of carbamate insecticide (Ficam VC 80 WP) from Bayer and other IRS commodities. Table 4 shows the items and quantities AIRS Rwanda procured internationally.

TABLE 4: INTERNATIONAL PURCHASES

Description	Quantity in Stock Before Campaign	Quantity Received	Total Quantity	Quantity Used	Quantity in Stock after the Campaign
Insecticide	5,753	122,040	127,793	123,214	4,579 ⁶
Dust Mask	14,919	21,840	36,759	27,879	8,880
First Aid Kits	70	34	104	100	4
Gloves	2,689	684	3,373	488	2,885
Nozzle body	6	173	179	0	179
Valve body cap	75	175	250	1	249
Footrest	0	100	100	0	100
Shoulder strap	88	60	148	15	133
USAID/PMI – (logo)	0	1,682	1,682	1,556	126
Lance	0	100	100	96	4
Pressure gauge	14	100	114	66	48
Gaskets, simplex cover	30	100	130	0	130

⁶ PMI directed AIRS Rwanda to donate all the insecticide that remained to MOPDD; this was used to spray Gatunda Sector of Nyagatare District.

2.4.2 LOCAL PROCUREMENT

Local procurement involved an open competitive tendering process in which AIRS Rwanda issued a solicitation for quotes for services and materials. The AIRS Rwanda procurement committee based its selection on the lowest cost and technically acceptable bid according to the criteria in the solicitation for the quotations. The services/items procured locally included the following.

- Transportation services for IRS planning, operations, and supervision
- Printed materials for IEC, IRS data collection, and commodity tracking
- Operation site refurbishment materials, including materials for soak pits
- Food vendors for SOP breakfasts and training

Please see Annex 3 for the detailed list.

2.4.3 MATERIAL DISTRIBUTION TO THE DISTRICTS AND OPERATION SITES

AIRS Rwanda retained IRS materials such as coveralls, boots, helmets, gloves, masks, and pumps in district storage facilities. AIRS Rwanda distributed other items such as respiratory masks and gloves from the central warehouse to all district stores in January 2016 and distributed insecticide in February 2016. AIRS Rwanda based distribution of other materials to the operation sites on the number of target structures to spray and the number of support staff (see Table 5).

TABLE 5: IRS COMMODITY DISTRIBUTION TO DISTRICT STORES

District	Coveralls	Boots	Helmets	Respiratory Masks	Carbamate Sachets	Pumps
Kirehe	1,834	835	781	17,250	72,840	757
Nyagatare	1,340	608	602	13,119	54,953	558
Total	3,174	1,443	1,383	30,369	127,793	1,315

2.5 HUMAN RESOURCE REQUIREMENTS

The project recruited and deployed 170 support staff, who provided support during the IRS operations in the two districts. Seasonal staff comprised: two district IEC assistants, 16 data clerks, two district storekeepers, 25 sector store keepers, three logistics assistants, two pump technicians, three finance assistants, 25 sector coordinators, 64 sector supervisors, 26 sector IEC assistants, and two office cleaners.

The staff that implemented IRS operations in the sectors included 956 spray operators, 240 TLs, 89 washers, 128 cell IEC mobilizers, and 1,893 village IEC mobilizers. Fifty-two security guards provided IRS support at the sector level. AIRS Rwanda recruited staffs at the district level with assistance from local authorities and health centers, including the District Vice-Mayors, District Health Directors, Sector authorities, and Health Center Chiefs. Females comprised 28.0% (n=989) of the 3,528 people AIRS Rwanda hired as seasonal staff. More than half of hired SOPs (57.1 %) were female. Of the 240 TLs, 48.8% were women. Table 6 enumerates the IRS seasonal support staff by gender and district. In September 2015, 27.3% (n=1,468) of all seasonal staff were females, and (57.2 %) of spray operators and team leaders were female. The percentage of females among spray operators is high relative to other cadres of seasonal staff because spray operators come from the community health workers (CHWs) pool at the village level. The composition of the CHWs is such that in each village there are three CHWs and two of them are females.

TABLE 6: SEASONAL IRS STAFF HIRED

Staff Position	Total		% Females Hired
	Male	Female	
District IEC Assistants	1	1	50%
Data Clerks	8	8	50%
District Storekeepers	1	1	50%
Sector Storekeepers	12	13	52%
Logistics Assistants	1	2	67%
Finance Assistants	1	2	67%
Sector Coordinators	18	7	28%
Sector Supervisors	35	29	45%
Sectors IEC Assistants	16	10	38%
Spray Operators	410	546	57%
Team Leaders	123	117	49%
Cell IEC Mobilizers	83	45	35%
Village IEC Mobilizers	1,741	152	8%
Security Guards	52	0	0%
Washers	34	55	62%
Pump Technicians	2	0	0%
Cleaners	1	1	50%
Total	2,539	989	28%

2.6 IRS TRAINING

Before commencement of IRS activities, a team of Abt staff members in collaboration with MOPDD reviewed and updated the IRS training manuals and materials, including data forms, supervision checklists, and the IRS structure cards. In addition, Abt and MOPDD identified training sites and external trainers in advance of the training, which covered the following key topics:

- Introduction to malaria control
- IRS planning and logistics management
- Spray techniques and processes
- Environmental compliance and personal safety
- Advocacy and social mobilization
- IRS monitoring and evaluation
- Supervision of IRS activities
- Gender in IRS
- m-Health

2.6.1 TRAINING OF TRAINERS

AIRS Rwanda organized and conducted a five-day refresher training of trainers (ToT) in collaboration with MOPDD on January 25-29, 2016. MOPDD did the official opening of the ToT and facilitated some of the sessions, including introduction to malaria control and management of adverse effects. Since most participants had gone through the ToT during the September 2015 and other past IRS rounds, the ToT's main aim was to refresh the participants' skills and knowledge of IRS. During the February 2016 spray campaign, AIRS Rwanda increased the number of training days of ToT to five from the three in past IRS campaigns. During the ToT, AIRS Rwanda emphasized spray techniques and other areas that required improvement such as supervision and monitoring of IRS operations. A session on mobile phone supervision highlighted m-Health functionalities such as daily reporting for performance monitoring tracking (PMT) and mobile application supervisory checklists.

Moreover, the ToT incorporated a new session of team leader training to equip participants on: a) how to facilitate team leader trainings at sector levels, especially on supervision of spray techniques, b) team leadership skills, c) how to use the Home Owner Preparation and Spray Operator Performance checklist in managing the performance of the Spray Team, and d) how to provide feedback to the spray operators after supervision.

The training consisted of both theory and practical sessions, including group discussions, demonstrations, lectures, and question-and-answer methods. The participants included 25 IRS sector coordinators and 80 IRS sector supervisors. After the ToT, the participants went to different training sites in the IRS target districts to conduct IRS training for SOPs and TLs. AIRS Rwanda based the number of trainers deployed to each of the training sites on the number of training participants at each training site. The number of trainers is shown in Table 7.

TABLE 7: NUMBER OF TOT PARTICIPANTS, BY GENDER

IRS Role	Number of Participants		Total
	Male	Female	
Sector Coordinators	18	7	25
Sector Supervisors	45	35	80
Total	63	42	105

FIGURE 2: IRS TOT PRACTICAL TRAINING SESSION



2.6.2 SPRAY OPERATOR AND TEAM LEADER TRAINING

AIRS Rwanda organized and conducted the SOP and TL training in close collaboration with district and sector authorities for five days during the period February 8-12, 2016. In the two target districts, sector authorities provided or Abt rented training sites. Abt rented three training venues in Nyagatare district (Rukomo, Mimuri, and Nyagatare). Sector authorities provided all other 18 training venues for free. The major objective of the training was to equip the SOPs and TLs with the skills to conduct quality IRS.

Before training, all the SOPs and TLs went through a medical examination in their respective district hospitals to ensure that they were medically and physically fit to perform IRS activities. The hospitals screened all females for pregnancy. These workers included SOPs, TLs, storekeepers, sector supervisors, and sector coordinators.

Two women were found pregnant during training in Rukomo and Nyagatare sectors of Nyagatare district. AIRS Rwanda assigned them to cell IEC mobilizer positions, which don't expose them to insecticide.

In addition, the SOPs and TLs had to meet the selection criteria to be eligible for training and IRS operations. The selection criteria required an SOP or TL to be:

- A resident of the sector
- A CHW
- Able to read and write
- Below 40 years of age

The SOPs and TLs attended intensive five-day theory and practical sessions (see Annex 5), which covered:

- Introduction to malaria control
- Spray techniques
- Handling and managing insecticides
- Handling and maintaining spray pumps
- Personal and environmental safety
- Data collection and filling out data collection forms
- Basics of IEC for IRS

AIRS Rwanda trained 1,246 SOPs and TLs. Details are in Table 7. One hundred fifteen facilitators (ToT participants) conducted the training. See Annex 4 for a detailed SOP program.

TABLE 8: NUMBER OF SPRAY OPERATORS AND TEAM LEADERS TRAINED TO IMPLEMENT IRS

District	Training Sites	Spray Operators Newly Trained			Spray Operators Previously Trained			Facilitators		
		Male	Female	% Female	Male	Female	% Female	Male	Female	% Female
Nyagatare	9	68	118	63.4%	143	198	58.1%	27	19	41.3%
Kirehe	12	59	84	58.7%	281	295	51.2%	42	27	39.1%
Total	21	127	202	61.4%	424	493	53.8%	69	46	40.0%
		329 (26.4%)			917 (73.6%)			115		

2.6.3 TEAM LEADER TRAINING

During February 2016 spray campaign, AIRS Rwanda conducted a one-day training for team leaders on February 13th, 2016 in all operational sites. The main objective of the training was to build the capacity and skills of spray TLs in their supervisory role.

Sector coordinators and supervisors who received training during the ToT sessions facilitated the TL training. The team leader training covered the following key topics:

- Spray team leader responsibilities
- Giving and receiving constructive feedback
- Using the Home Owner Preparation and Spray Operator Performance checklist in managing the performance of the spray team
- Data Collection and Reporting

AIRS Rwanda trained 240 spray TLs in the two IRS target districts. Below is the summary of team leaders trained:

TABLE 9: NUMBER OF TEAM LEADERS TRAINED, BY GENDER

District	Male	Female	Total
Nyagatare	49	52	101
Kirehe	74	65	139
Total	123	117	240

2.6.4 DATA COLLECTION TRAINING

Between January and February 2016, the AIRS Rwanda team, led by the M&E and Database Managers, facilitated data collection training sessions during the ToT for sector coordinators, supervisors, and sector IEC assistants. They also facilitated the data collection training for SOPs, TLs, IEC mobilizers and data entry clerks. The training focused on the following key topics:

- Familiarity with data collection forms (SOP and TL forms, IEC-village and cell-mobilizer forms) and the AIRS Supervisory Toolkit
- Understanding key IRS definitions (e.g. eligible structure) and indicators
- Supervisory roles and responsibilities
- Reviewing collected data and spotting irregularities
- Timely, consistent, and accurate reporting
- Setting appropriate and realistic reporting timelines
- Establishing backup reporting/ communication protocols
- AIRS database and security protocols
- Data Quality Assurance and Control
- House marking for IRS operations
- Mobile data collection and reporting

2.6.5 LOGISTICS TRAINING

AIRS Rwanda trained all the staff who would be involved in logistics and storekeeping during the IRS implementation. Sector coordinators, sector supervisors, and IEC assistants received basic skills in logistics and store management during the ToT sessions. AIRS Rwanda conducted a comprehensive, two-day training for 34 logistics assistants and storekeepers (14 males and 20 females). AIRS Rwanda trained participants on the following topics:

- Individual roles and responsibilities in logistics
- Warehouse and commodity management
- Store management record keeping
- IRS transportation management
- Management of food vendors
- IRS water management for cleaning PPE and progressive rinsing
- Soak pit management
- Environmental compliance
- Understanding and preparing for post IRS activities

2.6.6 WASHER TRAINING

Before the commencement of IRS operations, AIRS Rwanda gave 89 washers a one-day refresher training/orientation at the 25 operational sites in the two IRS districts. Sector coordinators, sector supervisors and sector storekeepers managed the refresher training at their respective operational sites. The washers received instruction on the use of PPE, washing insecticide contaminated PPE, soak pit maintenance, effluent waste disposal, and the effects of insecticide on humans and the environment. They also received advice on how to respond to insecticide side effects they might experience. Table 10 shows the number of washers AIRS Rwanda trained by gender per district.

TABLE 10: WASHERS TRAINED BY GENDER PER DISTRICT

District	Male	Female	% Females
Nyagatare	9	28	75.7%
Kirehe	25	27	51.9%
Total	34	55	61.8%

2.6.7 FIRE AND TRANSPORTATION SECURITY TRAINING

Fifty-two security guards received orientation on fire security and a general security protocol for IRS stores. Seventy-seven IRS drivers received orientation on safety procedures while transporting insecticides and the use of first aid kits. They also received training on measures to take:

- While transporting spray operators to and from the field
- In case an accident occurred, leading to an insecticide spill

3. INFORMATION, EDUCATION AND COMMUNICATION

To ensure effective community mobilization, AIRS Rwanda collaborated with the MOPDD and district and sector authorities to train implementers and use diverse approaches and channels of communication to sensitize and mobilize communities.

3.1 TRAINING

3.1.1 TRAINING OF TRAINERS

AIRS Rwanda collaborated with the MOPDD to conduct a one-day ToT on mobilization in Kigali on January 29, 2016. The main objectives of the training were to strengthen participants' knowledge and capacity to train and disseminate IEC and behavior change communication (BCC) messages to IEC community mobilizers and to plan, coordinate, and supervise IEC IRS activities. The training included both theory and practical sessions, among which were mock sessions to practice IRS mobilization and filling of data collection tools. The trainees also received training on how to develop and update a community mobilization plan.

During the ToT, the MOPDD facilitated the following sessions: introduction to malaria; malaria prevention and control interventions; malaria burden in Rwanda; and mosquito characteristics. The trainees included the District IEC Assistants, Sector IEC Assistants, Sector Supervisors, and Sector Coordinators. They received training on how to conduct training of IEC mobilizers at the cell and village level and how to coordinate and supervise all IEC/IRS activities. A total of 133 candidates (80 males and 53 females) participated in this training. They included two District IEC Assistants, 26 Sector IEC Assistants, 25 Sector Coordinators, and 80 Sector Supervisors.

3.1.2 TRAINING OF IEC COMMUNITY MOBILIZERS

AIRS Rwanda trained IEC mobilizers on February 3-4, 2016 in Kirehe and Nyagatare districts in designated training sites in the sectors. The trainees were village and cell leaders whom AIRS Rwanda recruit based on the following criteria: a cell or village leader and/or in charge of security at the village level, good conduct, respectable, able to read and write, and known by the community. Sector IEC Assistants, Sector Coordinators, and Sector Supervisors facilitated the sector-level training. District IEC Assistants and AIRS Rwanda staff provided overall coordination. AIRS Rwanda trained the IEC mobilizers on the basics of malaria control and IRS and how to:

- Identify eligible structures for IRS in the two targeted districts
- Promote understanding and acceptance of IRS by educating the community about the purpose of the IRS campaign
- Inform beneficiaries about the benefits of IRS
- Address common myths and misconceptions about IRS

- Discuss with structure owners their role before, during, and after spray operations to ensure a safe and successful IRS campaign
- Create a more long-term or sustainable awareness of the program by involving and engaging key community stakeholders

AIRS Rwanda trained 2,021 mobilizers (197 females and 1,824 males) at the cell and village level. Each sector and cell team also developed an individual community mobilization implementation plan. Table 11 below shows the number of mobilizers AIRS Rwanda trained by district.

TABLE 11: NUMBER OF IEC MOBILIZERS TRAINED TO IMPLEMENT IRS

District	Number of IEC Mobilizers Trained				TOTAL	% Females Trained
	Cell		Village			
	Male	Female	Male	Female		
Kirehe	34	26	1,098	105	1,263	10.4 %
Nyagatare	49	19	643	47	758	8.7 %
TOTAL	83	45	1,741	152	2,021	9.7 %

3.2 DOOR-TO-DOOR MOBILIZATION

AIRS Rwanda conducted door-to-door mobilization of structures for two days in each village from February 12-March 09, 2016. During this exercise, village mobilizers reached eligible structures with IRS messages and distributed IRS structure cards to those who lost or never received IRS cards. They also collected data using the IEC mobilizer form and communicated the dates of spraying to the structure owners. They marked the outside doors of the mobilized structures with the IRS structure number found on the IRS card issued to that structure. AIRS Rwanda mobilized 161,645 structures with a 96.3% IRS acceptance rate recorded. Table 12 shows the results of the mobilization activity during the IRS spray round. Sector IEC Assistants, with support from the Sector and Cell Social Affairs Officers, oversaw the implementation of this activity. They also reviewed the data collected and IRS cards issued to the structures to ensure data accuracy and completeness (Figure 3).

FIGURE 3: MOBILIZATION



TABLE 12: RESULTS OF IRS MOBILIZATION

District	Structures Sensitized	Adults Reached with IRS Messages		Structures Accepting IRS	% Structures Accepting IRS
		Male	Female		
Nyagatare	72,638	69,097	80,799	67,697	93.2%
Kirehe	89,007	85,691	104,481	87,947	98.8 %
TOTAL	161,645	154,788	185,280	155,644	96.3 %

3.3 IEC COORDINATION

During the entire period of spraying, local leaders at all levels readily provided support. Sector executives and social affairs officers were instrumental in linking spray operations teams to target communities. Each of the IRS districts had a district IEC staff member who coordinated and supervised district IEC activities. They worked closely with the District Vice-Mayors in charge of social affairs and district health officers to supervise the district IEC activities. Sector IEC staff worked closely with sector and cell social affairs and sector coordinators to supervise the sector IEC activities. The Sector IEC supervisors issued the village mobilizers the materials (structure cards and IEC data collection tools) a day before the mobilization date of the village. The supervision team ensured that the cell and village mobilizers mobilized all eligible structures, that mobilizers informed structure owners about the date of spraying at least a day in advance, and that the data collected by mobilizers was accurate. IEC teams worked according to the updated IRS schedule each day.

On the actual spraying date, the IEC mobilizers worked with SOPs to give directions to the mobilized structures, facilitated the structure preparations by structure owners, and helped to convince the structure owners who were hesitant about IRS. The IEC mobilizers also noted structures that were not sprayed on the planned day and coordinated with SOPs to spray them the following day.

3.4 OTHER IEC ACTIVITIES

3.4.1 COMMUNITY MOBILIZATION BY LOCAL LEADERS

Local leaders actively participated in mobilization activities. This was due to early advocacy and engagement from both Abt and the MOPDD. The sector executive secretaries, social affairs officers, and CHWs' chief at the health centers supervised the IRS activities and occasionally led IRS teams to mobilize the community, especially in cases where the communities tended to resist. The cell social affairs officers supervised the mobilization activities in their respective cells.

3.4.2 MONTHLY COMMUNITY WORK (UMUGANDA)

In Rwanda, there is a mandatory community service day from 8:00am to 11:00am on the last Saturday of each month called "Umuganda," meaning community service. It is a day of contribution and building the country by citizens themselves. By law, all able-bodied persons above the age of 18 and below 65 are expected to participate in volunteer community work. During the spray campaign period, Umuganda occurred on February 27, 2016.

AIRS collaborated with the local leaders to include IRS as part of the Umuganda agenda to sensitize the community on the ongoing IRS activities. The IRS district and sector support teams participated in Umuganda at various sites. They shared IRS messages with the community through the local authorities, specifically the cell and village leaders who are also the IEC mobilizers for IRS. The main message was to encourage community members to embrace IRS and open their houses for the spray operators to spray them. The District Vice-Mayors (Social Affairs) and Sector Executive secretaries helped deliver the IRS message to the population in the IRS districts in addition to mobilizing leaders in their areas of jurisdiction to participate in IRS supervision. In some sectors where community members were unlikely to open their structures for spraying, leaders made arrangements with the community to conduct IRS as their Umuganda day activity.

3.4.3 MASS MEDIA COMMUNICATION

Radio spots aired twice daily from February 11-24, 2016, in Kirehe and Nyagatare districts. The key messages during the radio spots were the importance of IRS in the fight against malaria, the IRS campaign dates, the role of the community in IRS activities (before, during, and after spraying), adverse-effects management, and information on the funding agency. In addition, Kirehe district conducted a radio talk show about the IRS campaign in the district. The radio talk show highlighted the progress of spray operations in Kirehe district, feedback from the community on IRS acceptance, and challenges throughout the campaign. During the talk show, community members called in to express their appreciation and ask questions about IRS.

Mass media communication also included 27 banners at two IRS district offices and at 25 sector administrative offices. The message on the banners was “*Birakureba*” (Kinyarwanda for “This concerns you”). Table 13 presents details of the mass media communication activities during the IRS operations.

TABLE 13: MASS MEDIA COMMUNICATION ACTIVITIES

Dates	Type of IEC Activity/Material	Frequency/Number Produced
February 11 - 24, 2016	Radio spots aired twice daily for each radio station	28 times on Radio Nyagatare station, Nyagatare; and, 28 times on Rwanda Broadcasting Agency (RBA) in Kirehe district.
February 3 - March 09, 2016	IRS Banner	One banner at each IRS district office and one at each sector administrative office
February 27, 2016	Umuganda	One meeting in every sector
March 2, 2016	Radio Talk Show	One radio talk show held in Kirehe district

4. IMPLEMENTATION OF IRS ACTIVITIES

The February 2016 IRS campaign was the 15th round of IRS implementation since the start of IRS campaigns in 2007. AIRS Rwanda conducted it over a 20-day period from February 15-March 9 in Kirehe and Nyagatare districts. On day one of the spray operations, AIRS Rwanda in collaboration with the authorities in the two districts launched IRS in a selected sector in each of the two districts.

4.1 IRS SUPERVISION

A team from Abt, the MOH/MOPDD, PMI, and local authorities at both the district and sector levels supervised IRS. During the IRS campaign, the team ensures supervision of the spray operations at all levels. To achieve this, the team set up a structure such that:

- SOPs were in teams of four., with one TL supervising each team
- A sector supervisor supervised four teams. Supervisors reported directly to the sector coordinator, who in turn reported to the district coordinator
- In each district, a full-time AIRS Rwanda staff member helped the AIRS District coordinator coordinate routine daily supervision by working closely with the district staff and all other supervisors (from AIRS Rwanda and other stakeholders). At least five AIRS staff, in addition to the district coordinators, worked in the field Monday through Thursday every week to provide supportive supervision to the district staff
- The MOPDD appointed three staff in the two IRS target districts to work closely with the AIRS Rwanda district coordinator and other supervisors in the field during spray operations
- AIRS Rwanda put in place a supervision plan to ensure consistency and coordination of supervision and proper follow-up of corrective measures to improve spray operations performance
- Local government officers (sector social affairs officers in charge of CHWs at both district hospitals and health centers, M&E officers at district hospitals, and district health environmental officers) dedicated two days each week to IRS supervision. The District Vice-Mayors and Sector Executive secretaries occasionally visited the teams in the field to supervise operations
- Supervision checklists augmented supervision. The checklists (see Annex 4), are tools to assess the daily performance of SOPs and TLs, adherence to environmental compliance requirements, data collection, and data entry. In addition, during supervision in the field, all supervisors in all target districts and sectors used m-Health e-checklists on mobile phones, which comprised all environmental checklists. This promoted real time tracking and addressing of issues supervisors observed during spray operations
- All of the operational sites used the Performance Tracking Sheet on a daily basis. At the end of each spray day, sector coordinators submitted summary data from the performance tracking sheet to District coordinators. They in turn compiled the data, updated the district Performance Tracking Sheet, and submitted a daily report to the central level (AIRS Rwanda management and the MOPDD IRS focal point). This daily report comprised the district

performance data for that day, the data for all past days, the challenges experienced in the day, and how the team resolved them

- AIRS Rwanda held regular meetings at all levels (national, district, and sector) to review the progress of IRS and check on implementation of recommendations reached during the operations

Table 14 summarizes the institutions/stakeholders that participated in supervision.

TABLE 14: INSTITUTIONS/ STAKEHOLDERS THAT PARTICIPATED IN IRS SUPERVISION

Level	Institution	Responsibilities
National Level	MOH/MOPDD/Rwanda Biomedical Center (RBC), USAID/CDC/PMI AIRS Rwanda	Overall supervision for IRS activities
District and Sector Level (Local Authorities)	District Vice-Mayor/Social Affairs District Health Director District Environmental Health Officer Hospital Director M&E Officer at District Hospital In charge of CHW's at District Hospital Sector Executive secretaries Sector Social Affairs In charge of CHW's at Health Centers	Close supervision in districts and environmental protection

As part of supervision activities, AIRS Rwanda supervisors convened at the Kigali office every Friday during the IRS operations period for a feedback meeting and to review the progress of IRS activities. Staff from the MOPDD occasionally joined AIRS Rwanda staff during progress review meetings. During these interactions, MOPDD representatives and the AIRS Rwanda team discussed the issues at hand and provided guidance to the district coordinators and the teams in the field.

4.2 M-HEALTH

During the February 2016 spray campaign, AIRS Rwanda implemented the m-Health system to gain faster access to daily data on spray operations and improve supervisory efforts by different levels of IRS supervisors.

AIRS Rwanda continued to use the three-part mobile system that Dimagi LLC helped develop during the September 2015 IRS campaign to support management of the spray campaign. In the past IRS campaigns, the project reported all data in the field using paper forms, and supervisors used paper checklists to conduct supervision. Reporting and follow-up of issues encountered in the field took up to three days. The use of m-Health for reporting and supervision sped up the process, enabling same-day reporting of issues and immediate follow-up. It was easy to track progress and rectify issues as they came up in the field. The AIRS Rwanda IT Specialist who worked remotely with a consultant from Dimagi could update CommCare application configuration on phones as needed.

Before the start of the February 2016 spray operations, AIRS Rwanda deployed 18 mobile phones in Kirehe and 15 phones in Nyagatare. The team used a gateway phone at the central level to receive data from all sectors and synchronize all data to the Dimagi server.

AIRS Rwanda used the mobile phones for three major functions;

Reporting: During spray operations, all sector coordinators sent daily reports on four operational indicators to the gateway phone. The gateway phone would then send the data to the Dimagi server for processing and storage. The indicators included the total number of SOPs who worked, the total number of structures they found, the total number of structures they sprayed, and the total number of insecticide sachets they used.

Supervision: Sector coordinators and supervisors used checklists in the mobile phones on a daily basis to supervise spray operations, including environmental compliance. At the end of each day, supervisors submitted completed supervisory forms to the CommCare system. The CommCare system then sent the submitted reports to both the country-level staff and AIRS home office staff. The reports helped address gaps were noted during supervision or red flag issues for immediate action as required.

Job aids messaging: All seasonal workers received different daily job aid messages on spray operations and gender issues. These messages regularly reminded the seasonal staff of important IRS messages, which in turn led to increased awareness of SOPs and better quality of spraying. (See Annex 5 for Job aid messages that went to seasonal staff.)

The mobile phone application for reporting and supervision of IRS operations added value to the operations. AIRS Rwanda soled a few problematic areas during the September 2015 spray campaign. For instance, during the February spray operations, the system improved so that we could receive daily supervisory reports with and without red flags as opposed to the previous spray campaign, when we received supervisory reports with red flags only.

4.3 LOGISTICS

4.3.1 IRS STORAGE AND INSECTICIDE STOCK MANAGEMENT

District level storage facilities served as distribution centers for IRS materials, equipment, and supplies for IRS operations. A logistics assistant and a storekeeper managed each of the district storage facilities and ensured distribution and close supervision of supplies and materials. There were 25 storage facilities at the operation sites in the two districts, 22 of which the district/sector provided at the sector offices free of charge as an in-kind contribution to the IRS campaign. AIRS Rwanda rented three storage facilities in Nyagatare District at locations near the sector offices. With construction ongoing in the districts, AIRS Rwanda will continue to negotiate with the sector authorities for provision of storage facilities for free. Each Sector Storekeeper was in charge of storage management at the sector level with oversight from the District Logistics Assistant and Storekeeper.

AIRS Rwanda carefully tracked insecticide, other materials, and equipment stocks from the central warehouse to the district storage facility and subsequently to the operation sites' storage facilities. The team tracked empty insecticide sachets daily at the sector and district stores. Storekeepers accounted for them by recording how many insecticide sachets each spray operator, team, or sector had received and used. They documented stock records on stock cards and commodity ledger books.

4.3.2 IRS VEHICLES

AIRS Rwanda contracted 77 vehicles for the support of the IRS operations in the two districts. AIRS Rwanda managed the two vehicles in such a way that the teams used 77 vehicles for SOPs' transportation during the first 18 days of the spray campaign and reduced the number to 55 during the last two days. This is because in the last two days of operations, most teams worked in villages near the operation sites and could walk to the villages; otherwise, vehicles did two trips from the operation sites to the villages to drop off the SOPs since the distances are relatively short. This strategy gave us total cost saving of US\$4,200. Table 15 shows the number of vehicles assigned to each district.

TABLE 15: DISTRIBUTION OF VEHICLES IN THE DISTRICTS

District	First 18 days			Last 2 days		
	Vehicles for SOPs	Vehicles for Supervision	Total	Vehicles for SOPs	Vehicles for Supervision	Total
Kirehe	42	2	44	28	2	30
Nyagatare	31	2	33	23	2	25
Total	73	4	77	51	4	55

4.4 IRS PAYMENTS

Before the start of the spray operations, AIRS Rwanda conducted a one-day refresher training to bring together the three Finance Assistants. The participants received briefings on responsibilities to ensure efficient management of funds and facilitation of logistical support. Their responsibilities included:

- Distribution and collection of signed contracts from all the seasonal staff (SOPs, TLs, washers, security guards, and mobilizers)
- Collection of all timesheets for seasonal staff before preparing payrolls
- Preparation of payrolls the District Coordinator approved and submitted based on the schedule of payments the Finance Manager created at the start of the IRS campaign
- Follow up with the Savings and Credit Cooperatives (SACCO) banks (Microfinance Banks) to ensure that all the seasonal staff received their payments and signed the payroll
- Collection of invoices from food vendors and sending them to the AIRS Rwanda finance office for payments
- Collection and reconciling of IRS vehicle logs sheets

AIRS Rwanda paid IRS support staff at the district level through their bank accounts by electronic transfer. AIRS Rwanda paid other seasonal staffs at the sector level, including SOPs, TLs, mobilizers, washers, and security guards, by transfer of funds to SACCO micro finance institutions in each sector. AIRS Rwanda and SACCO established an agreement for this service. After each payment, a copy of payroll signed by recipients was returned to the AIRS main office in Kigali as proof of payment.

5. POST-SEASON ACTIVITIES

5.1 POST SEASON REVIEW MEETINGS

AIRS Rwanda conducted IRS evaluation/review meetings at the district level to:

- Review the overall IRS programmatic implementation process for the February 2016 spray round and experiences and achievements of the IRS round
- Review IRS challenges in the two IRS target districts and come up with recommendations for the next spray cycle
- Reach a consensus on the recommendations and way forward for future spray campaigns

District authorities in collaboration with the AIRS Rwanda district teams convened the review meetings. The aim of these meetings was to review the implementation of the IRS operations at the district level and to share experiences, challenges, and lessons learned to generate ideas on improving future spray operations. The following categories of people attended these meetings:

- District and Sector Authorities, including Army and Police Commanders in the district
- Hospitals and health centers
- MOH/MOPDD representatives
- AIRS Rwanda staff

The number of participants who attended the review meetings is shown in Table 16.

TABLE 16: EVALUATION MEETINGS PARTICIPANTS

District	Review Meeting Dates	Participants		Total
		Male	Female	
Kirehe	March 18, 2016	27	16	43
Nyagatare	March 17, 2016	31	14	45
Total		58	30	88

The recommendations from the review meetings included:

- The district/ sector authorities should enhance oversight of the recruitment process of SOPs to limit recruitment to CHWs with previous IRS experience and to make sure recruitment strictly adheres to all criteria the MOH sets
- Agreement on a plan for improved recruitment of SOPs whereby the President in-charge of CHWs at the sector takes overall responsibility for recruiting, the health facility in-charge (Sector Social Affairs) verifies the list, and the Sector Executive Officer signs off on the final list

- The sector and district IRS support staff should coordinate closely with the Sector authorities to avoid disruption of IRS activities without sufficient notice. For instance, spray operations and village mobilizers in Matimba and Nyagatare sectors of Nyagatare District missed a spray day to attend the International Women’s Day, which was scheduled on a spray day
- The district hospitals and AIRS Rwanda should meet to discuss improving the medical checkup exercise of CHWs
- District and sector authorities should take special measures to address IRS refusals in the peri-urban areas such as trade centers, especially in Nyagatare sector of Nyagatare district and Kirehe and Kigina sectors of Kirehe district

5.2 INVENTORY

Following completion of IRS operations, AIRS Rwanda transported all of the commodities at the sector stores to the district stores. The sector storekeepers updated their stock records and handed them over to the district storekeepers/logistics assistants. At the district stores, storekeepers updated stock records to show the remaining stock, including the commodities that were retrieved from the sector stores. Storekeepers updated the district inventories accordingly. See Annex 6 for IRS commodities stock.

6. MONITORING AND EVALUATION

Monitoring and evaluation for the February 2016 IRS campaign closely followed the processes in the annual AIRS Rwanda Work Plans and the AIRS M&E Concept Paper the AIRS Home Office team developed.

6.1 KEY OBJECTIVES

The key objectives of AIRS Rwanda M&E activities are:

- To emphasize accuracy of both the data collection and data entry processes through comprehensive training and supervision at all levels
- To streamline and standardize data flow, minimize error, and facilitate timely reporting
- To ensure IRS data security and storage for future reference through the establishment and enforcement of proper protocols
- To document lessons learned and good practices observed in the implementation of the project activities and apply to future project years

6.2 DATA MANAGEMENT

AIRS Rwanda incorporated all AIRS M&E protocol updates, including enhancements to the data collection tools, before the start of mobilization and spray to ensure the collection, management, and reporting of high-quality data. The database served as a tool for implementation and management by tracking key performance and output indicators. The database helped M&E and technical staff members produce real-time reports for quick feedback. The database also helped reconcile and prevent additional errors in data collection and entry through programmed audit checks and other data quality assurance measures.

Spray operators collected spray data, which team leaders and supervisors verified and transmitted to the data centers for entry. Data clerks performed a final verification of spray form data and arithmetic before entering the data into the database. At the end of each day, the Database and M&E Managers reviewed the data entered for anomalies and addressed issues with data center staff. For quality control purposes and timely generation of weekly client spray progress reports, data clerks entered all data within 48 hours of spraying. They filed and archived daily spray operator and IEC/mobilizer forms at each data center. Data clerks performed a daily electronic back-up to the AIRS Rwanda server and to an external hard drive for data safety and storage.

6.2.1 DATABASE PREPARATION

The AIRS Rwanda M&E team performed the following activities in preparation for the spray campaign:

- Reviewed the database based on challenges and lessons learned from the last spray campaign to make sure that data quality assurance and control of IRS data are upheld at all levels
- Ensured IRS data security and storage for future reference through establishment and enforcement of proper protocols
- Streamlined and standardized data information flow to minimize errors and facilitate timely reporting
- Emphasized accuracy of both the data collection/verification and the data entry process through comprehensive training and supervision at all levels
- Recruited and trained data clerks in data entry and data management
- Facilitated training of data entry clerks, data cleaners, and M&E Assistants on the database

Spray coverage was calculated with details data and is based on the total number of structures sprayed (numerator) divided by structures found by spray operators (denominator). A final count of “structures found” from the last spray campaign served as targets for tracking spray progress and performance at the sector- and district-levels.

6.3 DATA QUALITY ASSURANCE AND CONTROL

During the February 2016 spray round, AIRS Rwanda used the AIRS M&E Supervisory Toolkit, which consists of the following two tools to standardize and improve IRS supervision:

- Error Eliminator (EE) forms for mobilizer and spray data verify the completeness and correctness of data collected in the field. Every day during the spray campaign, TLs, sector supervisors and coordinators, district IEC Assistants and Coordinators, M&E Assistants, and Abt staff completed the EE for spray data. Also each day, cell IEC Supervisors, Sector IEC Assistants, District IEC Assistants, District Coordinators, M&E Assistants, and Abt staff completed the EE for mobilizer data.
- Data Collection Verification (DCV) forms check the accuracy of data collected by SOPs in the field. Supervisors used the DCV to ensure that the data written on the Daily Spray Operator Forms matched the information households reported. Supervisory staff (Sector Coordinators, District IEC Assistants, District Coordinators, M&E Assistants, and Abt staff) use this form to interview households a few days after spraying. During the February 2016 spray campaign, the AIRS team incorporated the DCV in the mHealth checklists in the smartphone. Data collected on the mHealth DCV was sent directly to the server. The reports generated by CommCare were submitted to the M&E manager and Assistants who then used the report to confirm if the data collected using DCV agreed with SOP structure data.
- Supervisory staff visited ~1,622 structures (~1.09 %) with the DCV and compared the data collected from the field with the DCV with data spray operators collected on the data collection forms. AIRS Rwanda staff addressed and rectified any discrepancies.

Table 17 shows the number of M&E forms AIRS Rwanda completed during the February 2016 spray operations, errors AIRS Rwanda found and measures the project took.

TABLE 17: NUMBER OF M&E FORMS COMPLETED, ERRORS FOUND AND MEASURES TAKEN

Type of Form	Number of Forms Completed	Common Errors Found	Action Taken
Error Eliminator for Spray Data	20,888	SOP and Team Leader forms where insecticide reported on forms didn't match with actual insecticide received.	The AIRS Rwanda team worked closely with the logistics team to use insecticide distribution cards and other logistics tools to crosscheck insecticide issued and returned. The team urged SOPs to indicate on the SOP forms the number of insecticide sachets they received immediately after they received them.
Error Eliminator for Mobilizer Data	3,173	Mobilizer forms without mobilizer codes. Errors in summations	AIRS Rwanda reminded Cell and Sector IEC's to make sure that they completely filled out all mobilizer forms well before submission to data centers. Advised sector IECs to verify all village IEC forms before submission to data centers.
DCV	1,622	Cases where the number of people residing in structures and rooms found mismatched on SOP forms. Some SOPs did not record 'found and not sprayed' structures on the SOP form	Corrections were immediately done in the database and SOP's were advised to report accurate data. The TLs were advised to diligently track all found structures (sprayed and unsprayed) by their teams during spraying and cross-check with SOP forms that all were recorded.

AIRS Rwanda staff performed data quality assurance measures daily during the IRS campaign. A variety of AIRS staff performed the function, including TLs, supervisors, sector coordinators, sector and district IEC Assistants, district coordinators, M&E Assistants, and Abt staff. We provide more detail below about the activities we performed to ensure high-quality data, including physical data verification (spray and mobilization), database quality control, and random spot checks.

6.3.1 DATABASE QUALITY CONTROL

As in previous spray campaigns, the Access database used programmed audit checks and data locks that prevent data clerks from incorrectly entering data. For this particular campaign, Abt's Client Technology Center (CTC) continued to use SQL Servers to centralize and connect data clerk computers and avoid duplicate entries at each data center. The SQL servers have the capacity and speed to process large amounts of data (more than 80,000 structures per data center). CTC reviewed the IRS cleaning/reporting tool to help data clerks clean and reconcile data. We hired sufficient data clerks this campaign to allow enough time for one clerk to use the IRS cleaning/reporting tool every day to clean data. As a result, we completed data cleaning one day after data entry of all spray data. The cleaning/reporting tool also enabled clerks to generate local reports for each district.

Finally, data clerks performed double-data entry, whereby they initially entered spray totals data or a summary of each daily spray operator form to produce real-time reporting of spray progress. Thereafter, they entered spray details data (i.e., line-by-line or structure-by-structure), which generated this End of Spray Report and all other client-submitted reports. During a thorough cleaning process using the IRS cleaning/reporting tool, AIRS Rwanda investigated and reconciled discrepancies between spray totals and details data before finalizing and reporting campaign results. AIRS Rwanda corrected the paper spray forms and the database, where necessary.

6.3.2 RANDOM SPOT CHECKS

The M&E and Database Managers performed daily data verification activities for the Access database to guarantee data quality. They scanned the database and ran spray progress reports to identify anomalies and data entry errors. In the event they found discrepancies between data collected and data entered that they could not reconcile at the data center level, the M&E Manager contacted the field supervisor for clarification to resolve the issue. At the end of every day, the M&E Assistant used IRS cleaner/reporter to identify data entry errors and provided corrections and feedback to the data clerks.

6.4 IRS RESULTS

During the spray campaign, 147,947 structures of the 150,818 structures found were sprayed, resulting in 98.1 % spray coverage. A total of 618,696 people were protected, including 10,256 pregnant women and 90,089 children under five (see Table 18).

TABLE 18: SUMMARY OF RWANDA IRS RESULTS FOR FEBRUARY 2016 CAMPAIGN

District	Total Structures Found	Total Structures Sprayed	Spray Coverage (%)	Total Population Protected			
				Male	Female	Pregnant Women	Children <5 Years
Kirehe	84,055	82,965	98.7%	164,271	177,125	5,668	47,882
Nyagatare	66,763	64,982	97.3%	134,948	142,352	4,588	42,207
Total	150,818	147,947	98.1%	299,219	319,477	10,256	90,089

The spray operations progressed at a higher pace than the planned pace. The major reason was that during the planning, AIRS Rwanda assumed that by week two there would be rain, which would slow the spray progress. This did not happen; the rain came in the last week.

6.4.1 SCHOOLS AND PRISONS IN IRS TARGET DISTRICTS⁷

During the February 2016 spray campaign, AIRS Rwanda sprayed 121 dormitories in 23 schools and three police stations in the two IRS target districts, protecting 6,354 people. AIRS Rwanda used 228 insecticide sachets (see Table 19).

⁷ Spraying of special structures such as dormitories in schools and prisons is reported only in the EOSR, not in the weekly spray progress reports sent to PMI.

TABLE 19: IRS RESULTS FOR SCHOOLS AND PRISONS IN IRS DISTRICTS

District	Targets for schools	# Targets for Dormitories	# Schools sprayed	# Police Stations Sprayed	# Dormitories sprayed	Population Protected				Found Rooms	Sprayed Rooms	Mosquito Nets Available	Insecticide Used
						Male	Female	Pregnant Women	Children < 5 years				
Kirehe	9	56	9	1	51	1,766	1,250	0	0	72	71	2,082	94
Nyagatare	15	30	15	2	70	1,603	1,735	0	1	192	180	1,871	134
Total	24	86	24	3	121	3,369	2,985	0	1	264	251	3,953	228

6.4.2 INSECTICIDE USAGE

The total number of sachets AIRS Rwanda used during the February 2016 campaign was 123,214 (122,986 plus 228 sachets for other structures and schools in the two target districts). On average, one sachet sprayed 1.2 structures (see Table 20). The average number of sachets a spray operator used per day was 7.1, and each operator, on average, sprayed 8.5 structures per day in the two target districts. The total number of leftover insecticide in stock after the end of the February 2016 spray campaign was 4,579 sachets. All 4,579 sachets of leftover Carbamate were donated to the MOPDD.

TABLE 20: INSECTICIDE USAGE

District	Total Structures Sprayed	Total Sachets Used	Average Number of Sachets per Sprayed Structure	Average Number of Sachets per SOP per Day	Number of Structures sprayed per day per SOP
Kirehe	82,965	69,432	1.2	7.2	8.7
Nyagatare	64,982	53,554	1.2	6.8	8.3
Total	147,947	122,986	1.2	7.1	8.5

7. ENVIRONMENTAL COMPLIANCE

7.1 ENVIRONMENTAL COMPLIANCE DOCUMENTATION

The 2011 SEA, which AIRS amended in 2013, is valid throughout 2016. A letter report, which AIRS Rwanda submitted in July 2015, highlighted the environmental compliance plan for the February 2016 IRS campaign and the choice of pesticides for IRS. It also reported on the preparations and readiness for the IRS campaign.

7.2 PRE-SEASON ENVIRONMENTAL ASSESSMENT

From February 8-12 2016, the AIRS Rwanda team conducted pre-spray environmental assessments in the two IRS districts at the operation sites at the sector level. AIRS Rwanda entered data on smartphones while at the field operational sites and submitted to a central database on an automated server at Abt's Bethesda office. The ECO generated a work list, which he instantly shared with the AIRS Rwanda Chief of Party (COP), Operations Manager, and the Environmental Compliance Officer to guide them on the actions to take to prepare the operation sites for IRS. The assessments involved identifying potentially compliant storage facilities, determining the suitability of soak pits from the previous IRS round, and siting locations for new soak pits. In total, AIRS Rwanda rented three storage facilities while sector authorities at the sector and cell office premises provided 22 facilities. Some of the stores required minor refurbishments, which generally included fixing double locks and reinforcing doors and windows. AIRS Rwanda cleared the soak pits of bushes that had grown in and around them; AIRS Rwanda added and compacted murrum in the wash area. AIRS Rwanda fixed a polythene sheet onto the murrum. Finally, AIRS Rwanda fixed poles to stabilize the fence. AIRS Rwanda replaced the various materials, especially the charcoal and sawdust, in the pit. Table 21 shows the details of the refurbishments at the operation sites.

TABLE 21: CONSTRUCTION AND REFURBISHMENTS AT IRS OPERATION SITES

District/Province	Number of Operation Sites	Site Refurbished (soak pit, storeroom, fence, etc.)
Nyagatare/ Eastern province	10	6 soak pits refurbished 4 new soak pit constructed 7 offices and storage facility provided by sector and cell authorities 3 office and storage facilities were rented
Kirehe/ Eastern province	15	8 soak pits refurbished 8 new soak pit constructed 15 offices and storage facility provided by sector and cell authorities 0 offices and storage facilities were rented

7.3 SAFETY AND ENVIRONMENTAL COMPLIANCE DURING THE SPRAY CAMPAIGN

Before IRS training in preparations for the spray operation, all spray operators, washers, and supervisors underwent medical tests to ensure their fitness to participate in the IRS operations. The tests comprised a routine physical examination, pregnancy tests for all females (also included were storekeepers, sector supervisors, sector coordinators) and hematocrit and liver function tests (AST, ALT). Anyone who was found unfit did not participate in the operations. During the medical examinations conducted in January 2016, medical personnel found 13 SOPs and washers unfit for IRS operations. Two of them were pregnant women whom AIRS Rwanda assigned mobilization duties in their cells. AIRS Rwanda replaced the other 11 before IRS training and operations. Table 22 shows the number of SOPs, washers, and supervisors who underwent medical checkups in each IRS district.

TABLE 22: MEDICAL CHECKUP FOR IRS STAFF

District	SOPs, Washers, storekeepers and supervisors examined		SOPs ⁸ found unfit	
	Male	Female	Male	Female
Nyagatare	289	422	1	12
Kirehe	354	411	0	0
Total	354	833	1	12

During IRS operations, AIRS Rwanda required all staff who took part in IRS to adhere to the requirements for environmental and human safety related to IRS. AIRS Rwanda instituted mitigation measures by providing appropriate PPE to all spray personnel and others who had potential exposure to insecticide. PPE included coveralls, gloves, boots, helmets, face shields, and dust masks for use throughout the spray period. The spray operators also wore neck protection.

Enclosed trucks transported insecticides from the central warehouse to district warehouses. The trucks were certified according to the PMI/AIRS BMP⁹ criteria for vehicles that transport pesticide. Trucks covered with tarpaulins distributed insecticides from the district warehouse to the operations sites. Each vehicle had a kit for spill management and first aid, material safety data sheets, and accident/emergency procedures sheets. Spray operators moved from operational sites to the field using certified trucks retrofitted with railings on the periphery and bench seats. Before using vehicles, AIRS Rwanda inspected them against the PMI BMPs to ensure compliance with safety and environmental requirements and issued a certificate attesting to their compliance.

⁸ Only SOPs were found unfit.

⁹ <http://www.pmi.gov/docs/default-source/default-document-library/tools-curricula/best-practices-indoor-residual-spraying-feb-2015.pdf?sfvrsn=4>

AIRS Rwanda monitored soak pits throughout operations. AIRS Rwanda used plastic sheeting at the wash areas to ensure that insecticide contaminated effluent did not pollute the environment. AIRS Rwanda replaced the sheeting where and when it was necessary. AIRS Rwanda fenced and gated the soak pit and wash areas to ensure that unauthorized entities did not access the premises. AIRS Rwanda used the progressive (triple) rinsing system at each soak pit for washing spray pumps. Trained washers washed the PPE over the soak pits each spray day. The spray operations teams also bathed themselves in the provided washrooms at the end of every work day before leaving the operational sites for the day. AIRS Rwanda conducted mid-spray environmental compliance inspections during the spray operations in the two IRS districts to ensure adherence to mitigation measures put in place during spray operations. AIRS Rwanda staff, in conjunction with the district health environmental officers, used smartphones to conduct the inspections.

The inspection teams assessed the use of PPE during spraying and washing activities, stores records and arrangement, transportation of SOPs, and use of warning signs and first aid kits. They inspected fire extinguishers in storerooms. They ensured correct handling and packing of wastes during the operations in preparation for disposal at the end of the operations. The teams monitored preparations of households for spraying and the instructions given to residents on what to do during and after spraying operations. The inspections also involved observing the spray operators in the field.

7.4 MANAGEMENT OF INSECTICIDE ADVERSE EFFECTS AND OTHER INCIDENTS

Each of the two IRS districts had a team in charge of adverse effects. The team comprised a coordinator, a doctor who was based at the district hospital, and a nurse at each health center affiliated with each IRS operation site. These teams worked closely with the ECO and addressed adverse effects that community members and/or the spray operations support staff experienced during spray operations. Before the start of the IRS operations, the teams received refresher training at each district on management of IRS adverse effects. During the February 2016 spray campaign, only one case of adverse effects and another one of attempting to steal insecticide were reported in Kirehe district (Nyamugali sector) and Nyagatare district (Rwimiyaga sector) respectively. See incident descriptions below:

- A. **Nyamugali incident:** A spray operator of Nyamugali sector had a pain in the left leg, which extended to the whole left part of his body and ended up as numbness on that side of the body. This case was attended to at the Bukora Health Center in Nyamugali sector. The person recovered within two days after report of the incident.
- B. **Rwimiyaga incident:** The attempt to steal insecticide happened on February 17. When the spray teams came back to the operation site from spraying, the sector store keeper miscounted the empty sachets returned from the field and reported immediately to the sector coordinator that there was a missing empty sachet. The sector team immediately informed the SOPs, TLs, and the village leader from village they had been spraying to pass word around the village and to ask if there a sachet was misplaced in any of the houses that were sprayed.

The sector team recounted the empty sachets and found that the missing sachet was actually not missing. It had been a counting error in the earlier count by the sector store keeper. They however did not inform the SOPs/TLs or the village leader of the error since it was getting late and the SOPs/TLs had already left.

Meanwhile, when word went round the village from the village leader about the missing sachet, the household owner came out and said he had seen one in his house but had already put it in the latrine (though he was lying). Using the IRS card, the sector supervision team identified the SOP who had sprayed that structure. After being coerced by the local authorities and the sector managers, the house owner produced the insecticide sachet, which was just the inner sachet with insecticide. The house owner said that he asked the spray operator to give him the insecticide so that he could use it to spray termites in his house. The spray operator removed the inner sachet, gave it to him, and brought back the outer empty sachet to the operation site for counting. The house owner and the SOP were handed over to the sector authorities, who later handed them over to the police. The SOP's contract for spraying was also terminated.

7.5 POST-SEASON ENVIRONMENTAL ASSESSMENT

AIRS Rwanda conducted the post-season environmental assessment in the two districts using smartphones. The assessment confirmed collection of all IRS items from the operation sites and transport of insecticides and IRS wastes to district storage facilities. AIRS Rwanda cleaned soak pits and their surroundings, covered them with a plastic sheet, and securely locked doors. AIRS agreed with the district and sector authorities that the sectors would provide security for the soak pits and wash areas to ensure against vandalism during the non-spraying season. AIRS Rwanda cleaned and decontaminated stores before handing them over to the owners.

7.6 IRS WASTE DISPOSAL

AIRS Rwanda disposed of IRS wastes at different sites according to the type generated during the IRS operations.

Nyagatare

AIRS Rwanda sent 762 kg of contaminated wastes from Nyagatare district, comprising 53,688 empty insecticide sachets and 12,279 used masks, to the Nyagatare District Hospital incineration plant, whose combustion temperature is 1100° Celsius for incineration. The plant issued an incineration certificate. AIRS Rwanda disposed of other wastes, including 156 torn gloves and assorted plastics items (damaged barrels, jerry cans, and basins), at the Entreprise pour la Protection de l'Environnement et Development Rural (EPEDR) Recycling plant. AIRS Rwanda donated 591 uncontaminated carton boxes to Cards from Africa Company at Samuduha. AIRS Rwanda disposed of other uncontaminated wastes such as papers and used dry cell batteries at the Nduba dumping site.

Kirehe

AIRS Rwanda sent 1,025 kg of contaminated wastes from Kirehe district, comprising 69,526 empty insecticide sachets and 15,550 used masks, to Kirehe Hospital incineration plant, which issued a certificate of incineration. AIRS Rwanda disposed of other wastes, including 332 torn gloves and assorted plastics items (223 damaged torches and empty boxes of first aid kits) at the Entreprise pour la Protection de l'Environnement et Development Rural (EPEDR) Recycling plant. AIRS Rwanda donated 805 uncontaminated cardboard boxes to Cards from Africa Company at Samuduha. AIRS Rwanda disposed of other uncontaminated wastes such as papers and used dry cell batteries at the Nduba dumping site. Please see Annex 7 for certificates of incineration.

8. CAPACITY BUILDING OF THE MINISTRY OF HEALTH

8.1 CAPACITY BUILDING DURING IRS TRAINING

AIRS Rwanda conducted the IRS implementation in close collaboration with the MOH and district staff to promote sustainability. The MOPDD staff worked with the AIRS staff in the facilitation of the IEC and SOP ToTs. The training created a pool of trainers who will be useful in the future depending on their availability.

The trained IEC and SOP ToTs in turn facilitated training for the IEC implementers and spray operators at the district and sector levels. The beneficiaries of the two training sessions (IEC implementers and SOPs) were the cell and village heads and CHWs (SOPs) involved in IEC and spraying activities respectively. AIRS Rwanda supervised IRS operations in collaboration with the MOPDD and district/sector staff (Vice Mayor-Social Affairs, District Health Director, District Environmental Health Officer, and Sector Social Affairs Officers). The staff received orientation on IRS supervisory activities.

In addition, AIRS Rwanda conducted training in the districts to bring together environmental health officers and clinicians who would in turn play an important role in ensuring adherence to environmental compliance procedures and management of side effects, respectively.

After completion of the PMI-supported IRS in March 2016, AIRS provided technical support to IRS in three other MOH funded districts. The IEC and SOP ToTs we trained during the PMI-supported IRS trained IEC implementers and spray operators in the three MOH IRS districts. Consequently they worked as the support staff at the district and sector levels.

8.2 TECHNICAL SUPPORT FOR MOH IRS OPERATIONS

During the February 2016 spray season, MOH/MOPDD conducted spray operations in two sectors of Nyagatare district. AIRS Rwanda provided technical support to the MOH-supported sectors during the implementation. In Nyagatare District, AIRS Rwanda district coordinator and AIRS Rwanda staff worked hand in hand with a point person from the Nyagatare district hospital whom they supported throughout the spray operations period. In addition, with PMI approval, AIRS Rwanda lent materials and equipment (80 spray pumps and 40 complete helmets) to the MOH/Nyagatare Hospital during implementation of spray operations in MOPDD-supported sectors.

Due to the reported upsurge in malaria cases in Rwanda, the Government of Rwanda through the MOH is supporting spraying of the two sectors (Karangazi and Gatunda) we did not spray in Nyagatare district. In addition, three other districts Bugesera, Gisagara and Gatsibo were sprayed.

During implementation of the MOH IRS scheduled for April 4-30 and April 19-May 16 2016, AIRS Rwanda is providing technical support to the target districts (Nyagatare, Bugesera, Gisagara, and Gatsibo). AIRS Rwanda has appointed four staff to provide full time support to the districts (one for each district) in the preparations and implementation of the spray operations. In addition, AIRS Rwanda provided technical support for environmental compliance, stores management, and data entry and

management during the MOH IRS operations. Moreover, AIRS Rwanda has lent materials and equipment to MOH for use during implementation of the spray operations. The MOH IRS will use in Nyagatare district the insecticide balance of 4,579 sachets from the PMI-supported 2016 February spray operations. Table 23 shows the list of materials which AIRS Rwanda lent to the MOH/MOPDD. The MOPDD will return all materials after completion of the spray campaign.

TABLE 23: LIST OF MATERIALS LENT TO MOPDD

#	Item Description	Unit	Quantity lent
1	X-pert spray pumps	Pce	1,600
2	Hard hat Complete	Pce	1,500
3	Boots	Pce	1,500
4	Coveralls	Pce	3,000
5	Hand Lubber Gloves	Pair	300
6	Fire Extinguishers	Pce	50
7	Pump Repair Kits	Box	6
8.	Insceticide (bendiocarb 80WP) ¹⁰	sachet	4,579

¹⁰ Insecticide will not be returned; this was a donation

9. ENTOMOLOGY

Entomological monitoring is essential in any insecticide-based vector control intervention such as IRS. It helps assess the quality of the vector control intervention and its efficacy. The entomological monitoring data helps justify decisions such as the type of insecticide and selection of target areas. Working in collaboration with the MOPDD, AIRS Rwanda implemented entomology activities. Entomological monitoring was aimed at:

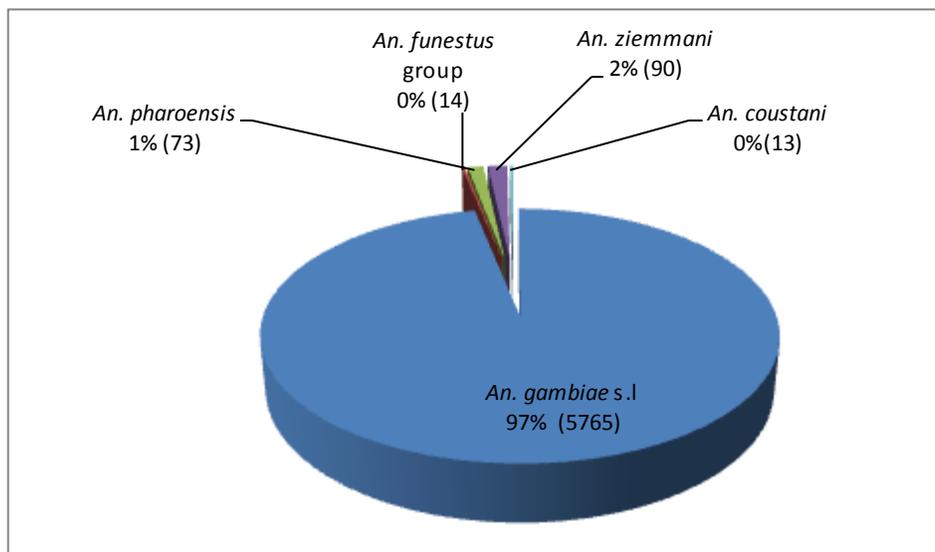
- Assessing malaria vector density and species composition in intervention areas
- Determining vector behavior
- Establishing vector feeding time and location
- Assessing the quality of insecticide application and monitoring insecticide decay rates

9.1 VECTOR SPECIES COMPOSITION, DENSITIES, FEEDING TIME AND LOCATION

Monthly vector collections assessed the vector species composition, density, and behavior in the IRS districts using human landing catches (HLCs) and pyrethrum spray catches (PSCs). AIRS Rwanda performed human landing catches monthly during two consecutive nights in six houses per district (three houses per site) per night. AIRS Rwanda conducted pyrethrum spray catches monthly in each of two sites in each IRS district and one site in the control district. AIRS Rwanda performed the collections on two consecutive mornings in 15 houses per site each day. AIRS Rwanda calculated vector density as the average number of *An. gambiae* s.l. collected per house per day from PSC data.

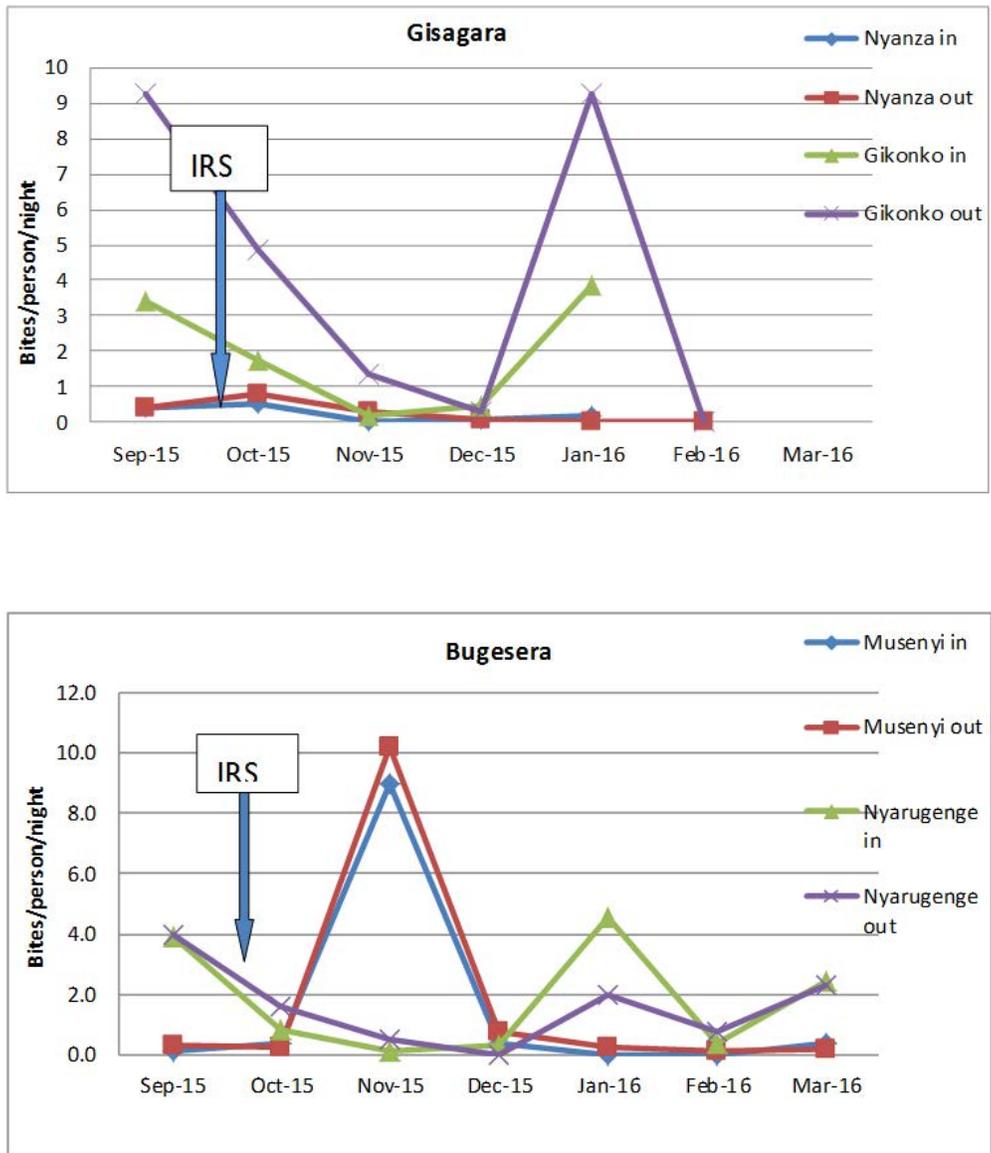
An. gambiae s.l. was the only important malaria vector AIRS Rwanda identified during the entomological monitoring collections. AIRS Rwanda collected insignificant numbers of other minor vectors in some of the sites (Figure 4).

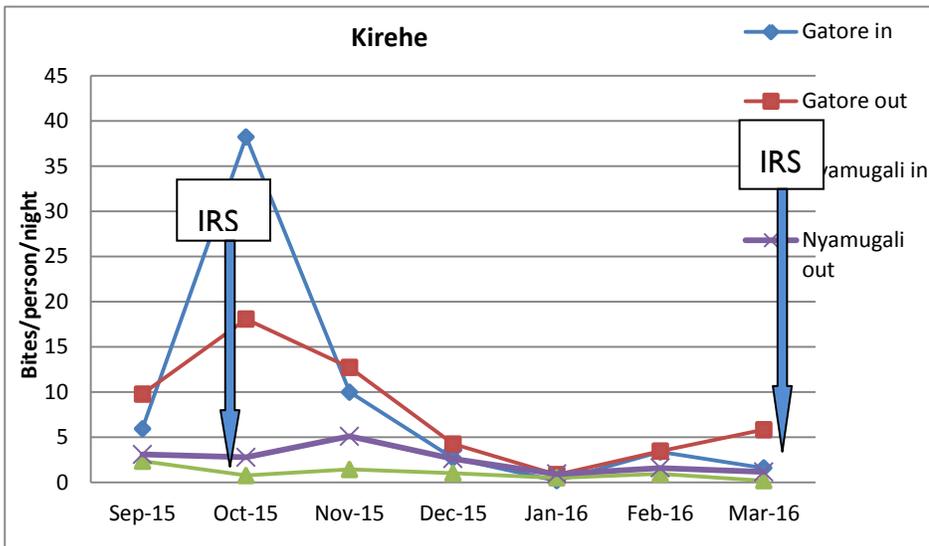
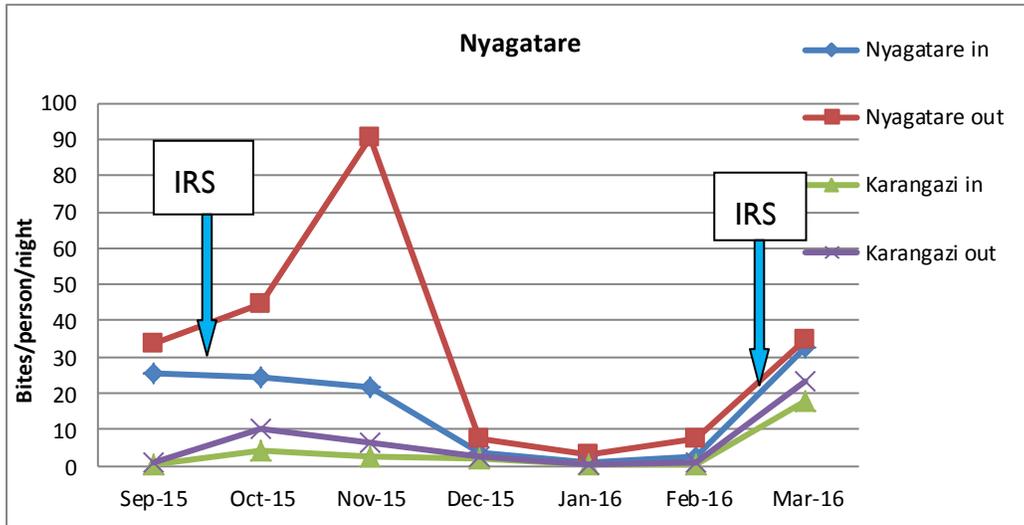
FIGURE 4: VECTOR ABUNDANCE

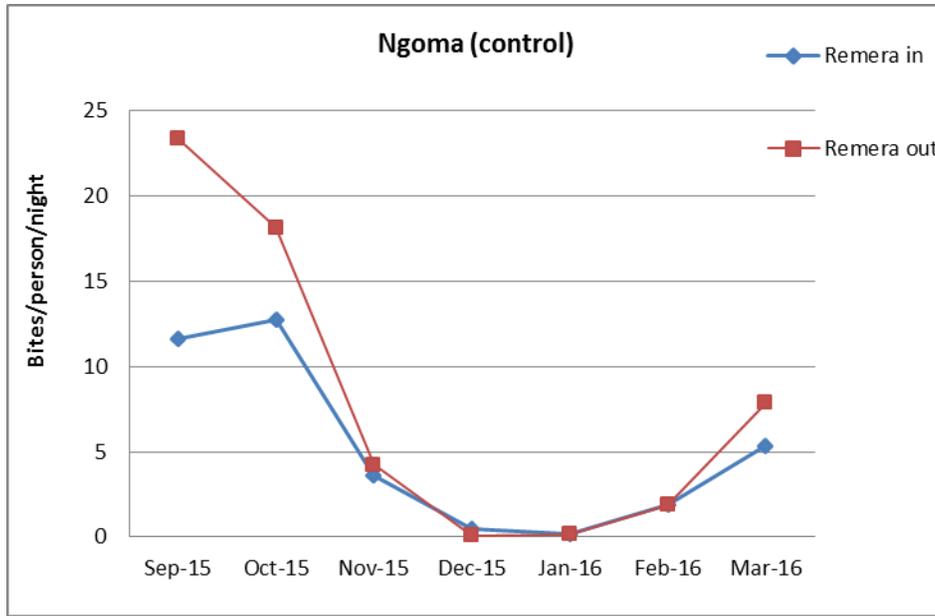


An. gambiae s.l. generally showed slightly more exophagic than endophagic behavior in the four districts, including the control district. However, in Kirehe's Gatore site, *An. gambiae* s.l. was slightly more endophagic in the month of Oct 2015, (Figure 5 and Annex 8)

FIGURE 5: AN. GAMBIAE S.L. AVERAGE MONTHLY BITING TRENDS

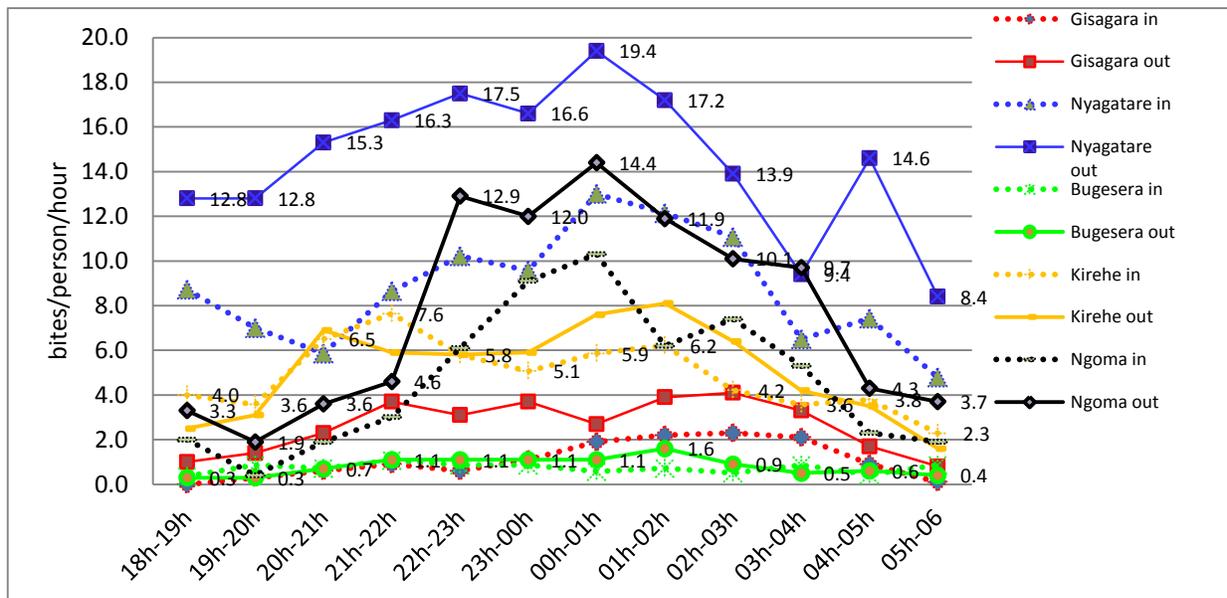






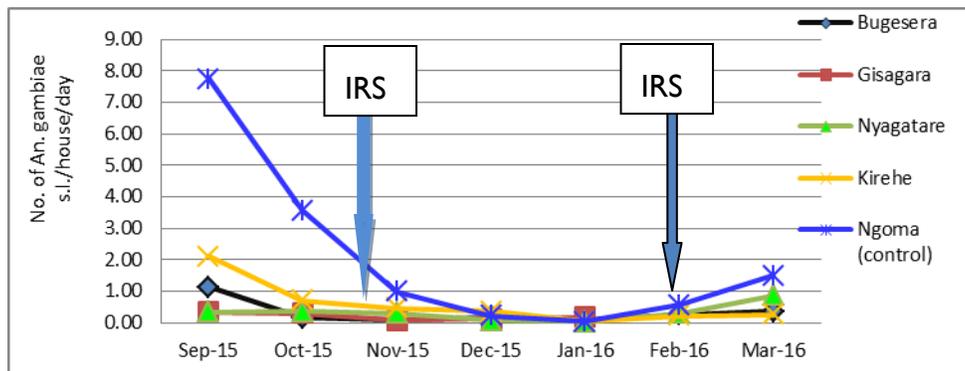
Hourly biting rates per person varied across the five districts. They were highest in Nyagatare, followed by Ngoma (control district) and Kirehe. Gisagara and Bugesera showed the least bites/person/hour. The relatively higher biting in Nyagatare, Ngoma, and Kirehe could be due to the fact that apart from the rains, there is considerably more rice farming in the districts relative to the other two districts. Hourly biting was slightly higher outdoors than indoors in all the districts. In Nyagatare, biting was generally high at 1900h. An increase in biting density was observed at around 2200h-2300h and peaked at 0001h. Figure 6 below shows average *An. gambiae* s.l. bites per person per hour through the night across the five districts.

FIGURE 5: AVERAGE AN. GAMBIAE S.L. HOURLY BITING



Vector density (average *An. gambiae* s.l./house/day) was highest in the control district through the reporting period. Kirehe district showed the highest vector density relative to the other IRS districts. Vector density in the five districts (including the control district) was high in September 2015 but gradually dropped to minimum values in December and January. This decrease could be attributed to the application of insecticide that took place in September/October 2015. It however may not explain the decline in its entirety since a similar trend is observed in the control district. (See Figure 7 and Annex 9).

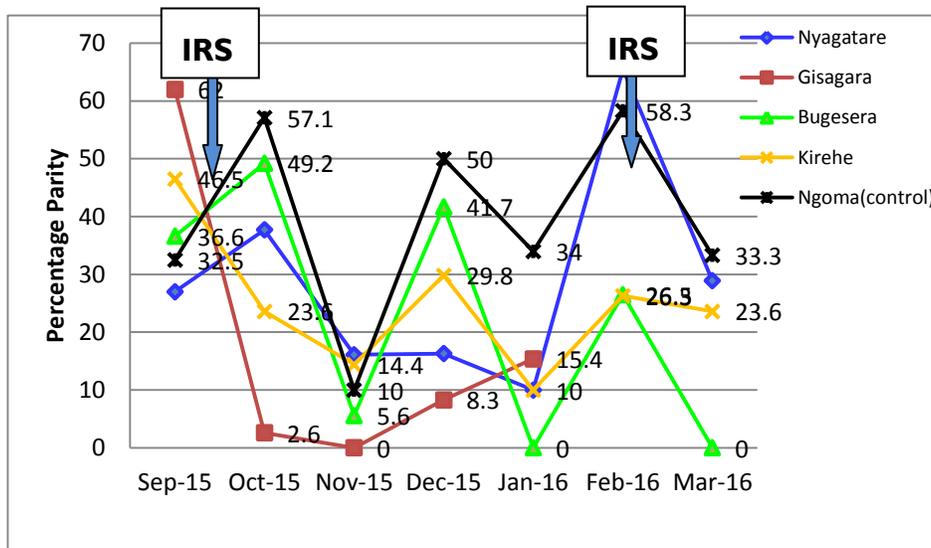
FIGURE 6: AN. GAMBIAE S.L. DENSITY



9.2 PARITY

AIRS Rwanda performed ovary dissection of the *An. gambiae* s.l. collected through HLC to determine parity rates. Parity was very high in all the sites in the month of October when spraying was completed. The trend observed in the intervention sites is similar to that in the control site except that parity remained generally higher in the control site relative to the intervention sites. The lower parity in the intervention sites could thus be attributed to IRS, (Figure 8 and Annex 10).

FIGURE 7: PARITY



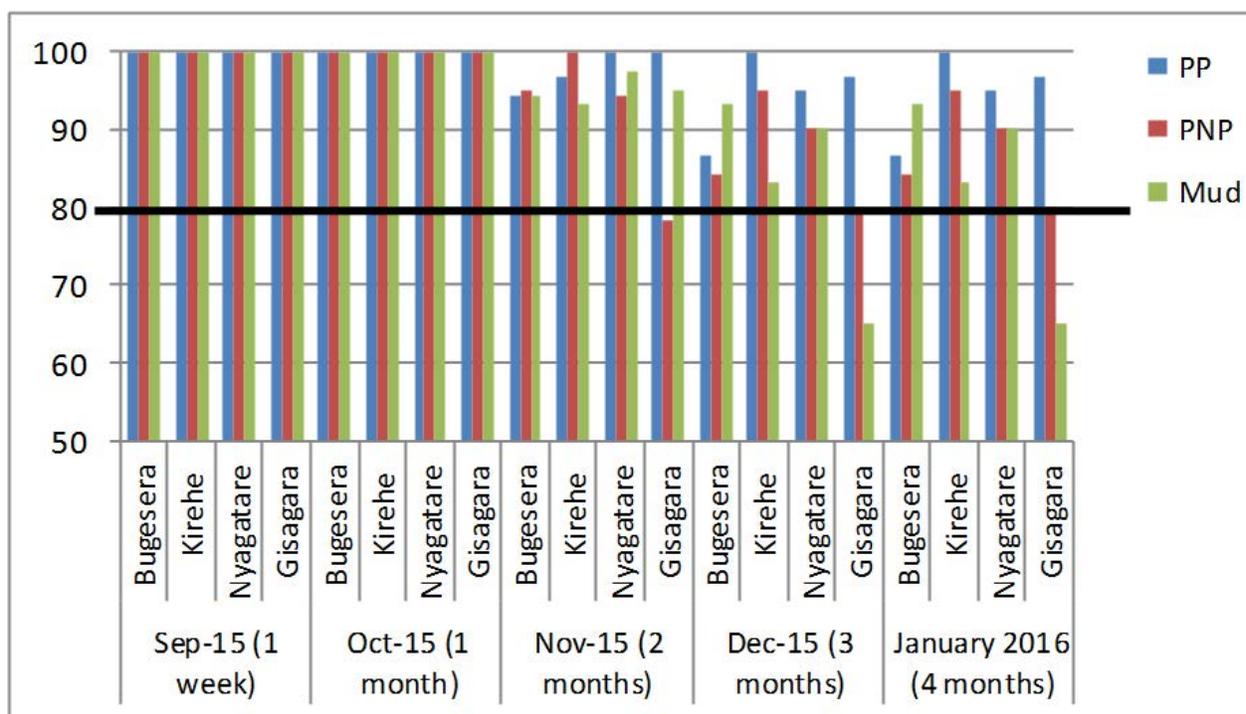
9.3 WALL BIOASSAYS

AIRS Rwanda conducted cone bioassays in 36 and 24 sprayed structures on three different wall surfaces - mud, plastered not painted (PNP), and plastered and painted (PP)--in each of the IRS districts in the September 2015 and February 2106 spray campaigns, respectively. AIRS Rwanda conducted control tests alongside on surfaces known to have no insecticide. AIRS Rwanda conducted the cone bioassays using susceptible *An. gambiae* s.s. (Kisumu colony).

Cone bioassays conducted within one week of spraying to assess the quality of spraying in September 2015 showed 100% mortality of susceptible *An. gambiae* s.s., indicating quality spraying took place.

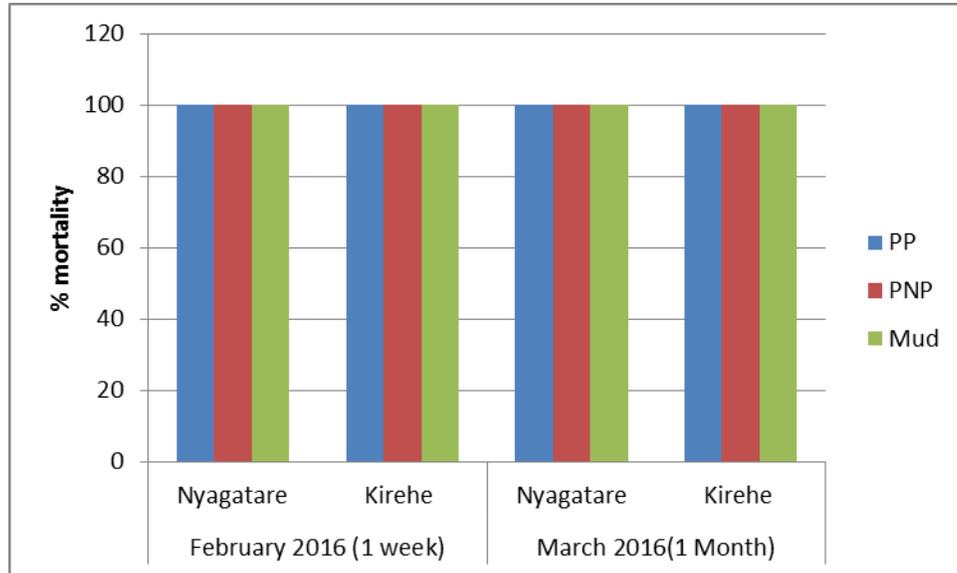
Monthly WHO cone bioassay tests conducted following the September 2015 IRS campaign showed mortality of more than 80% in all the three surface types in the four districts up to two months after spraying except on the PNP surface in Gisagara district. Four months after spraying, the PP surfaces and PNP surfaces recorded more than 80% mortality rates in all four districts. Mud surfaces showed less than 80% mortality in Gisagara district, while that of the other three districts remained above the 80% threshold (Figure 9).

FIGURE 8: WALL BIOASSAY TEST RESULTS (SEPTEMBER 2015-JANUARY 2016)



AIRS Rwanda conducted quality control wall bioassay tests for the spray operations in February 2016 in 24 structures in the two districts (Kirehe and Nyagatare) within week one of spraying. In all test cones, AIRS Rwanda recorded 100% mortality of susceptible *An. gambiae* s.s. One month after IRS in March 2016, AIRS Rwanda recorded test mortality rates of 100% in all the sites in the two districts (Figure 10).

FIGURE 9: WALL BIOASSAY TESTS RESULTS (FEBRUARY-MARCH 2016)



10. GENDER

10.1 GENDER INCLUSION IMPLEMENTATION

During the implementation of February 2016 spray operations, AIRS Rwanda implemented all planned activities in the gender inclusion initiative in the operational plan. Below are details of all activities AIRS Rwanda carried out:

- *Training:* AIRS Rwanda incorporated gender sessions in all IRS training materials for discussion during the IRS training (ToTs, mobilizer, and SOP training)
- *Increased women's recruitment:* AIRS Rwanda reinforced the existing system of recruiting only CHWs with previous IRS experience. AIRS Rwanda used micro-planning meetings where all district and sector authorities discussed the importance of maintaining and increasing the number of women SOPs during IRS operations by respecting the criteria of recruiting only CHWs with previous IRS experience. Also, AIRS Rwanda continued to advocate with the MOH increasing the number of women mobilizers during IRS operations. AIRS Rwanda revised all vehicle tenders adverts and encouraged vehicle vendors to hire at least 30% of women drivers during IRS operations. During the February 2016 spray campaign, AIRS Rwanda employed one woman vehicle driver in Nyagatare district. AIRS Rwanda will continue to advocate for more women in all IRS activities.
- *Gender-friendly work environment:* AIRS Rwanda improved the work environment to be more gender friendly by constructing separate stand-alone double bathrooms for both men and women in each operational site. This was an improvement in the former setting, where we had the bathrooms for men and women constructed as one structure with a partition separating the side for men from that of women.
- *Alternative duties for pregnant IRS workers:* Two pregnant SOPs switched their assignment to responsibility for mobilization in their cells of residence.
- *Gender Awareness Guidelines and messages:* AIRS Rwanda posted gender awareness guidelines at each operational site to help all seasonal workers, especially women, feel respected and comfortable in the AIRS work setting. In addition, AIRS Rwanda prepared and disseminated gender messages regularly to all seasonal workers throughout the spray campaign to enhance gender awareness and encourage women to express any gender-related issues encountered during IRS operations.
- *Gender norms survey:* AIRS Rwanda conducted the Gender Norms and Attitudes survey before the start of the spray campaign and at the end of the spray campaign. The objective of this survey was to assess the gender norms and attitudes with regard to decision making and agency (ability to act on decisions) of men and women within the home among all IRS seasonal workers of the sampled sectors in the two IRS target districts. The team has analyzed the data and has found encouraging results. The average pre-score for all respondents was 6.93. The post score statistically significantly rose by .84 points to 7.76 ($p < 0.001$).

II. CHALLENGES, LESSONS LEARNED AND RECOMMENDATIONS

II.1 CHALLENGES

The main challenges AIRS Rwanda experienced during the IRS campaign included:

- Absence of some households during time of spraying because of farming, market days, work days, funerals, and some refusals meant that some structures could not be covered, even after mop-up. Out of 2,871 structures that were not sprayed, 318 (11.07%) were because of refusals.
- SOPs were not recording and marking structures in the first week of spraying.
- Competing government functions/meetings during IRS at the sector level requiring the mobilizers and spray operators (village leaders) led to occasional interruption of spray operations. For instance, spray operations and village mobilizers in Matimba and Nyagatare sectors of Nyagatare District missed a spray day to attend the International Women's Day, which took place on a spray day.
- Some structures/rooms in structures were used for storage of harvested food, and this limited their availability for spraying.
- Local community elections conducted during February 2016 in the country affected IRS operations in the sense that spraying was cancelled on February 22, 2016, which resulted in postponing the end date of our spray operations to from March 8 to March 9.
- Heavy rain during the last week completely stopped spray operations the whole day on March 8 in some sectors of Nyagatare District mainly, Rwimiyaga, Rwempasha, and Musheru sectors. In some other sectors in both Kirehe and Nyagatare districts, spray operators went to the field very late, and this produced the poor performance of our spray teams (2-3 structures per SOP per day) for the last two days of the campaign. Also, because of the rain, the end date of spray operations in Rwimiyaga sector was extended to March 10.
- IRS coverage was low in the districts urban areas, , because of resistance and absence of householders at the time of spraying.

II.2 LESSONS LEARNED AND RECOMMENDATIONS

- Engagement of CHW supervisors at operational sites for IEC coordination in the sectors enhanced coordination of IRS activities at the community level. Further, while local leaders are critical in mobilizing and enhancing IRS acceptability, their role and engagement in IRS needs to be re-evaluated to maximize their involvement.
- During supervision, it was noted that in the first week, SOPs were not marking all unsprayed structures both physically and in their data collection forms. With enhanced close supervision, the structures would be marked as follows: the mobilizers marked the IRS card number and

the mobilizer code on the doors of structures, and the SOPs marked the door with Y, the code of a spray operator and the date to indicate sprayed, or N and date to indicate 'unsprayed'. For structures found but NOT sprayed (for example home owners were away and spray operators were still active in the respective village), spray operators marked the house as follows: date, spray operator code, and X. This way SOPs would be able to mark unsprayed structures with their IRS Card number on their data collection form, and teams would be able to see if an eligible structure has not been sprayed.

- AIRS Rwanda should adhere to the procedure for recruitment of SOPs by the officer in charge of CHWs at the Health Center, followed by verification and approval by the Head of Health Center, Sector Social affairs, and the Sector Executive Officer.
- Enhanced supervision by the AIRS staff, the MOPDD, and district and sector staff and regular feedback meetings were instrumental in the smooth implementation and high spray coverage recorded.
- Data cleaning conducted regularly during IRS data entry was instrumental in identifying any errors and taking immediate remedial action. This also provided an opportunity to compare recording of insecticide used in the database with daily logistics records.
- Supervisors conducted data collection verification to validate the accuracy of data collected in the field by interviewing household owners using mHealth smartphones. This provided an opportunity to confirm the correctness of SOP data records on a regular basis, leading to improved integrity of the IRS campaign.
- Cell offices can provide storage facilities and IRS operation sites where space is unavailable at sector offices.
- The district hospitals and AIRS Rwanda should discuss ways to improve the medical checkup exercise of CHWs. Leaders in the district review meetings expressed concern about the distances the SOPs and washers travel to the District Hospitals for the medical tests. AIRS Rwanda and the District Hospitals' authorities will work out a way to see if health centers can conduct the medical examinations.
- District and sector authorities should take special measures to address IRS refusals in urban areas such as trade centers, especially in Nyagatare, Kirehe, and Kigina sectors of Nyagatare and Kirehe districts, respectively.
- mHealth: A number of areas were noted for improvement in the m-Health system:
 - Worker monitoring and DVC Reports: the AIRS Rwanda team was not able to export in the system on a daily basis reports of checklists completed by the AIRS Rwanda team, including DCV reports.
 - We thus recommend training the AIRS Rwanda focal points on how to generate these reports from the system on a daily basis so that we are able to track the progress of our spray operations efficiently in a timely manner.
 - Crashing of Mobile supervision application: During the first days of the spray campaign, there were issues with the application crashing on the mobile supervision phones of sector coordinators. This was mainly due to the fact that the geographic locations were changed right before the campaign, and then needed to be changed in the Dimagi system; this is something that Dimagi have happened earlier. This application crashed because the sector coordinators did not properly synch their phones with the new geographic locations.

To avoid this issue in future, all updates and changes on phones would be finalized before the TOT. During the m-Health /mobile phone supervision training session during TOT, sector coordinators will test that they can see each of the cells and villages of their respective sectors before deploying phones to the field. This will help to adjust the settings if needed and all phones will be properly synced so that we can guarantee that this problem is addressed before the start of the spray campaign.

- Gateway troubles: During the February 2016 spray campaign, the gateway failed to function properly halfway through the campaign. This was due to an overflow of messaging in two ways: the Telerivet system/ software was backed up and the gateway phone memory/SIM was full. In the future, this issue could be addressed as follows: i) the Dimagi team and the AIRS Rwanda IT Specialist should clear out the memory on the gateway phone every day; ii) AIRS Rwanda will reduce the number of messages sent on certain days by better message scheduling; iii) the Dimagi team and the AIRS Rwanda IT Specialist will figure out how to use two gateways so that the bulk messages go through one gateway and the other gateway would be reserved for receiving the sector coordinators PMT data.
- Misapprehension of supervision checklists: During the February 2016 spray campaign, we noted issues among supervisors of misunderstanding English supervision checklists. Almost 70% of the reported incidents were due to misunderstanding of the checklists and not because there were actual incidents. We plan to address this issue by translating the supervision checklists to Kinyarwanda in the mobile application system.
- Report spray date: Due to connectivity and other unpredictable issues in the field, sector coordinators sometimes failed to submit their reports daily. The implication of this was that when they submitted their reports on a later date, the SMS indicator report would not record which spray date the data was for. AIRS Rwanda would like to adjust the text message system slightly so that there is a date tagged to the message that could allow sector coordinators to know when data they are submitting is being logged into the system.

ANNEX I: MOH LETTER ON INSECTICIDE SELECTION 2013/2014



ANNEX 2: INSECTICIDE RESISTANCE TESTING RESULTS

District	Sites	Pyrethroids			Organophosphates		Carbamates	Organochlorine	Date Tests were conducted
		Lamdacyhalothrin 0,05%	Deltamethrin 0.05%	Permethrin 0.75%	Pirimiphos methyl 0,25%	Fenitrothion 1%	Bendiocarb 0,1%	DDT 4%	
Nyagatare	Ngarama	67	83	91	100	100	100	94	August 2014
Nyagatare	Nyagatare	80.4	81	91.9	100	100	100	95	August 2014
Bugesera	Mwogo	86	97	89	100	100	100	84	August 2014
Bugesera	Gashora	46	58	41	100	100	100	70	January 2015
Bugesera	Mareba	43	67	63	100	100	100	80	January 2015
Gisagara	Gakoma	92	90	95	100	100	100	95	September 2014
Gisagara	Kirarambogo	66	90	84	100	100	100	90	December 2014
Kirehe	Bukora	36	67	54	100	100	94	62	January 2015
Nyanza	Busoro	62	63	47	100	100	100	89	May 2015

ANNEX 3: LOCAL PROCUREMENT

Description	Quantity/ Number
IRS Transportation	
Rented Vehicles used in micro-planning and logistics assessments	2
Rented Vehicles used in IRS implementation	77
IRS Supervision vehicles (Country Office)	2
Rented vehicles that facilitated the Post IRS activities	2
Printing and Photocopying	
Spray Operator Form	18,265
Team Leader Form	3,748
Village IEC Form	10,414
IRS Cards	137,677
Spray Performance Sheets (Sector)	12
Spray Performance Sheets (District)	5
Daily Summary report for sector coordinators	353
Morning Mobilization	931
Homeowner preparation(IEC)	1,596
Insecticide Distribution Card	318
Error Eliminator Form for spray Data	5,397
Stock card	1,113
Request Book	19
Good Issued Note	70
Sector Commodity Ledger Book	14
Material Safety Data Sheet	78
Spill Response Procedure	108
Emergency Contact	108
Different Photocopies	40,000
Assorted materials	
Basin	71
Gloves	72
Cloth Lines	7
Dry cell batteries for normal torches	161
Duracell batteries (AA)	2,559
Duracell batteries (AAA)	41
Empty Boxes (Cartons)	691
Empty sac	578

Description	Quantity/ Number
Liquid Soap	5
Lubricant oil	435
Padlock	41
Powder soap	1,949
Sisal rope	20
Toilet soap	1,291
Washing/laundry soap	659
Stationery	
Clear sheet protector	2,000
Flip chart Pad	54
HP Cartridge	7
Marker pen	718
Note Pad	4,334
Office file	323
Pen	4,458
Register Book	25
Paper Ream	20
Calculator machine,	31
Stapler machine	31
Staples	68
Stapler remover	31
Puncher	31

ANNEX 4: SOP TRAINING PROGRAM

Time	Subject	Facilitator
DAY 1		
08.30 am – 09.00 am	Session 1: Opening Ceremony	Sector Authorities
08.30 am - 08.45 am	Arrival and Registration	Sector Supervisor
08.45 am – 09.00 am	Introduction and Opening remarks	Sector Coordinator
09.15 am – 09.30 am	Objective of the training	Sector Coordinator
09.30 am – 10.00 am	Introduction to Indoor residual spraying	Trainer
10.00 am – 11.00 am	<ul style="list-style-type: none"> ✓ Parts of Compression pump, Handling and pump maintenance. ✓ Assembling & pressurizing the spray pump, trouble shooting and carrying position. 	Trainer
11.30 am - 12.30 pm	Mixing of insecticide (Proper use of Insecticide, Care and maintenance of Nozzles).	Trainers
12.30 pm – 01.00 pm	<ul style="list-style-type: none"> ✓ Safety of population and Environment. ✓ Personal Protection. 	Trainers
01.00 pm – 02.00 pm	Lunch	
02.00 pm – 03.00 pm	Dressing rehearsal	Trainers
03.00 pm - 04.00 pm	Filling of Spray Operator and Team Leader Forms	
04.15 pm - 04.45 pm	Practice/Filling of Spray Operator and Team Leader Forms	
04.45 pm - 05.00 pm	Filling day evaluation Chart	
DAY 2		
	Session 3: Safety of IRS	
08.00 am - 09.00 am	House marking for IRS Operations purposes	Trainers
09.00 am – 10.00 am	<ul style="list-style-type: none"> ✓ Preparing Structures for IRS (Household preparation). ✓ Community mobilization. 	Trainers
10.00 am - 11.00 am	Daily spray operations plans (IEC and IRS operations)	Sector Coordinator
11.00 am - 01.00 am	Basics in Management of adverse effects	Sector Coordinator
1.00 pm – 2.00 pm	Lunch	

Time	Subject	Facilitator
2.00 pm – 2.30 pm	Gender Awareness in IRS	Trainers
2.30-5.00 pm	<ul style="list-style-type: none"> ✓ Supervision and reporting of all IRS activities. ✓ Use of supervision checklists and Spray and team leader Pocket guides. 	Sector Coordinator
	Quality Control	
08.00 am-09.00 am	<ul style="list-style-type: none"> ✓ Introduction to the spraying surface. ✓ Spraying techniques theory (Theory) 	Trainers
09.00 am – 05.00 pm	<ul style="list-style-type: none"> ✓ Wall Spraying: Demonstration and practice: <ul style="list-style-type: none"> • Maintaining 45cm distance from wall. • Maintaining 75 cm swath width and 5cm overlap. • Spray rhythm (Speed top –down). 	Trainers
08.00 am-09.00 am	Lessons learned on day 3 during wall spraying practice	Trainers
09.00 am- 01.00 pm	<ul style="list-style-type: none"> ✓ Wall Spraying: Demonstration and practice: <ul style="list-style-type: none"> • Maintaining 45cm distance from wall. • Maintaining 75 cm swath width and 5cm overlap. • Spray rhythm (Speed top –down). 	
1.00 pm – 2.00 pm	Lunch	
2.00 pm-03.00 pm	Calibration of compression pump	Trainers
03.00 pm – 05.00 pm	Progressive rinsing (Practice)	Trainers
08.00 am-09.00 am	Lessons learned on day 3 during wall spraying practice	Trainers
09.00 am- 01.00 pm	<ul style="list-style-type: none"> ✓ Wall Spraying: Demonstration and practice: <ul style="list-style-type: none"> • Maintaining 45cm distance from wall. • Maintaining 75 cm swath width and 5cm overlap. • Spray rhythm (Speed top –down). 	Trainers
1.00 pm – 2.00 pm	Lunch	
2.00 pm-4.00 pm	<ul style="list-style-type: none"> ✓ IRS Payment : <ul style="list-style-type: none"> • Timesheet. • SACCO/ Account number. 	

ANNEX 5: JOB AID MESSAGES THAT WERE SENT TO SEASONAL STAFF

Time	Recipient	Message	Total Number to be submitted in a spray season
<i>What time of day should this message be sent? For sprayers, they are not allowed to have phones during the work day.</i>	<i>Who will receive this message</i>		
1h30	Team Leaders	Team Leaders MUST carefully check the filled spray operators' data collection forms at the close of the day before submitting to the supervisors.	10
2h00 PM	Cell and Sector IEC's; and, Sector Coordinators	Ensure mobilizers notify the communities to prepare a day ahead of the arrival of the spray team.	7
9h00 AM	Spray Operators, Team Leaders, Supervisors and Sector Coordinators	Eating, drinking or smoking during the spraying period will result in dismissal. It is not allowed.	6
7h00	Spray Operators and Team Leaders	Good morning! Remember the spray target is 9 structures per spray operator per day. All rooms should be sprayed as well. Thanks for the good job.	6
16h30	M&E Assistant	Attention! {case.name} have not submitted their SMS report for today.	20
1h30	Sector Coordinator	a. # team members. Structures found. #structures sprayed. #IUs used.	1
6h30 AM	Spray Operators, Team Leaders, Supervisors and Sector Coordinators	Full PPE use remains mandatory for the duration of the spray operation.	4
4h00 PM	Spray Operators and Team Leaders	Remember only heavy, non-edible, bulky items should be packed in the center of the room and covered with the polythene sheet before spraying.	4

Time	Recipient	Message	Total Number to be submitted in a spray season
7h30	Team Leader	Remember your spray nozzle should be 45cm from the surface. Spray pressure is between 35 and 55psi.	5
6h50 AM	Spray Operators, Team Leaders, Supervisors and Sector Coordinators	To ensure the Safety of all seasonal staff and community, report the health status and any adverse effect to your supervisor.	7
15h00	Spray Operators, Team Leaders, washers, security guards, Supervisors, Sector Coordinators	PMI AIRS Project will not tolerate sexually-oriented conduct, whether it is intended or not, that is unwelcome.	7
15h00	Spray Operators, Team Leaders, washers, security guards, Supervisors, Sector Coordinators	Sexual harassment is defined as: Sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature	8
14h30	Spray Operators, Team Leaders, washers, security guards, Supervisors, Sector Coordinators	Other work-related harassment is the unwelcome, deliberate or repeated unsolicited verbal, physical, or visual contact or solicitation of favors that are offensive, abusive, intimidating, hostile, denigrating, or demeaning.	7
14h30	Spray Operators, Team Leaders, washers, security guards, Supervisors, Sector Coordinators	The PMI AIRS Project takes any allegations of sexual harassment seriously. All complaints should be made to your <u>Gender Focal Point at 0786477460</u> . Please also contact the Rwanda National Police, Gender Based Violence Unit at 3512 for further support.	7
		14	99

ANNEX 6: STOCK UPDATE

Description	Quantity in Stock Before Campaign	Quantity Received	Total Quantity	Quantity Used/Damaged/Out of use	Quantity in Stock after the Campaign
Sprayer pumps	1,713	0	1,713	18	1,695
Dust Mask	14,919	21,840	36,759	27,879	8,880
Hard Hat (Shell)	2,430	0	2,430	19	2,411
Face shield	2,375	0	2,375	700	1,675
Face shield bracket	2,708	0	2,708	22	2,686
Apron	183	0	183	18	165
First Aid Kits	70	34	104	100	4
Gloves	2,689	684	3,373	488	2,885
Coverall	4,745	0	4,745	17	4,728
Boot (Rubber)	2,011	0	2,011	42	1,969
Valve body cap	75	175	250	1	249
Control flow valve (CFV)	1,685	0	1,685	0	1,685
Extension lance	258	0	258	22	236
Gasket Nozzle	1,359	0	1,359	340	1,019
Lance	0	100	100	96	4
Stop cock	68	0	68	22	46
Repair kit	36	0	36	8	28
Pressure gauge	14	100	114	66	48
Gaskets, simplex cover	30	100	130	0	130
Wash valve pin	315	0	315	0	315
Body shutoff	30	0	30	4	26
Insecticide (Carbamate)	5,753	122,040	127,793	123,214	4,579 ^{11*}

*Expiry date: Sept 2017

¹¹ All the insecticide that remained during February 2016 spray campaign were donated to MOPDD

ANNEX 7: WASTE DISPOSAL CERTIFICATES



ANNEX 8: HUMAN BITING RATES (BITES/PERSON/NIGHT)

	Bugesera				Gisagara				Nyagatare				Kirehe				Ngoma	
	Musenyi in	Musenyi out	Nyarugenge in	Nyarugenge out	Nyanza in	Nyanza out	Gikonko in	Gikonko out	Nyagatare in	Nyagatare out	Karangazi in	Karangazi out	Gatore in	Gatore out	Nyamugali in	Nyamugali out	Remera in	Remera out
Sep-15	0.1	0.3	3.9	4	0.4	0.4	3.4	9.3	25.6	33.7	0.1	1	5.9	9.8	2.3	3.1	11.7	23.3
Oct-15	0.3	0.3	0.8	1.6	0.5	0.8	1.8	4.8	24.4	44.8	4.3	10	38.2	18.1	0.7	2.8	12.7	18.2
Nov-15	9	10.2	0.1	0.5	0	0.3	0.2	1.3	21.4	90.4	2.5	6.1	10	12.7	1.4	5.1	3.7	4.2
Dec-15	0.3	0.8	0.3	0	0.1	0.1	0.5	0.3	3.6	7.4	1.7	2.7	2.7	4.2	1	2.6	0.5	0.1
Jan-16	0	0.2	4.6	2	0.2	0	3.8	9.3	1	3.1	0.1	0.1	0.2	0.8	0.5	0.9	0.2	0.2
Feb-16	0	0.1	0.3	0.8		0		0	2.3	7.4	0.1	0.9	3.4	3.4	0.9	1.6	1.9	1.9
Mar-16	0.3	0.2	2.4	2.3					32.7	34.6	17.7	23.2	1.6	5.8	0.2	1.1	5.3	7.9

ANNEX 9: VECTOR DENSITY

District	Nyagatare		Gisagara ¹²		Bugesera		Kirehe		Ngoma	
	Total Collected	Vector Density	Total Collected	Vector Density	Total Collected	Vector Density	Total Collected	Vector Density	Total Collected	Vector Density
Sep-15	20	0.33	21	0.35	68	1.133	126	2.1	232	7.73
Oct-15	22	0.37	18	0.30	10	0.167	42	0.70	107	3.57
Nov-15	18	0.3	5	0.083	6	0.1	28	0.47	30	1.00
Dec-15	5	0.08	8	0.13	11	0.183	22	0.37	7	0.23
Jan-16	2	0.03	11	0.18	4	0.067	2	0.03	1	0.03
Feb-16	18	0.30			16	0.267	14	0.23	17	0.57
Mar-16	52	0.87			22	0.367	16	0.27	45	1.50

¹² Ento monitoring was not conducted in Gisagara District starting February 2016. The MOPDD/AIRS agreed to sample three districts for entomology monitoring; thus Gisagara was excluded

ANNEX 10: PARITY

			Total Collected	Total Dissected	Total Parous	% Parity
Sep-15	Gisagara	Nyanza	10	8	6	62.0
		Gikonko	152	51	25	
	Ngoma	Remera	420	80	26	32.5
	Kirehe	Gatore	188	61	35	46.5
		Nyamugali	65	28	10	
	Bugesera	Nyarugenge	95	27	13	36.6
		Musenyi	5	4	1	
	Nyagatare	Nyagatare	712	98	53	13.5
Karangazi		13	13	0		
Oct-15	Kirehe	Gatore	675	100	31	23.6
		Nyamugali	42	31	5	
	Ngoma	Remera	371	98	56	57.1
	Bugesera	Nyarugenge	29	20	13	49.2
		Musenyi	7	6	2	
	Nyagatare	Nyagatare	830	96	30	37.7
		Karangazi	171	59	26	
	Gisagara	Gikonko	79	38	2	2.6
Nyanza		15	14	0		
Nov-15	Kirehe	Gatore	272	70	18	14.4
		Nyamugali	78	33	1	
	Ngoma	Remera	95	40	4	10.0
	Bugesera	Nyarugenge	7	3	0	5.6
		Musenyi	15	9	1	
	Nyagatare	Nyagatare	434	74	9	16.1
		Karangazi	103	40	8	
	Gisagara	Gikonko	18	9	0	0.0
Nyanza		3	2	0		

			Total Collected	Total Dissected	Total Parous	% Parity
Dec-15	Nyagatare	Nyagatare	132	46	15	16.3
		Karangazi	53	33	0	
	Ngoma	Remera	7	4	2	50.0
	Kirehe	Gatore	83	40	20	29.8
		Nyamugali	43	21	2	
	Bugesera	Nyarugenge	4	4	2	41.7
		Musenyi	13	9	3	
	Gisagara	Gikonko	10	6	1	8.3
Nyanza		2	2	0		
Jan-16	Gisagara	Gikonko	157	55	17	30.9
	Ngoma	Remera	170	58	20	34.0
	Bugesera	Nyarugenge	10	5	0	0.0
		Nyagatare	49	24	6	20.0
	Kirehe	Gatore	12	8	0	0.0
		Nyamugari	17	12	0	
Feb-16	Kirehe	Gatore	81	35	9	26.3
		Nyamugari	30	26	7	
	Ngoma	Remera	46	24	14	58.3
	Bugesera	Nyarugenge	9	4	2	53.0
	Nyagatare	Nyagatare	116	41	23	65.5
		Karangazi	12	4	3	
Mar-16	Kirehe	Gatore	89	36	17	23.6
		Nyamugari	16	7	0	
	Ngoma	Remera	158	57	19	33.3
	Bugesera	Nyarugenge	56	21	0	0.0
		Musenyi	6	2	0	
	Nyagatare	Nyagatare	808.0	68.0	22.0	28.9
Rukomo		491.0	63.0	16.0		

ANNEX II: PEOPLE TRAINED TO IMPLEMENT IRS

Categories of Persons Trained	Training on IRS Delivery										Other Trainings														Total		
	Training of Trainers		Spraying Operations		Data Capture		Logistics Training		Technical Maintenance		Structure Enumeration/IEC TOT		Structure Enumeration/IEC Training		Poison Control		Environmental Compliance		Coveralls Washing		Fire Security		Finance			Transport Security	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		M	F
Sector coordinators	18	7																									25
Sector Supervisors	45	35																									80
Spray Operators			428	578																							1,006
Team Leaders			123	117																							240
Data Entry Clerks					8	9																					17
Logisticians							1	3																			4
District Store Keepers							1	1																			2
Sector Store Keepers							12	16																			28
Finance Assistants																							1	3			4
Pump Technicians									2	0																	2
District IEC Assistants											1	1															2
Sector IEC Assistants & Supervisors											79	52															131
Cell IEC Mobilizers													83	45													128
Village IEC Mobilizers													1,741	152													1,893
Adverse Effects Teams (Clinicians)															23	10											33
Environmental Compliance Officers																	1	0									1

Categories of Persons Trained	Training on IRS Delivery										Other Trainings										Total						
	Training of Trainers		Spraying Operations		Data Capture		Logistics Training		Technical Maintenance		Structure Enumeration/IEC TOT		Structure Enumeration/IEC Training		Poison Control		Environmental Compliance		Coveralls Washing			Fire Security		Finance		Transport Security	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		M	F	M	F	M	F
Washers																			34	55							89
Security Guards																					52	0					52
Drivers																								76	1	77	
TOTAL M/F	63	42	551	695	8	9	14	20	2	0	80	53	1824	197	23	10	1	0	34	55	52	0	1	3	76	1	3,814
TOTAL/Training	105		1,246		17		34		2		133		2,021		33		1		89		52		4		77		3,814

ANNEX 12: ENVIRONMENTAL MITIGATION AND MONITORING REPORT – THE PMI AIRS PROJECT

- **The Environmental Reporting Form (EMMR)**, submitted annually with the End of Spray Report (EOSR)
- This form reports on the results of applying the mitigation measures described in the Mitigation Plan and identifies outstanding issues with respect to required conditions. In some cases, digital photos will be the best way to document mitigation and should be included in the report.

The EMMR must be completed by the Implementing Partner. The EMMRs are reviewed and approved by the COR and the BEO (and/or MEO, as appropriate). Any sub- awards, sub-grants, and sub-activities must incorporate provisions stipulating a) the completion of an annual environmental monitoring report and b) that activities to be undertaken will be within the scope of the environmental determinations and recommendations of this IEE. This includes assurances that any mitigating measures required for those activities be followed.

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.	ECO and district coordinators inspected vehicles to be used during IRS operations to see if they met IRS standard requirements. A total of 77 vehicles were inspected and hired for the support of the IRS operations in the four districts.	Vehicles that did not meet PMI IRS requirements (such as insurance, strong benches for SOP to sit on, etc.) were not contracted and old fire extinguishers were replaced with new ones.	
Ib. Driver training	77 drivers were trained on safety issues (including wearing coveralls while on IRS field operations).	In this years spray campaign , we did not have any problem with drivers not following our instructions of wearing coverall and other compliance requirements.	
Ic. Cell phone, personal protective equipment (PPE) and spill kits on board during pesticide transportation.	In this spray campaign, spray operator transportation vehicle inspections revealed that all vehicles had spill kits on board during the transportation of spray operators.		
Id. Initial and 30-day pregnancy testing for female candidates for jobs with potential pesticide contact.	Training and screening of SOPs in order to see those who were unhealthy and pregnant. All female SOPs and washers were tested for pregnancy and 13 (2 pregnant case and 11 unit out of the total screened were eliminated after positive results.	Two women found pregnant were assigned to cell IEC mobilizer positions.	
Ie. Health fitness testing for all operators	All SOPs, washers, and supervisors were medically tested for health and fitness. A total of 1,347 SOPs were screened for health and fitness and the 13 found to be unfit were excluded from participating in IRS operations	In this years spray campaign,we used the updated lists of medically tested SOPs submitted by hospital directors.	
If. Procurement of, distribution to, and training on the use of PPE for all workers with potential pesticide contact.	Training on the use of PPE was conducted for all SOPs, there was no case of adverse effect resulting from insecticide contact.		
Ig. Training on mixing pesticides and the proper use and maintenance of spray pumps.	All SOPs were trained on mixing pesticides before spraying.	Before spray camapaign, all SOPs had formal training on mixing insecticide before spraying.	

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
1h. Provision of adequate facilities and supplies for end-of-day cleanup,	Washing soap and other supplies were available at all operational sites to facilitate end of day clean up. There were 459 smartphone-based end of day cleanup inspections during the campaign and no cases the unavailability of soap and water for cleanup were reported.	No outstanding issues	
1i. Enforce clean-up procedures.	The seven-barrel progressive rinsing procedure was performed by all SOPs. Of the 459 end of day cleanup inspections conducted, there was only few cases of the cleanup not being supervised, The non-compliant issues identified during the inspections included: washing of the outside of pumps; rinsing of PPE; SOPs washing hands and face; Overalls being cleaned; flooding of soak pits draining of water into soak.	All non-compliance issues were immediately corrected.	
2a. IEC campaigns to inform homeowners of responsibilities and precautions.	IEC campaigns were effectively carried out before the campaign. A total of 1893 Village IEC's (1741 males and 152 females) conducted IEC campaigns to inform homeowners of responsibilities and precautions. Village IEC's were being supervised by 128 Cell IEC's (83 males and 45 females).	No outstanding issues	
2b. Prohibition of spraying houses that is not properly prepared.	In general, households were prepared before spraying activities were conducted. During the campaign, 501 homeowner preparation inspections were conducted and there were no issues with houses not being properly prepared. All our SOPs did not spray a house which was not prepared.		
2c. Two-hour exclusion from house after spraying	Supervisors informed homeowners of a two-hour exclusion from house after spraying.	SOPs and supervisor facilitated each other in empasizing the massage of two hour exlusion from the house to homeowners	

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
2d. Instruct homeowners to wash itchy skin and go to health clinic if symptoms do not subside.	There were no reported case (out of 501 total inspections) of homeowners being exposed to Insecticide. Before spraying started, all homeowners were being instructed to be away from an exposure to insecticide.		
3a. Indoor spraying only.	Sector coordinators and supervisors emphasized indoor spraying only. There were no cases of SOPs spraying outdoor surfaces . All SOPs observed this requirement.		
3b. Training on proper spray technique	Training of SOPs was conducted with application of spraying techniques. There were few cases of SOPs not in compliance with the spray speed and 5 cm swath overlap guidelines.	The few raised issues on spraying techniques were addressed immediately by IRS supervisors.	
3c. Maintenance of pumps	A pump technician was placed at each district warehouse to repair and maintain pumps before and during IRS operations. There were reported few cases of a pump found to be leaking and they were immediately repaired.	Leaking pumps were repaired after being identified by SOPs. No outstanding issues were reported	A greater effort have been done during our ToT's and SOP trainings to train SOPs to report on time any leaks discovered so that repairs are done before going out to the field.
4a. Choose sites for disposal of liquid wastes according to PMI BMPs.	Contaminated liquid wastes to be disposed in soak pits. All soak pits for the disposal of liquid waste were chosen and inspected and determined to be ready for operations prior to the beginning of the spray campaign. The pre-seasonal environmental compliance inspection was conducted from 11-15 th January 2016 to verify the soak pits which required rehabilitation and also best sites to construct new soak pit		
4b. Construct soak pits with charcoal to adsorb pesticide from rinsewater.	Re-construction of new soak pits was done before spraying operations. Rehabilitation and reconstruction of some soak pits was done all based on PMI BMP guidelines.	During IRS Operations, we constructed one new soak pit in Nyagatare district because it was found flooding.	
4c. Maintain soak pits as necessary during season.	There was 1 reported case of the soak pit at Rurenge cell Nyagatare district not adequately draining water, but the gravel in the soak pits was found to be adequate.	There was construction of a new soak pit to replace the one which was flooding.	

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
4d. Inspection and certification of solid waste disposal sites before spray campaign.	ECO conducted Certification of solid waste disposal sites before spray campaign. Site visits to all IRS waste disposal areas was done before start of operations.	All our waste disposal sites were in good condition before IRS disposal started. There was no issue of concern.	
4e. Monitoring waste storage and management during campaign.	All wastes at district sectors were properly stored in district stores prior to final disposal.	There are no outstanding issues.	
4f. Monitoring disposal procedures post-campaign.	All IRS wastes were accompanied to disposal sites by storekeepers and logistic assistants.	The ECO was in post inspection activities and our storekeepers and logistic assistants successfully delivered IRS wastes to respective areas.	
5a. Maintain records of all pesticide receipts, issuance, and return of empty sachets/bottles.	Storekeepers are to maintain and check all records of the stock regularly during IRS operations. During the 154 storekeeper performance inspections, there were few instances of non-compliance with stock-keeping guidelines. These cases were all addressed immediately.	Branding and updating stock records was emphasized	Non-compliance with stock-keeping guidelines cases were all addressed immediately
5b. Reconciliation of number of houses sprayed vs. number of sachets/bottles used.	Daily checking of spray performance sheet to verify insecticide usage rate team by team.	In some few sectors insecticide usage rate was low.	Sector teams and Team leaders were instructed to supervise the insecticide usage rate by SOP's.

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
5c. Visual examination of houses sprayed to confirm pesticide application.	Quality control wall bioassay tests were conducted for the first week spray round in February 2016 in twenty four (24) sprayed structures in the two districts. In each of the two districts 2 sectors were selected. In each sector, six (6) structures were sampled. The structures sampled were of three different wall surfaces, namely; plastered & painted (PP), plastered & not painted (PNP) and mud. For each of the three different wall surfaces, two structures were used for the tests. The results showed 100% knock-down after both 30 and 60 minutes post exposure. Mortality rates of 100% in the three different wall surfaces of the structures tested were recorded. The results show that the application of the insecticides was satisfactory. Further monthly wall bioassay tests will be conducted to assess the insecticide decay rates.		
5d. Perform physical inventory counts during the spray season.	Inventory check was done by coordinators, store keepers and supervisors during the spraying periods in all districts sectors.	In IRS operations sites where inventory checks were done by supervisors, records of the stock was proper.	

ANNEX 13: MONITORING AND EVALUATION PLAN MATRIX – FEBRUARY 2016 CAMPAIGN RESULTS

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								
I.1 Procurement								
1.1.1 Number and percentage of insecticide procurements that had a pre-shipment QA/QC test at least 60 days prior to spray campaign	<i>Data source:</i> Project records – insecticide procurements <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	Round 1: 1; 100% Round 2: 1; 100%	Round 1; 100% Round 2: 100%	Round 1: 1; 100% Round 2: 1; 100%	Round 1: 1; 100%	TBD; 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	Round 1: 1; 100% Round 2: 1; 100%	Round 1; 100% Round 2; 100%	Round 1: 1; 100% Round 2: 1; 100%	Round 1; 100%	TBD; 100%	
1.1.3 Number and percentage of international equipment procurements, including PPE, delivered in country, at port of entry, at least 30 days prior to start of spray operations	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	Round 1: 1; 100% Round 2: 1; 100%	Round 1: 1; 100% Round 2: 1; 100%	Round 1: 1; 100% Round 2: 1; 100%	Round 1: 0; 0% ¹³	TBD; 100%	

¹³ AIRS Rwanda received international procurement on the 22th January, and we started IRS Operations on the 15thFebruary

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
1.1.4 Number and percentage of local procurements for PPE delivered 14 days before the start of spray operations	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	Round 1: N/A Round 2: NA	Round 1: N/A Round 2: N/A	Round 1: N/A Round 2: N/A	Round 1: N/A	TBD; 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	Round 1: Acheived Round 2: Achieved	Round 1: Acheived Round 2: achieved	Round 1: Acheived Round 2: Achieved	Round 1: Acheived	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	Round 1: Completed Round 2: Completed	Round 1: Completed Round 2: Completed	Completed	Round 1: 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	Round 1: 26: 15 males 11 females Round 2: 39 Male: 22 Female: 17	Round 1: 25; 100% 14 males 11 females Round 2: 45; 100% 17 males 28 females	Round 1: 33 17 Male 16 Female Round 2: 38 19 Male 19 Female	Round 1: 34; 100% 14 Males 20 Females	TBD; 100%	
1.3.2 Number and percentage of base stores where physical inventories are verified by up-to-date stock records	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	Round 1: 20: 100% Round 2: 36; 100%	Round 1: 20: 100% Round 2: 35; 100%	Round 1: 26;100 % Round 2: 33;100 %	Round 1: 25;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	Round 1: completed Round 2: completed	Round 1: Completed Round 2: Not yet completed	Round 1: completed Round 2: completed	Round 1: Completed	TBD; 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
Component 2: Implement safe and high-quality IRS programs and provide operational management support								
2.1 Planning and Design of IRS Programs								
2.1.1 Annual PMI AIRS country work plan developed and submitted on time	<i>Data source:</i> Project records <i>Reporting frequency:</i> Annually	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
2.1.2 Percentage reduction in project operational expenses per structure from the previous year, excluding insecticide costs .	<i>Data source:</i> Project financial records <i>Reporting frequency:</i> Annually	By Spray Campaign	5%	13.1%	5%	TBD	5%	
2.2 Support of Safety and Health Best Practices and Compliance with USAID and Host Country Environmental Regulations								
2.2.1 SEA/letter reports submitted on time based on schedule agreed upon with the-PMI COR team	<i>Data source:</i> Project records – submitted SEAs/ letter reports <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
2.2.2 Number of spray personnel trained in environmental compliance and personal safety standards in IRS implementation ¹⁴	<i>Data source:</i> Project records – Training reports <i>Reporting frequency:</i> Each spray season	By Spray Campaign By Gender	Round 1: 3,215 Males: 2,301 Females: 919 Round 2: 5,593 Male: 3941 Female: 1652	Round 1: 3,220: Males: 2,269 Females: 951 Round 2: 5,726 Males: 4,120 Females: 1,606	Round 1: 4,047 Round2: 5269	Round 1: 3,793 Males: 2,721 Females: 1,072	TBD	

¹⁴Those are: Sector Coordinators and supervisors, SOP's and Team leaders, Logisticians, Pump technicians, Environmental Compliance Officers, sector IEC's, cell and village mobilizers, clinicians, Washers, security guards and Drivers.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
2.2.3 Number of health workers receiving insecticide poisoning case management training	<i>Data source:</i> Project records – Training reports <i>Reporting frequency:</i> Each spray season	By Spray Campaign By Gender	Round 1: 54 Males: 30 Females: 24 Round 2: 88 Male: 44 Female:44	Round 1: 38 Male: 19 Female: 19 Round 2:93 Males:67 Females:26	Round 1: 30 Round 2: 38	Round 1: 33 Males: 23 Females: 10	TBD	
2.2.4 Number of adverse reactions to pesticide exposure documented	<i>Data source:</i> Incident report forms <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign By Residential/ occupational exposure	Round 1: 0 Round 2: 0	Round 1: 2 Round 2: 1	Round 1: 0 Round 2: 0	Round 1: 2 Occupational exposure: 2	0	
2.2.5 Number and percentage of soak pits and storehouses inspected and approved prior to spraying	<i>Data source:</i> Project records – Reports submitted by district environmental officers <i>Reporting frequency:</i> Each spray season	By Spray Campaign By Soak Pit By Storehouse	Round 1: 40 Soakpit: 20 Storehouse: 20 Round 2: 72 Soakpit: 36 Storehouse: 36	Round 1: 40 Soakpit: 20 Storehouse: 20 Round 2: 70 Soakpit: 35 Storehouse: 35	Round 1: 52 Round 2: 66 Soakpit:26 Storehouse:26 Soakpit:33 Storehouse:33	Round 1: 50 Soakpit: 25 Storehouse: 25	TBD; 100%	
2.3 Conduct Communications Activities and Community Mobilization								
2.3.1 Number of radio spots and talk shows aired	<i>Data source:</i> Project records <i>Reporting frequency:</i> Per spray campaign	By Spray Campaign	Round 1: 60 Round 2: 90	Round 1: 60 Round 2: 84	Round 1:56 Round 2:56	Round 1: 28	TBD	
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	Round 1: 0 Round 2: 0 Brochures	Round 1: 13,358 Round 2: 0 Brochures	N/A	Round 1: N/A	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
		material and message(s)						
2.3.3. Number of people reached with IRS messages via door-to-door mobilization	<i>Data source: Mobilization Data Collection Forms</i> <i>Reporting frequency: Daily per mobilization conducted</i>	By Spray Campaign By Gender	Round 1: 269,084 Males: 119,947 Females: 149,137 Round 2: 480,643 Males: 209,965 Females: 270,678	Round 1: 267,024 Males: 116,647 Females: 150,377 Round 2: 554,302 Males: 199,858 Females: 354,444	Round 1: 332,581 Males: 145,285 Females: 187,296 Round 2: 411,767 Males: 179,877 Females: 231,890	Round 1: 340,068 Males: 154,788 Females: 185,280	TBD	
2.4 Spray Targeted Structures According to Technical Specifications								
2.4.1 Number of structures targeted for spraying	<i>Data source: Previous spray campaign data, enumeration data (targets); Daily Spray Operator Forms (results)</i> <i>Reporting frequency: Daily per spray campaign</i>	By Spray Campaign	Round 1: 126,714 Round 2: 213,271	Round 1: 127,892 Round 2: 220,114	Round 1: 144,417 Round 2: 188,189	Round 1: 150,818	TBD	
2.4.2 Number of structures sprayed with IRS	<i>Data source: Daily Spray Operator Forms</i> <i>Reporting frequency: Daily per spray campaign</i>	By Spray Campaign	Round 1: 107,707 Round 2: 181,280	Round 1: 127,150 Round 2: 215,981	Round 1: 122,754 Round 2: 159,961	Round 1: 147,947	TBD	
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	Round 1: 85% Round 2: 85%	Round 1: 99.4% Round 2: 98.1	Round 1: 85% Round 2: 85%	Round 1: 98.1%	85%	

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
2.4.4 Number of people residing in structures sprayed (Number of people protected by IRS)	<i>Data source:</i> Daily Spray Operator Forms <i>Reporting frequency:</i> Daily per spray campaign	By Spray Campaign By Gender By pregnant women By children <5 years old	Round 1: 503,259 Round 2: 883,674	Round 1: 517,194 Males: 244,275 Females: 272,919 Pregnant Women: 8,489; Children <5: 74,279 Round 2: 889,326 Males: 427,914 Females: 461,412 Pregnant Women: 14,375 Children <5: 132,568	Round 1: 602,198 Round 2: 774,778	Round 1: 618,696 Males: 299,219 Females: 319,477 Pregnant Women: 10,256 Children <5: 90,089	TBD	TBD
Component 3: Ongoing Monitoring and Evaluation and Quality Control Measures								
3.1 Submit AIRS Rwanda M&E Plan to PMI for approval	<i>Data source:</i> Project records <i>Reporting frequency:</i> Semi-annual	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
3.2 Conduct a post-spray data quality audit within 60 days of completion of spray operations	<i>Data source:</i> Spray operations reports <i>Reporting frequency:</i> Per spray campaign	By Spray Campaign	Round 1: NA Round 2: NA	Round 1: NA Round 2: NA	Round 1: NA Round 2: Completed	Round 1: N/A	Completed	

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
Component 4: Contribute to Global and Country-Level IRS Policy Setting and Develop and Disseminate Experiences and Best Practices								
4.1 Number of guidelines/checklists/tools related to IRS operations developed or refined with project support	<i>Data source:</i> Project records – Activity reports <i>Reporting frequency:</i> Semi-annually	By Spray Campaign By Guideline/checklist/tool	Round 1: NA Round 2: 1 ¹⁵	Round 1: NA Round 2: 1	Round 1: N/A Round 2: N/A	Round 1: N/A	TBD	
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	Round 1: NA Round 2: NA	Round 1: NA Round 2: NA	Round 1: 1 Round 2: 1	Round 1: 1 Operational	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	Round 1: 1 Round 2: 1	Round 1: 1 Round 2: 1	Round 1: 2 ¹⁶ Round 2: 2 ¹⁷	Round 1: 2 ¹⁸	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	Round 1: 4 Round 2: 5	Round 1: 4 Round 2: 4	Round 1: 2 Round 2: 2	Round 1: 2	TBD	

¹⁵ We shall add the gender guidelines in our training manuals

¹⁶ 1 presentation per district for district review meeting

¹⁷ 1 presentation per district for district review meeting

¹⁸ 1 presentation per district for district review meeting - Operations

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 5: Contribute to the collection and analysis of Routine entomological and epidemiological data								
5.1 Support entomological monitoring activities and insecticide resistance strategies								
5.1.1 Number of entomological sentinel sites supported by the PMI AIRS Project established to monitor vector bionomics and behavior (vector species, distribution, seasonality, feeding time, and location)	<i>Data source:</i> Entomological reports <i>Reporting frequency:</i> Annually	By Spray Campaign	Round 1: 12 Round 2: 12	Round 1: 12 Round 2: 12	Round 1: 12 Round 2: 12	Round 1: 12	TBD	
5.1.2 Number and percentage of entomological monitoring sentinel sites measuring all the five primary PMI entomological monitoring indicators	<i>Data source:</i> Entomological reports <i>Reporting frequency:</i> Annually	By Spray Campaign	Round 1: 12; 100% Round 2: 12; 100%	Round 1: 12; 100% Round 2: 12; 100%	Round 1: 12;100%; Round 2: 12;100%	Round 1: 12;100%;	TBD	
5.1.3 Number and percentage of entomological monitoring sites measuring at least one secondary PMI indicator	<i>Data source:</i> Entomological reports <i>Reporting frequency:</i> Annually	By Spray Campaign	Round 1: 12; 100% Round 2: 12; 100%	Round 1: 12; 100% Round 2: 12; 100%	Round 1: 12;100%; Round 2: 12;100%	Round 1: 12;100%;	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:</i> Entomological reports <i>Reporting frequency:</i> Annually	By Spray Campaign	Round 1: 12; 100% All four classes of insecticide will be tested at each of the 12 sites Round 2: 12; 100% All four classes of insecticide will be tested	Round 1: 12; 100% All four classes of insecticide are being tested at each of the 12 sites Round 2: 12; 100% All four	Round 1: 12;100% All the four classes of insecticide will be tested at each of the 12 sites Round 2: 12;100% All the four classes of	Round 1: 12;100% All four classes of insecticide are being tested at each of the 12 sites	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
			at each of the 12 sites	classes of insecticide are being tested at each of the 12 sites	insecticide will be tested at each of the 12 sites Round			
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	Round 1: 1 bioassay (24 houses) Round 2: 1 bioassay (24 houses)	Round 1: 1 bioassay (24 houses) Round 2: 1 bioassay (36 houses)	Round 1: 1 bioassay (24 houses) Round 2: 1 bioassay (24 houses)	Round 1: 1 bioassay (24 houses)	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	Round 1: 2 (24 houses) Round 2: 2 (36 houses)	Round 1: 5 (24 houses) Round 2: 6 (36 houses)	Round 1: 4 (24) Round 2: 4(24)	Round 1: 4(24)	TBD	
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	4 replicates per 6 insecticides	4 replicates per 6 insecticides	4 replicates per 6 insecticides	4 replicates per 6 insecticides	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	Round 1: N/A Round 2: N/A	Round 1: N/A Round 2: N/A	Round 1: N/A	Round 1: N/A	TBD	
5.2.2 Number of targeted health facilities with routine epidemiological malaria data collection supported by the PMI AIRS Project	<i>Data source: Epidemiological reports</i> <i>Reporting frequency: Annually</i>	By Spray Campaign	Round 1: N/A Round 1: N/A	Round 1: N/A Round 2: N/A	Round 1: N/A	N/A	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
Component 6 (Cross-cutting): Capacity Building, Knowledge Transfer, Gender Inclusion								
6.1 Increasing the Role of Women and Addressing Gender Barriers								
6.1.1 Number of people trained to deliver IRS in target districts *	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign By Spray Campaign By Gender Percentage of Women Trained	Round 1: 1,179 Males: 525 Females: 654; 55.4% Round 2: 1973 Male: 872 Female: 1101; 55.8%	Round 1: 1,152 ¹⁹ Males: 509 Females: 643; 55.8% Round 2: 2,005 ²⁰ Males: 882 Females: 1,123	Round 1: 1,389 Males:619 Females: 770; 55.5% Round 2: 1,735 Males: 772 Females: 963; 55.5%	Round 1: 1,384 Males: 637 Females: 747; 54%	TBD	
6.1.2 Total number of people trained to support IRS in target districts	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign By Spray Campaign By Gender Percentage of women trained	Round 1: 3,274; Males: 2,394 Females: 880; 26.9% Round 2: 5,622; Male:3,957 Female: 1,665;29.6%	Round 1: 3,237 Male: 2,278 Female: 959; 29.6% Round 2: 5,761 Males: 4,139 Females: 1,622; 28.1 %	Round 1: 3,760 Females: 26.8% Round 2: 5,256 Females: 29.6%	Round 1: 3,814 Males: 2,730 Females: 1,084 Females: 28.4 %	TBD	
6.1.3 Number of women recruited (i.e. number of women on the selection list) for IRS	Data source: Project records – Recruitment reports reports	By Country By Percentage	Round 1: 903; 29.2% Round 2:	Round 1: 903: 29.2% Round 2:	Round 1: 1,033: 27.1%	Round 1: 1,085: 28.4%	TBD	

¹⁹ This includes only: SOP's, TL's, Sector coordinators and supervisors and clinicians

²⁰ This includes only: SOP's, TL's, Sector coordinators and supervisors and clinicians

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
employment	<i>Reporting frequency: Semi-annually</i>	of women recruited	1,625; 28.9%	1,485; 27.5%	Round 2: 1,343: 35%			
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	Round 1: 172; Males: 78 Females: 94 54.7% Round 2: 289; Male: 132 Female: 157;54.3%	Round 1:160 Males: 73 Females: 87 54.4% Round 2: 307 Males: 161 Females:146	Round 1: 109; Round 2: 168	Round 1: 105 Males: 63 Females: 42; 40%	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	Round 1: 2,987 Males: 2,121 Females: 866; 28.9% Round 2: 5,573; Male: 3,948 Female: 1,625; 29%	Round 1: 3,096 Male: 2,193 Female: 903; 29.2% Round 2: 5,395 Male: 3,909 Female:1,486	Round 1: 3,700 Females: 29% Round 2: 6,946 Females: 29.1%	Round 1: 3,528 Males:2, 539 Females: 989 Females: 28%	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 supervise seasonal staff ²¹)	<i>Data source: Project records – Contracts signed</i> <i>Reporting frequency: Semi-annually</i>	By Spray Campaign Percentage of women hired	Round 1: 188; 45.9% Round 2: 338; 45.9%	Round 1: 188; 45.9% Round 2: 329; 44.6%	Round 1: 55% of 507 Round 2: 55% of 687	Round 1: 212; 43.4 %	TBD	

²¹ Those are: District and Sector IEC Assistants, District Logistics and store keepers, TL's, Sector Coordinators and supervisors,, Cell IEC's and M&E Assistants.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
6.1.7 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 trained	Round 1: NA Round 2: 5543; 100%	Round 1: NA Round 2: 5,329 ²² ; 100%	Round 1: 3,508; 92.3% Round 2: 4,941; 94%	Round 1: 3,557; 28.6%	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	Round 1:63 Males: 33 Females: 30; 47.6% Round 2: 100; Males: 52 Female: 48;48%	Round 1: 40 Males: 21 Females:19 47.5% Round 2: 50; 100% Males:38 Females: 12	Round 1:38 Round 2:46	Round 1: 34 Males: 24 Females: 10; 29.4%	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	Round 1: Completed Round 2: Completed	Round 1: Completed Round 2: Completed	Completed	Round 1: Completed	Completed	
6.2.3 Rwanda 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	Round 1: Completed Round 2: Completed	Round 1: Completed Round 2: Completed	Round 1:Completed Round 2: Completed	Round 1: Completed	TBD	

²² This includes sector coordinators, supervisors, SOP's, Team Leaders, Data clerks, Logisticians, District and sector store keepers, District and Sector IEC's, Cell and Village Mobilizers; and, National and District Authorities.

