



U.S. PRESIDENT'S MALARIA INITIATIVE



PMI | Africa IRS (AIRS) Project

Indoor Residual Spraying Task Order Six

RWANDA

END-OF-SPRAY REPORT

SPRAY CAMPAIGN:
SEPTEMBER 18–OCTOBER 10, 2017
AND
OCTOBER 16–NOVEMBER 21, 2017

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ACRONYMS

AIRS	Africa Indoor Residual Spraying
CFV	control flow valve
CHW	community health worker
CS	Capsule Suspension
DCV	data collection verification
DOS	directly observed spraying
EE	Error eliminator
EMSP	Extended Malaria Strategic Plan 2013–2020
GPS	Global Positioning System
HOT	Humanitarian Open Street Source Team
IEC	information, education and communication
IRS	indoor residual spraying
IVM	integrated vector management
M&E	monitoring and evaluation
MOH	Ministry of Health
MOPDD	Malaria and Other Parasitic Diseases Division
OP	organophosphate
PMI	President’s Malaria Initiative
PP	plastered and painted
PNP	plastered, not painted
PPE	personal protective equipment
RBC	Rwanda Biomedical Center
SACCO	Savings and Credit Cooperatives
SEA	Supplemental Environmental Assessment
TL	team leader
TOT	training of trainers
USAID	United States Agency for International Development
WHOPES	World Health Organization Pesticide Evaluation Scheme

EXECUTIVE SUMMARY

Abt Associates (Abt) supports the implementation of indoor residual spraying (IRS) in Rwanda through 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 September 18 to October 10, 2017 in the Kirehe and Nyagatare Districts, and from October 16 to November 21, 2017 in the Gisagara District. Using Actellic 300 Capsule Suspension (CS) an organophosphate (OP), since 2016, AIRS Rwanda targeted 226,526 structures in 31 sectors in the three districts: Nyagatare (14 sectors), Kirehe (12 sectors) and Gisagara (5 sectors) which resulted in full coverage of Nyagatare and Kirehe by PMI and full coverage of Gisagara in cooperation with the Government of Rwanda.

The spray campaign lasted 20 operational days in each site: from September 18 to October 10, 2017 in Kirehe and Nyagatare Districts, and from October 16 to November 21, 2017 in the Gisagara District. (See Table 1.)

AIRS sprayed 231,258 out of 232,966 structures found by spray operators in the targeted districts, accounting for a coverage rate of 99.3%. In total, 919,735 residents received protection, including 131,734 (14.3%) children under five and 14,433 (1.6%) pregnant women.

- AIRS Rwanda prepared homes for spraying and mobilized households in 242,088 structures.
- AIRS Rwanda trained 5,825 individuals, using PMI funds, to support IRS activities in the three districts. Of these, 1,587 were spray operators (630 men and 957 women), 373 were team leaders (TLs; 195 men and 178 women), and 2,865 were village information, education and communication (IEC) mobilizers (2,603 men and 262 women). More than half (60.3%) of all spray operators trained to implement IRS were women. Overall, 30.4% (n=1,769) of all IRS-trained personnel for the September–October 2017 campaign were women. AIRS Rwanda used 182,408 bottles of insecticide to spray 231,258 structures in the three PMI-targeted districts, with a utilization ratio of approximately 1:1.27 bottles to structures sprayed. The Ministry of Health (MOH) provided 5,024 bottles to spray the Musha sector in Gisagara District.
- AIRS Rwanda sprayed 140 dormitories in 13 schools in the three targeted districts, protecting 4,282 residents. Spray operators used 176 bottles of insecticide for these structures.
- AIRS Rwanda incinerated all IRS-contaminated waste (760 kg), including 43,100 used masks. Incineration took place at three incineration plants – at Nyagatare Hospital for waste from Nyagatare; at Kibilizi Hospital for waste from Gisagara; and at Kirehe Hospital for waste from Kirehe. A total of 182,584 empty insecticide bottles, 1,639 hard hats, 1,464 inner parts, 1,913 pieces of headgear, and 5,050 including face shields and other assorted plastic items (damaged barrels, jerry cans and basins) were sent to the Rotassairwa plastics recycling plant. AIRS Rwanda donated 15,216 uncontaminated carton boxes to Cards from Africa Company at Samuduha. AIRS Rwanda disposed of 1,304 used gloves and other uncontaminated waste such as used dried cell batteries at the Nduba dumping site.

- Cone wall bioassays conducted within one week of spraying in September 2017 showed that the average knockdown rate in Kirehe District was 100% in all surveyed houses 60 minutes after exposure, and in Nyagatare District the knockdown rate 60 minutes post exposure was 88.3%, 80%, and 57.5% respectively in plastered and painted (PP) houses; plastered, not painted (PNP) houses; and mud houses, respectively.
- Mortality rates of 100% were recorded on the three different wall surfaces of the structures tested during one-week and one-month post-spraying tests, respectively in all sites in both Kirehe and Nyagatare.
- Assessment in Nyagatare sector of Nyagatare District of the fumigant effect of Actellic one month post spraying, conducted 24 hours post exposure, showed average mortality rates of 90%, 100%, and 85% on PP, PNP, and mud surfaces, respectively.

Table I: AIRS Rwanda IRS Campaign Summary: September 2017

Number of districts covered by PMI-supported IRS	3 (Gisagara, Kirehe and Nyagatare)
Insecticide	OP
Number of structures sprayed by PMI-supported IRS	231,258
Number of structures found by PMI-supported IRS	232,966
Spray coverage	99.3%
Population protected by PMI-supported IRS	919,735 (14,433 pregnant women; 131,734 children under five)
Dates of PMI-supported IRS campaign	September 18–October 10, 2017 in Kirehe and Nyagatare Districts; and October 16–November 21, 2017 in Gisagara District
Length of campaign	20 days in all districts
Number of people trained with U.S. government funds to deliver IRS ¹	2,203

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

I. 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.² Malaria is endemic in Rwanda, with the eastern and southern provinces accounting for over 70% of the disease burden. In the remaining parts of the country, malaria prevalence remains unstable, and largely influenced by climate and altitude. Other contributors are: population density, population movement (especially from areas of low to high transmission), irrigation schemes (especially in the eastern and southern parts of the country), and cross-border movement (especially in the eastern and southeast parts of the country). Until recently, malaria in Rwanda was declining: in 2005, malaria was the leading cause of death among children under five, but by 2008 its prevalence had decreased nearly 50% from 2.6% in 2008 to 1.4% in 2010.. In 2008 and 2011 it ranked 3rd and 11th respectively as a cause of death for children under five. By September 2016 the malaria incidence rate had increased from 112 per 1,000 in 2013–2014 to 308 per 1,000 in 2015–2016. The increase was observed in all provinces, with the largest increases recorded in the eastern and southern provinces.³ The Rwanda Bio Medical Center (RBC)/Malaria and Other Parasitic Diseases Division (MOPDD) of the Rwanda MOH intend to target interventions based on the changing malaria epidemiology, as articulated in the country's insecticide resistance management plan and the Rwanda Extended National Strategic Plan 2013–2020.

IRS has featured among the malaria control strategies applied in Rwanda since 2007. Declining malaria incidence since 2008 in some areas prompted adjustments from district-wide blanket IRS coverage to focal spraying in targeted high-risk areas. Over time, the RBC/MOPDD in collaboration with PMI began to reconsider using district-wide IRS coverage again because of general increases in malaria caseloads. PMI has funded much of the IRS in Rwanda. In August 2011, PMI contracted Abt to implement IRS in Rwanda under the AIRS Project for a three-year period. This was followed by another three-year task order (the PMI AIRS Project) which began in September 2014, and now the PMI VectorLink Project which began in September 2017. The September–November 2017 spray campaign was the 17th round implemented since IRS started in Rwanda. In this spray campaign, AIRS Rwanda sprayed 31 sectors in three districts of Kirehe (all 12 sectors), Nyagatare (all 14 sectors) and Gisagara (5 of 13 sectors), with a total of 226,526 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, including 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 Rwanda Extended National Strategic Plan 2013–2020.

- Safe and correct insecticide application to minimize human and environmental exposure to IRS insecticides, in compliance with the Safer Use Action Plan portion of the Supplemental Environmental Assessment (SEA)
- Coordination of IEC, sensitization, and mobilization activities with other stakeholders to raise 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 to the MOH/MOPDD during spray rounds.

Spray campaigns implemented by AIRS Rwanda since 2012 are summarized in Table 2.

Table 2: Spray Campaigns Implemented by AIRS Rwanda Since 2012

Year	Month	Number of Districts	Structures Sprayed	Population Protected	Insecticide Used
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	147,947	618,696	Carbamate
	Sep/Oct	2	198,970	812,714	OP
2017	Sept/Nov	3	231,258	919,735	OP

2. PRE-SEASON ACTIVITIES

2.1 SELECTION OF IRS DISTRICTS AND SECTORS

AIRS Rwanda in collaboration with the MOPDD and PMI selected three districts, Gisagara, Kirehe and Nyagatare, for IRS during the September 2017 campaign (see Figure 1 below). The IRS districts selection was based on the malaria burden reported in epidemiological data from health facilities. AIRS Rwanda targeted 226,526 structures for spraying in 31 sectors.

Figure 1: Map of Rwanda Showing the three IRS Target Districts

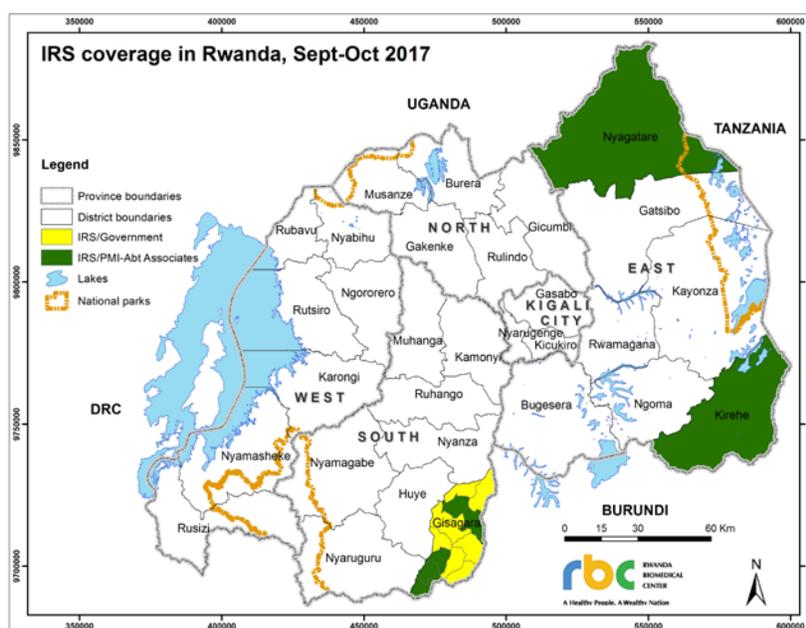


Table 3 summarizes the structures and population targeted in the 31 sectors.

Table 3: Targeted Structures for IRS Round 17

District	Number of Sectors	Number of Targeted Structures	Targeted Population		Total Targeted Population
			Females	Males	
Gisagara	5 of 13	26,248	56,566	50,194	106,760
Kirehe	12 of 12	85,873	179,496	165,919	345,415
Nyagatare	14 of 14	114,405	240,384	226,915	467,299
Total	31 of 39	226,526	476,446	443,028	919,474

2.2 DISTRICT PLANNING MEETINGS

Following the selection of the targeted sectors in the three IRS districts, AIRS Rwanda intensified collaboration and coordination with stakeholders. AIRS Rwanda organized a one-day micro-planning meeting with local leaders in each of the three districts to discuss and develop an IRS operational plan and to agree on the roles and responsibilities of each of the partners. Micro-planning meetings with districts and sector authorities were conducted in July 2017 for Nyagatare and Kirehe Districts and in October 2017 for Gisagara District. In all three districts the MOPDD facilitated invitations to counterparts from local government, district hospitals, and health centers. Among the key issues for discussion were recruitment of IRS seasonal staff, field simulation trainings of spray operators, the electronic data (E-data) collection pilot in Nyagatare District, and supervision at the sector level. The MOPDD/MOH endorsed the required operational collaboration expected from the local government counterparts and in each district. The issues discussed during the micro-planning meetings included:

- Recruiting IEC mobilizers and spray operators, including an emphasis on hiring women
- Community mobilization plan for IRS
- Identifying operation sites and storage space for IRS materials at the operation sites
- Role of districts/sectors in the provision of IRS operational site offices and stores
- IRS walk-to-work strategy (see Section 4.1)
- Field simulation trainings of spray operators
- E-data collection pilot in Nyagatare District
- Role of local leaders in supervision of IRS activities during the IRS operations
- Participation at weekly meetings at the sector level

During the meetings, sectors that had more than 60 spray operators and in which spray operators had to cover vast distances were divided into two operation sites.

In Kirehe and Nyagatare respectively, four sectors received this treatment.

In total, 101 participants (67 men and 34 women) attended micro-planning meetings in Gisagara, Kirehe and Nyagatare Districts.

2.3 INSECTICIDE SELECTION

AIRS Rwanda used an OP, Actellic 300CS, during the September–November 2017 IRS campaign in the three districts. This was the second time using this insecticide in Nyagatare and Kirehe Districts and the first time in Gisagara District. AIRS Rwanda based the selection on data from insecticide susceptibility assays in 2017 showing that the predominant local vector species (i.e., *Anopheles gambiae*) exhibited varying levels of susceptibility to the different classes of insecticides but had 100% mortality rates when exposed to OPs.

In addition, in an effort to manage development of insecticide resistance, specifically pyrethroid resistance, the Rwanda insecticide resistance management plan⁴ states that spraying should be phased to a carbamate for two years followed by an OP (pirimiphos-methyl or Actellic 300CS) for two years. The main strategy is

⁴ Rwanda Strategic Plan for Insecticide Resistance Management in Malaria Vectors (2013–2017).

rotation spraying using different classes of insecticide every two years. A switch to carbamates began in September 2013 in only one district. AIRS Rwanda fully implemented use of carbamate in all IRS districts starting in February 2014, and continued to use carbamate in the subsequent IRS campaigns, up to and including the September 2016 IRS campaign (see Annex A, MOH Letter on Insecticide Choice for 2016/2017, and Annex B, Insecticide Resistance Tests Results).

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 targeted districts. AIRS Rwanda reviewed the inventory records from the previous IRS campaign and assessed logistics needs in April–May 2017, including:

- Available stock of materials, consumables, and equipment
- Transportation arrangements, including hiring vehicles for spray operations and supervision
- Estimates of insecticide, PPE, and spray equipment required
- Mobilization and distribution of equipment, materials, and supplies (see Annex C)

2.4.1 INTERNATIONAL PROCUREMENT

Internationally procured commodities included 159,468 bottles of OP insecticide (Actellic 300CS) from Syngenta and other IRS commodities. Table 4 shows the items and quantities AIRS Rwanda procured internationally.⁵

Table 4: International Purchases

Description	Unit	Quantity in Stock Before Campaign	Quantity Received	Total Quantity	Quantity Used or To Be Disposed of ⁶	Quantity in Stock after the Campaign
Insecticide (OPs, Actellic 300CS)	Bottle	18,094	159,468	177,562	177,562	0
Dust mask	Piece	15,974	35,640	51,614	43,100	8,514
Portable first aid kits	Piece	19	144	163	115	48
Black PVC boots	Pair	2,421	900	3,321	426*	3,095
Face shield visor	Piece	1,669	600	2,269	1,993*	276
Headgear (bracket)	Piece	2,876	600	3,476	887*	2,589
Hard hat (lightweight helmet)	Piece	3,028	600	3,628	1,300*	2,328
USAID/PMI logo	Piece	0	2,000	2,000	1,250	750

⁵ Of these, 5,024 were provided by the MOH to cover the insecticide shortage that AIRS Rwanda encountered in Gisagara.

⁶ The starred (*) items were those which were disposed of (either by incineration, recycling or to be given to seasonal workers)

Description	Unit	Quantity in Stock Before Campaign	Quantity Received	Total Quantity	Quantity Used or To Be Disposed of*6	Quantity in Stock after the Campaign
Lance for Xpert pump	Piece	0	250	250	150	100
100-lb. pressure gauge XP	Piece	50	200	250	153	97
Gasket nozzle XP	Piece	560	500	1,060	1,060	0
Control flow valve (CFV) for Xpert pump	Piece	1,650	250	1,900	276	1,624
Pump strainers (nylon filters)	Piece	150	500	650	350	300
Hose for Hudson Xpert pump, with thrustless shutoff and strainer assembly	Piece	0	150	150	15	135
Cover assembly, complete	Piece	0	100	100	100	0
Hudson Tip Jet 8002 E nozzle (ceramic nozzles)	Piece	0	200	200	0	200
Goizper IK12 vector control sprayer	Piece	0	300	300	0	300
Goizper spare part kit (service kit)	Piece	0	50	50	13	37
Apron	Piece	137	50	187	69*	118
Afripads (sanitary napkins)	Piece	0	1,600	1,600	1,600	0
Poly/cotton coverall	Piece	4,878	2,500	7,378	3,176*	4,202
Standard nitrile glove (long)	Pair	1,709	1,224	2,933	1,304*	1,629
Nitrile glove (full-arm length)	Pair	153	72	225	46*	179
Spray operator bag (backpack)	Piece	0	1,927	1,927	0	1,927
Spray operator pocket guide	Piece	1,409	230	1,639	202	1,437
Team leader pocket guide	Piece	309	98	407	41	366

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
- Stationery and assorted materials
- Operation site refurbishment materials, including materials for soak pits
- Food vendors for spray operator breakfasts and training

Please see Annex C for the detailed list.

2.4.2 MATERIAL DISTRIBUTION TO THE DISTRICTS AND OPERATION SITES

AIRS Rwanda retained IRS materials, such as coveralls, boots, helmets, gloves, masks, and pumps, in Kirehe and Nyagatare District storage facilities, and distributed additional IRS materials to district warehouses to meet additional needs. Other items including respiratory masks and gloves were distributed from the central warehouse to Kirehe and Nyagatare Districts stores in August 2017 and to Gisagara in October. Insecticide was distributed to Kirehe and Nyagatare in September 2017 and to Gisagara in October. AIRS Rwanda based distribution of materials to the operational sites on the number of structures targeted for spraying and the number of support staff (see Table 5).

Table 5: IRS Commodity Distribution To district stores

District	Coveralls	Boots	Complete Helmets	Respiratory Masks	OP Bottles	Pumps
Gisagara	689	317	254	5,040	19,373	230
Kirehe	316	450	400	11,400	70,823	68
Nyagatare	2,000	450	200	16,900	92,391	232
Total	3,005	1,217	854	33,340	182,587	530

2.5 HUMAN RESOURCES REQUIREMENTS

The project recruited and deployed 277 support staff, who provided support during the IRS operations in the three districts. Seasonal staff comprised two district IEC assistants, 15 data clerks, three M&E assistants, three data cleaners, three district storekeepers, 39 sector storekeepers, four logistics assistants, six pump technicians, four finance assistants, 39 sector coordinators, 99 sector supervisors, 39 sector IEC assistants, 18 E-data supervisors, and three office cleaners.

The staff that implemented IRS operations in the sectors included 1,502 spray operators, 373 TLs, 136 washers, 190 cell IEC mobilizers, and 2,865 village IEC mobilizers. Eighty security guards provided IRS support at the sector level. AIRS Rwanda recruited staff 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.

Of the 5,668 people AIRS Rwanda hired as seasonal staff, 30.7% (n=1,739) were women. More than half of hired spray operators (59.7%) were women. Of the 373 TLs, 47.7% were women. Table 6 enumerates the IRS seasonal support staff by gender and district. In the 2016 IRS campaign, 28.4% (n=1,309) of all seasonal staff were women, and (56.4%) of spray operators and TLs were women. The percentage of women spray operators is high relative to in other cadres of seasonal staff, because spray operators are recruited from the community health workers (CHWs) pool at the village level – in each village, two of the three CHWs are women. Notably, AIRS Rwanda employed three women security guards and three women spray pump technicians; these roles have historically been dominated by men. The overall gender distribution of the workforce is highly impacted by the very low percentage of IEC village mobilizers who are women. This is because the pool – village heads and security in charge at the village level – from which we recruit village mobilizers is dominated by males. In future, the project will continue to advocate to district and sector authorities to increase the number of women in community mobilization activities.

Table 6: Seasonal IRS Staff Hired

Staff Position	Total		Percentage of Women Hired
	Men	Women	
District IEC assistants	1	1	50.0%
Data clerks	9	6	40.0%
M&E assistants	0	3	100.0%
Data cleaners	1	2	66.7%
E-data supervisors	10	8	44.4%
E-data TLs	120	125	51.0%
District storekeepers	2	1	33.3%
Sector storekeepers	25	14	35.9%
Logistics assistants	2	2	50.0%
Finance assistants	3	1	25.0%
Sector coordinators	27	12	30.8%
Sector supervisors	53	46	46.5%
Sectors IEC assistants	23	16	41.0%
Spray operators	606	896	59.7%
TLs	195	178	47.7%
Cell IEC mobilizers	123	67	35.3%
Village IEC mobilizers	2603	262	9.1%
Security guards	77	3	3.8%
Washers	44	92	67.6%
Pump technicians	3	3	50.0%
Cleaners	2	1	33.3%
Total	3,929	1,739	30.7%

2.6 IRS TRAINING

AIRS Rwanda reviewed the IRS training curriculum and other training materials and customized them to the Rwandan context. In addition, AIRS Rwanda identified appropriate training sites. The training 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
- Walk-to-work strategy
- Field simulation (“live fire”) training of spray operators
- Gender in IRS
- E-data collection
- mHealth
- IRS facilitation skills

2.6.1 TRAINING OF TRAINERS

AIRS Rwanda organized and conducted a five-day refresher training of trainers (TOT) in collaboration with the MOPDD from August 28 to September 1, 2017. The MOPDD opened the TOT and facilitated some of the sessions, including introduction to malaria control and management of adverse effects. Since most participants had already completed the TOT in September 2016 and other previous IRS rounds, the overall training approach was modified, based on lessons learned in the previous the 2016 September spray campaign, to strengthen skills in handling the OP insecticide, and other IRS implementation skills. The TOT emphasized the steps of insecticide mixing (Actellic 300CS), use of the CFVs, spraying techniques, the walk-to-work strategy, a field simulation of spray operations, E-data collection, gender /freedom from harassment, and supervision. A session on mobile phone supervision highlighted mHealth functionalities, such as daily reporting for performance monitoring tracking and mobile application supervisory checklists.

The TOT also incorporated TL training on: a) how to facilitate TL trainings at sector levels, especially on supervision of spray techniques, b) team leadership skills, c) how to use the directly observed spraying (DOS) checklist in supervising the spray quality, 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 sessions. The participants included 34 IRS sector coordinators, 114 IRS sector supervisors, and 36 IEC assistants. After the TOT, the participants went to different training sites in the IRS-targeted districts to conduct IRS training for spray operators and for

other TLs. AIRS Rwanda based the number of trainers on the number of training participants at each training site. Table 7 shows the gender breakdown of TOT participants.

Table 7: TOT Participants by Gender

IRS Role	Number of Participants		Total
	Men	Women	
Sector coordinators	24	10	34
Sector supervisors	59	55	114
IEC supervisors	21	15	36
Total	104	80	184

Figure 2: IRS TOT wall Practice Training Session



2.6.2 SPRAY OPERATOR AND TL TRAINING

AIRS Rwanda organized and conducted the spray operator and TL trainings on September 11–16, 2017 in Kirehe and Nyagatare Districts, and on October 9–14, 2017 in Gisagara District. The trainings were conducted in close collaboration with district and sector authorities. In the three targeted districts, either sector authorities provided training sites or AIRS Rwanda rented them. AIRS Rwanda rented three training venues in Nyagatare District (Rukomo, Mimuri, and Nyagatare) and one in Kirehe District (Gahara). Sector authorities provided all five training venues in Gisagara, 11 in Nyagatare, and 11 in Kirehe at no cost. The major objective of the training was to equip the spray operators and TLs with the skills to conduct quality IRS.

Before training, all the spray operators 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. These workers included spray operators, TLs, storekeepers, sector supervisors, and sector coordinators.

The hospitals screened all women for pregnancy. Thirteen women were found to be pregnant during the medical examination in the Mimuli and Katabagemu sectors of Nyagatare District, and in the Nyamugali,

Gatore, Musaza, Mahama, Mushikiri and Nasho sectors of Kirehe District. AIRS Rwanda assigned them to cell IEC mobilizer positions, which would not expose them to insecticide.

Additional selection criteria for spray operators and TLs were that they be:

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

The spray operators and TLs attended an intensive five-day theory and practical training (see Annex E), which covered:

- Introduction to malaria control
- Spray techniques and use of CFVs
- Handling and managing insecticides, including steps of insecticide mixing
- Handling and maintaining spray pumps
- Personal and environmental safety
- The walk-to-work strategy
- Field simulation (“live fire”) training of spray operators
- E-data collection
- In-person data collection and filling out data collection forms
- Gender/freedom from harassment
- Basics of IEC for IRS

AIRS Rwanda trained 1,960 spray operators and TLs – see Table 8. One hundred eighty-four facilitators (TOT participants) conducted the training. See Annex D for a detailed illustration of the spray operator program.

Table 8: Spray operators and TLs Trained to Implement IRS

District	Training Sites	Spray Operators Newly Trained			Spray Operators Previously Trained			Facilitators		
		Men	Women	% Women	Men	Women	% Women	Men	Women	% Women
Gisagara	5	18	28	60.9%	98	80	44.9%	14	8	36.4%
Kirehe	12	65	135	65.5%	268	283	51.4%	44	38	46.3%
Nyagatare	14	118	203	63.2%	258	406	61.1%	60	42	41.2%
Total	31	201	366	64.6%	624	769	55.2%	118	88	42.7%
		567 (28.9%)			1,393 (71.1%)			206		

2.6.3 TL TRAINING

In preparation for the September 2017 spray campaign, AIRS Rwanda conducted a one-day training for TLs on September 16, 2017 in all operational sites in Kirehe and Nyagatare, and on October 14, 2017 in Gisagara District. The main objective of the training was to build the capacity and skills of TLs in their supervisory role.

Sector coordinators and supervisors who had received training during the TOT sessions facilitated the TL training, which covered:

- Spray TL responsibilities
- Giving and receiving constructive feedback
- Using the DOS checklist in supervising the spray quality
- Data collection and reporting

AIRS Rwanda trained 373 TLs in the three IRS-targeted districts, as shown in Table 9.

Table 9: TLs Trained by Gender

District	Men	Women	Total
Gisagara	26	17	43
Kirehe	79	61	140
Nyagatare	90	100	190
Total	195	178	373

2.6.4 DATA COLLECTION TRAINING

Between August and September of 2017, 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 spray operators, TLs, IEC mobilizers and data entry clerks. The training focused on the following key topics:

- Data collection forms (SOP and TL forms, IEC village and cell mobilizer forms) and the AIRS supervisory toolkit
- 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
- E-data collection

Mobile data collection and reporting

2.6.5 E-DATA COLLECTION TRAINING

AIRS Rwanda conducted a two-day training of trainers for E-data supervisors on September 4–5, 2017. The training was facilitated by Matthew Boddie, the Data Visualization Developer from Abt’s Data Science, Statistics and Enabling Technologies Division, in close collaboration with the AIRS M&E manager.

In total, 32 E-data supervisors (14 men and 18 women) were trained on collecting and troubleshooting spray data using tablets. The training was designed to provide skills for E-data supervisors on how to:

- Capture data directly on forms that are loaded on a tablet
- Use maps as a guide during spray operations
- Use the List view/Map view
- Employ pre-programmed data entry controls on the tablets to minimize entry of illogical data
- Add non-mapped structures and indicate ineligible structures
- Mark houses specifically for E-data collection purposes
- Use logistical forms (for collecting/returning tablets from/to the storekeeper, and distributing/collecting tablets to/from the E-data TLs

In addition, AIRS Rwanda conducted a series of two-day trainings for E-data TLs in Nyagatare District during the September 7–16 period. These trainings took place in Mimuli, Rukomo, Nyagatare, Matimba and Karangazi, and were facilitated by E-data supervisors under the direct supervision of the AIRS M&E, database and IT managers. The objectives were to strengthen the capacity of E-data TLs to:

- Capture data directly on forms that are loaded on a tablet
- Use maps and Global Positioning System (GPS) as a guide to assist spray operators with the exact location of houses to spray
- Use the List View/Map view
- Add non-mapped houses
- Mark houses
- Synchronize data

In a total, 245 E-data TLs (120 men and 125 women) were trained in 14 sectors of Nyagatare District. Table 10 contains a summary of E-data TLs trained per sector.

Table 10: E-Data TLs Trained, by Gender and Sector of Origin, in Nyagatare District

Sector	Men	Women	Total
Gatunda	6	11	17
Karama	12	4	16
Karangazi	9	21	30
Katabagemu	14	6	20
Kiyombe	8	2	10

Sector	Men	Women	Total
Matimba	4	8	12
Mimuri	4	12	16
Mukama	7	7	14
Musheri	2	11	13
Nyagatare	14	9	23
Rukomo	11	6	17
Rwempasha	4	6	10
Rwimiyaga	14	14	28
Tabagwe	11	8	19
Total	120	125	245

2.6.6 IK VECTOR CONTROL GOIZPER PUMP TRAINING

On August 2, 2017, AIRS Rwanda in collaboration with Goizper organized a training for AIRS Rwanda staff, including the IRS core trainers and the district supervision team, on how to use and maintain IK Goizper pumps. The training was facilitated by Geoffrey Njoroge, Regional Manager of Goizper Spraying. AIRS Rwanda had procured these Goizper pumps, which were to be used for the first time during the September 2017 spray campaign. During this training, participants were taken through the main benefits of IK Goizper pumps; how to assemble the pumps and start them up; calibration and spray techniques; and cleaning and maintenance of the pumps. In total, 19 participants (14 men and 5 women) attended the IK Goizper pump training.

2.6.7 LOGISTICS TRAINING

AIRS Rwanda trained all staff involved in logistics and storekeeping during IRS implementation. Sector coordinators, sector supervisors, and IEC assistants received training on basic skills in logistics and store management during the TOT sessions. AIRS Rwanda conducted a comprehensive two-day training for 45 logistics assistants and storekeepers (19 men and 26 women) on:

- Individual roles and responsibilities in IRS logistics
- Warehouse and commodity management
- Store management and recordkeeping
- 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

2.6.8 WASHER TRAINING

Before starting IRS operations, AIRS Rwanda conducted a one-day refresher training/orientation for 136 washers at the 39 operational sites in the three IRS districts. Sector coordinators, sector supervisors and sector storekeepers managed the refresher training at their respective 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. Table II shows the number of washers trained by gender per district.

Table II: Washers Trained by Gender per District

District	Men	Women	Percentage of Women
Gisagara	2	13	86.7%
Kirehe	18	34	65.4%
Nyagatare	24	45	65.2%
Total	44	92	72.4%

2.6.9 FIRE, TRANSPORTATION AND SECURITY TRAINING

Eighty security guards received orientation on fire security and general security protocol for IRS stores. Ninety-two IRS drivers received orientation on safety procedures while transporting insecticides, and on the use of first aid kits. They also received training on measures to take while transporting spray operators to and from the field, and in case an accident occurred leading to an insecticide spill.

3. INFORMATION, EDUCATION AND COMMUNICATION

AIRS Rwanda collaborated with the MOPDD and district and sector authorities to train implementers in using diverse and effective 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 September 1, 2017. The first objective of the training was to strengthen participants' capacity to train IEC community mobilizers to disseminate IEC and behavior change communication messages. The second objective was to plan, coordinate, and supervise IEC IRS activities. The training included both theory and practical sessions, including mock IRS mobilization, completion of data collection tools, and how to develop and update a community mobilization plan. In addition, the TOT emphasized the key messages to be communicated to IRS beneficiaries on the strong smell of the OP insecticide that has been used since September 2016, to mitigate potential resistance.

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 train IEC mobilizers at the cell and village level, and how to coordinate and supervise all IEC/IRS activities. A total of 184 people (104 men and 80 women) participated in this training. They included two district IEC assistants, 34 sector IEC assistants, 34 sector coordinators, and 114 sector supervisors.

3.1.2 TRAINING OF IEC COMMUNITY MOBILIZERS

AIRS Rwanda recruited IEC mobilizers, and trained them on September 7–8, 2017 in Kirehe and Nyagatare Districts, and on October 9, 2017 in Gisagara District. Training took place at designated training sites in the respective sectors. The trainees had to meet the following criteria: be a cell or village leader and/or in charge of security at the village level; have a record of good conduct; ability to read and write; and be known in 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 on how to:

- Identify eligible structures for IRS in the three 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
- Explain the use of the insecticide (Actellic 300CS) and how to address any potential resistance from beneficiaries related to its strong smell
- Discuss with structure owners their role before, during, and after spray operations to ensure a safe and successful IRS campaign
- Create more long-term or sustainable awareness of the program by involving and engaging key community stakeholders

AIRS Rwanda trained 3,055 mobilizers (329 women and 2,726 men) at the cell and village level. As stated above, the reason for the gender imbalance is that the pool from which we recruit village mobilizers – village heads, and security in charge at the village level – is dominated by men. In the future, the project will continue to advocate to district and sector authorities to increase the number of women in community mobilization activities. Each sector and cell team also developed an individual community mobilization implementation plan. Table 12 shows the number of mobilizers AIRS Rwanda trained, by district.

Table 12: IEC Mobilizers Trained to Implement IRS

District	Number of IEC Mobilizers Trained				Total	Percentage of Women Trained
	Cell		Village			
	Men	Women	Men	Women		
Gisagara	14	8	335	37	394	11.4%
Kirehe	38	22	1,130	94	1,284	9.0%
Nyagatare	71	37	1,138	131	1,377	12.2%
Total	123	67	2,603	262	3,055	10.8%

3.2 DOOR-TO-DOOR MOBILIZATION

AIRS Rwanda conducted door-to-door mobilization for two days in each village; these mobilizations took place at different times from September 18 to October 10, 2017 in Kirehe and Nyagatare Districts and October 16 to November 21 in Gisagara District. During this exercise, village mobilizers reached eligible structures with IRS messages and distributed IRS structure cards to those who had lost or had 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 with the IRS structure number found on the IRS card issued to that structure (Figure 3). AIRS Rwanda mobilized households in 242,088 structures, obtaining a 99.3% IRS acceptance rate. Table 13 contains the results of the mobilization activity. 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 accuracy and completeness.

Figure 3: Mobilization



Table 13: Results of IRS Mobilization

District	Households Sensitized	Adults Reached with IRS Messages		Households Accepting IRS	Percentage of Households Accepting IRS
		Men	Women		
Gisagara	23,880	21,058	27,825	23,381	97.9%
Kirehe	89,939	81,682	100,905	89,581	99.6%
Nyagatare	128,269	120,848	144,012	127,543	99.4%
Total	242,088	223,588	272,742	240,505	99.3%

3.3 IEC COORDINATION

Local leaders at all levels readily provided support during the entire period of spraying. Sector executives and social affairs officers were instrumental in linking spray operations teams to targeted communities. A district IEC staff member in each of the IRS districts coordinated and supervised district IEC activities. They worked closely with the district vice mayors in charge of social affairs and with 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 households in 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 spray operators to give directions to the households in the mobilized structures, facilitated preparations by structure owners, and helped to convince the structure owners who were hesitant about IRS. The IEC mobilizers also noted structures that had not been sprayed on the planned day, and coordinated with spray operators to spray them the following day.

3.4 OTHER IEC ACTIVITIES

3.4.1 IRS LAUNCH

AIRS Rwanda organized a walk for IRS during the official launch of IRS operations in both Kirehe and Nyagatare Districts during September 2017. Among the participants were: district, sector, cell and village authorities; private sector representatives from business entities; schools; health facility representatives; the armed forces (army and police); the media; and the community. The launch event was broadcast live on national radio during the day, and in the evening on two major television stations, Rwanda Television and TVI.

Figure 4: Walk for IRS in Nyagatare District Launch



3.4.2 COMMUNITY MOBILIZATION BY LOCAL LEADERS

Local leaders actively participated in mobilization activities. This was the result of early advocacy and engagement from both AIRS Rwanda and the MOPDD. The sector executive secretaries, social affairs officers, and CHWs' chiefs at the health centers supervised IRS activities and occasionally led IRS teams to mobilize communities, especially where there was resistance. The cell social affairs officers supervised the mobilization activities in their respective cells. In past spray campaigns, AIRS Rwanda had experienced refusals at district centers. This was not the case during the September 2017 spray campaign, because all district and sector authorities, including all health facilities, participated actively in community mobilization in these areas. Additionally, during micro-planning meetings, AIRS Rwanda together with local leaders strategized to start mobilization and spraying in urban centers, so that all refusals were documented and reported to local leaders early enough during spray operations for immediate action.

3.4.3 MONTHLY COMMUNITY WORK (UMUGANDA)

In Rwanda, there is a mandatory morning of community service, from 8:00 a.m. to 11:00 a.m. on the last Saturday of each month; this is called "Umuganda," or community service. By law, all able-bodied citizens between 18 and 65 are expected to participate in voluntary community work. During the spray campaign period, *Umuganda* occurred on September 30, 2017 in Kirehe and Nyagatare Districts; and October 28 in Gisagara District. AIRS Rwanda collaborated with local leaders to include IRS as part of the *Umuganda* agenda and 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 local authorities, specifically the cell and village leaders who were

also the IEC mobilizers. 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 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 would have been otherwise unlikely to open their structures for spraying, leaders made arrangements with the community to conduct IRS as their *Umuganda* day activity.

3.4.4 MASS MEDIA COMMUNICATION

Radio spots were aired twice daily from September 14 to 27, 2017 in Kirehe and Nyagatare Districts; and from October 14 to 27, 2017 in Gisagara District. The key messages 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 about the funding agency.

Mass media communication also included 42 banners at three IRS district offices and at 39 operational sites. The message on the banners was “*Birakureba*” (Kinyarwanda for “This concerns you”). Table 14 presents details of the mass media communication activities during the IRS operations.

Table 144: Mass Media Communication Activities

Dates	Type of IEC Activity/Material	Frequency/Number Produced
September 14–27, 2017 in Kirehe and Nyagatare Districts; and October 14–27 in Gisagara District	Radio spots aired twice daily for each radio station	28 times on Radio Nyagatare station in Nyagatare District 28 times on Rwanda Broadcasting Agency in Kirehe District 28 times on Rwanda Broadcasting Agency in Gisagara District
September 6–October 10, 2017 in Kirehe and Nyagatare Districts; and October 8–November 21, 2017 in Gisagara District	IRS banner	One banner at each IRS district office and one at each operational site
September 30, 2017 in Kirehe and Nyagatare; and October 28, 2017 in Gisagara District	<i>Umuganda</i>	One meeting in every sector

4. IMPLEMENTATION OF IRS ACTIVITIES

The September 2017 IRS campaign was the seventeenth round of IRS implementation since the start of IRS campaigns in 2007 in Rwanda. AIRS Rwanda conducted the campaign from September 18 to October 10, 2017 in Kirehe and Nyagatare Districts; and from October 16 to November 21, 2017 in Gisagara District. Spraying in Gisagara District did not take place concurrently with both Kirehe and Nyagatare. This was because AIRS Rwanda had to wait for the MOH to finalize preparations for the sectors it was in charge of so that spraying in the entire Gisagara district could take place during the same period. On Day One of the spray operations, AIRS Rwanda in collaboration with the authorities conducted a special IRS launch activity in two selected sectors, one in Kirehe District and one in Nyagatare District.

AIRS Rwanda sprayed Gisagara District jointly with the MOH. AIRS Rwanda sprayed four of the 13 sectors of Gisagara District (Gishubi, Kansi, Kigembe and Nyanza), providing all the support required for the spray campaign. AIRS Rwanda also provided operational support for one more sector (Musha) and the MOH provided the insecticide required to spray this fifth sector. The remaining eight sectors were sprayed with full support from the MOH, and AIRS Rwanda provided technical support.

4.1 WALK-TO-WORK STRATEGY

During the September 2017 spray campaign, AIRS Rwanda implemented an innovation called the IRS walk-to-work strategy. The main aim was to reduce costs associated with vehicles used to transport spray operators during spray operations. Additional benefits include reducing the project's carbon footprint, and health benefits to workers of physical activity.

Before implementing the walk-to-work strategy, AIRS Rwanda had conducted a feasibility study on the strategy in March 2017 in both Nyagatare and Kirehe Districts, in collaboration with local leaders (district, sector and cell levels). These leaders provided information on sizes of cells and villages and also discussed the feasibility of the strategy with AIRS Rwanda staff. The AIRS Rwanda staff sampled one sector each in both Kirehe and Nyagatare Districts, and walked the actual distances involved. During micro-planning meetings, AIRS Rwanda further discussed the walk-to-work strategy with district and sector authorities to strategize about its implementation during the September 2017 spray campaign.

The strategy was implemented in all the spray areas in the three districts. Each sector was divided into two zones: Zone A, comprising villages within walking distance of the operation site; and Zone B, comprising villages far from the operation site, to which spray operators had to be transported using vehicles.

Midway into the spray operations, the distances for Zone B were getting shorter while those in Zone A were getting longer. If the distances to be covered by Zone A spray operators at this point were deemed too long, the vehicles would do an extra trip to drop off Zone A spray operators after dropping off the Zone B spray operators, and would pick up both sets of operators in the afternoon after spraying had been completed.

In order to evaluate the effectiveness of the walk-to-work strategy, AIRS Rwanda set three metrics, which were reported on weekly during IRS operations in order to assess success, challenges encountered, and lessons learned:

1. **Average time spray operators took** to reach the villages, spray the average daily eight structures, and report back to the operation site. Generally, spray operators who walked to spray structures spent 5 to 6 hours on average, whereas spray teams that used vehicles took 6–7 hours to achieve their daily spray targets. The majority of spray operators welcomed the walking strategy because it gave them opportunities to start and finish their work earlier and return to the site for end-of-day clean-up without having to wait for trucks. However, a few spray operators objected to having to carry pumps with leftover water and bags full of insecticide bottles in the morning as they went to start spraying.
2. **Average time for the close of the day.** The general observation was that most of the spray operators who walked were closing their day at around 2–3 p.m. End-of-day cleanup was being done earlier for spray teams who walked, because they reached the soak pits earlier compared to spray teams that used vehicles. Teams that used vehicles closed their day around 4 p.m.
3. **Cost comparison.** The walk-to-work strategy saved approximately \$65,643. This was calculated based on the cost of spray operator transport vehicles had we used the traditional IRS operations (\$171,672) in comparison to the cost of using the walk-to-work approach (\$106,029).

4.2 IRS SUPERVISION

A team from AIRS Rwanda, the MOH/MOPDD, PMI, and local authorities at both the district and sector levels supervised IRS. During the IRS campaign, the team ensured supervision of spray operations at all levels, using this structure:

- Spray operators were in teams of four, with one TL supervising each team.
- A sector supervisor supervised four teams. Sector 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 to 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, provided supportive supervision to the district staff in the field from Monday to Thursday every week.
- The MOPDD appointed four staff in the three IRS-targeted districts to work closely with the AIRS Rwanda district coordinator and other supervisors in the field during spray operations.
- AIRS Rwanda implemented 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 (officers of 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 were used to assess the daily performance of spray operators and TLs, adherence to environmental compliance requirements, data collection, and data entry. In addition, during supervision in the field, all supervisors in all targeted districts and sectors used mHealth environmental e-checklists on mobile phones. This promoted real-time tracking and monitoring of issues observed by supervisors during spray operations.

- All of the operational sites used the Performance Tracking Sheet on a daily basis. At the end of each day, sector coordinators submitted summary data from the Performance Tracking Sheet to district coordinators, who 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, challenges experienced during the day, and how the team resolved these.
- AIRS Rwanda maintained a supervision records book in each sector for coordination and consistency. Every supervisor who visited the sector noted their observations and recommendations in the book. The next supervisor would then follow up on the observations and recommendations made by the previous supervisor. Through this practice, performance improved because issues were addressed for specific sectors and not just generally.
- 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 operations.
- AIRS Rwanda received further supervision support from:
 - Bethesda office-based staff, namely
 - The technical program manager for AIRS Rwanda (Ana Maria Paddack), who came to provide short-term technical assistance to AIRS Rwanda
 - The M&E specialist for AIRS Rwanda (Meghan Tammaro), who came to oversee the implementation of an electronic data collection pilot in Nyagatare District
 - The environmental compliance manager for AIRS Rwanda (Alexis Hardie), who came to orient the new AIRS Rwanda environmental compliance officer and provide technical support to AIRS Rwanda during the final pre-spray environmental compliance assessment and start-up of the spray operations
 - The CDC PMI resident advisor (Emily Piercefield), who provided support during spray operator trainings in Nyagatare District and supervision of spray operations in Kirehe District
- In addition, AIRS Rwanda received further supervision support from the GEMS consultant, who conducted field visits in Kirehe and Nyagatare Districts with the mandate of USAID to evaluate environmental compliance in the PMI-supported IRS operations.
- During their visits, the above staff travelled to both Kirehe and Nyagatare Districts. They conducted supervision comprising soak pit and site store audits of IRS equipment and materials, including insecticide and PPE, in compliance with PMI Best Management Practices for DIRS. In addition, they supervised IRS in the field to observe adherence to spray quality techniques during the campaign. They also observed supervision techniques by the site supervisors and TLs and the use of supervision tools. During their supervision, they provided advice on areas to be improved in spray operations, such as stock management and spray quality techniques. More details are available in their trip reports.
- During spray operations, AIRS Rwanda continued to use the DOS checklist to ensure that all spray operators in the field were adhering to high quality standards for spraying, and to standardize spray quality supervision by TLs and other supervisors. TLs used the DOS checklist to supervise insecticide mixing and triple rinsing of insecticide bottles, proper PPE use by all spray operators, use of CFVs during spraying, preparation of households, and application of proper spray techniques. TLs used the DOS form to supervise each spray operator on their team at least once per day. TLs corrected any mistakes (noted on the form as red flags) made by the spray operators,

and noted the errors on the DOS checklist.

Table 15 summarizes the red flags reported via DOS and the main actions taken by AIRS Rwanda to address those red flags.

Table 155: DOS Checklists Completed by TLS and other Supervisors

Number of DOS Completed	Common Errors Found	Action Taken
17,410	<ul style="list-style-type: none"> • Nyagatare: <ul style="list-style-type: none"> ▪ The most common red flag was improper overlap of spray swaths. ▪ The second most common red flag was maintaining the correct speed of spray, i.e., 2 m of vertical wall surface in 5 sec. ▪ The third most common red flag was improper spray distance (45 cm). • Kirehe: <ul style="list-style-type: none"> ▪ The most common red flag was improper spray distance (45 cm). ▪ The second most common red flag was 5 cm overlap with each successive swath. ▪ The third most common red flag was leaks from the Hudson pumps as result of common wear and tear of pumps. • Gisagara: <ul style="list-style-type: none"> ▪ The most common red flag was improper 5 cm overlap with each successive swath. ▪ The second most common red flag was leaks from the pump. ▪ The third most common red flag was improper spraying with the tip of the nozzle 45 cm away from the wall. 	<ul style="list-style-type: none"> • There was close communication between AIRS Rwanda and field teams to address issues reported by DOS checklists. • Customized messages about red flags reported the previous day were sent directly to spray operators, TLs and supervisors in the field on a daily basis. • Daily morning briefings were used to remind TLs to observe spray quality for each spray operator. • In Gisagara, wall practice sessions of 30 minutes were conducted with spray operators who were observed to be weak after end-of-day washing activities on the first three days of spraying.

Table 16 shows the institutions/stakeholders that participated in supervision.

Table 16: Institutions/ Stakeholders that Participated in IRS Supervision

Level	Institution	Responsibilities
National level	MOH/MOPDD/RBC, Rwanda Environmental Management Authority, USAID/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 CHWs at district hospital Sector executive secretaries Sector social affairs In-charge of CHWs at health centers	Close supervision in districts and environmental protection
Other support	AIRS management staff in Bethesda, MD GEMS consultant	Overall supervision for IRS activities Independent environmental compliance field evaluation of PMI/AIRS activities in Rwanda

AIRS Rwanda stressed the need for strict supervision to ensure adherence to IRS best management practices. Some of the practices emphasized were:

- Letting natural light into the structure during spraying, by alternately opening and closing doors and windows so that a) sprayers could see what they were doing, and b) the TL could complete the DOS
- Ensuring proper recordkeeping on stock cards and other store records for insecticide and empty bottles at each sector store
- Conducting physical stock audits twice weekly at every district and sector store, including verifying the use of all inventory recordkeeping forms and verifying that the actual stock in the storeroom at the time of the audit matched the balances listed on the insecticide and empty-bottle ledgers

AIRS Rwanda supervisors met daily in the districts with the district teams to share and discuss challenges and observations from their supervision, for immediate action and feedback to all spray teams. Staff from the MOPDD regularly joined AIRS Rwanda staff in the districts during daily progress-review meetings. During these interactions, the 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.

AIRS Rwanda supervisors occasionally convened at the Kigali office on Mondays during the IRS operations period for a feedback meeting, and to review the progress of IRS activities and plan for key areas of supervision based on reports from the districts.

4.3 MHEALTH

During the spray campaign, AIRS Rwanda used the mHealth 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 had helped develop during the September 2015 IRS campaign. During past IRS campaigns, the project had 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 mHealth for reporting and supervision sped up the process, enabling same-day reporting of issues and immediate follow-up. It was easier to track progress and rectify issues as they arose in the field. The AIRS Rwanda IT specialist, who worked remotely with a consultant from Dimagi, could update the CommCare application configuration on phones as needed.

Before the start of the September 2017 spray operations, AIRS Rwanda deployed 34 mobile phones in Kirehe, 38 in Nyagatare, 12 in Gisagara and 12 to be used by AIRS Rwanda staff and district and sector leaders during supervision. 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:

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

Supervision: Sector coordinators and supervisors used checklists on 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 informed AIRS Rwanda in real time of the challenges encountered in the field. The reports also helped AIRS Rwanda to address gaps noted during supervision, or red-flag issues for immediate action.

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 issues, which in turn led to increased awareness of spray operators and better quality of spraying. (See Annex E for job aid messages that went to seasonal staff.)

The mobile phone application added value to operations in that AIRS Rwanda resolved issues that had been problematic during past IRS spray campaigns. For instance, during the September 2017 spray operations, the project received daily supervisory reports with red flags, but both the M&E manager and IT specialist were able to also retrieve the daily supervisory reports without red flags. This helped AIRS Rwanda to compare the usage rate with the expected number of supervision checklists from each supervisor. Moreover, the AIRS Rwanda IT specialist was trained to upload customized messages that were sent in a timely manner to all seasonal workers to address any reported operations issues.

It is important to note the distinction between the “mHealth” program and the e-data collection pilot. The “mHealth” program encompasses several tools, notably the supervisory forms, job aid messages and the Performance Management Tracker (PMT). The supervisory forms are a suite of tools designed to be used by operations staff to track and measure job performance of spray operators and storekeepers and ensure that best practices are being followed during the campaign. These supervisory forms, along with the job aids, were used in conjunction with the e-data pilot since the e-data pilot did not replace the need for these tools. The e-data pilot and the PMT served a similar purpose, in that they both were

designed to show campaign results in “real time”. Given that the e-data was in a pilot phase, a decision was made to keep the PMT for the 2017 campaign in case AIRS Rwanda experienced any significant challenges with the e-data application.

4.4 LOGISTICS

4.4.1 IRS STORAGE AND INSECTICIDE STOCK MANAGEMENT

AIRS Rwanda distributed IRS commodities from the central warehouse at the Kicukiro Small-Scale Industrial area in Kigali to the targeted district storage facilities. The district-level storage facilities served as distribution centers for insecticide, equipment, and other supplies for IRS operations. A logistics assistant and a storekeeper managed the Kirehe and Nyagatare storage facilities as well as the central warehouse. In Gisagara, the district storage was managed by a logistics assistant only. The logistics and stores management staff ensured distribution and close supervision of supplies and materials. The operation sites in the three districts had 39 storage facilities, all of which were provided to AIRS Rwanda free of charge by the local authorities as an in-kind contribution to the IRS campaign. This arrangement was made possible by the project’s good collaboration with district and sector authorities and health facilities in the three targeted districts. Each sector storekeeper was in charge of storage management at the operation site 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 bottles daily at the sector and district stores. Storekeepers accounted for them by recording how many insecticide bottles each spray operator, team, or operation site had received and used. They documented stock records on stock cards, insecticide distribution tracking sheets, and commodity ledger books.

Each week, the empty bottles were transported from district stores to the Rotassairwa plastics recycling plant in Kigali. Empty insecticide boxes were dismantled and delivered to Cards from Africa for recycling each week during spray operations. (This was done weekly because the district and sector storage facilities lacked the space needed to accommodate both full and accumulated empty insecticide bottles.)

4.4.2 IRS VEHICLES

AIRS Rwanda contracted 72 vehicles for IRS operations in the three districts plus 18 vehicles for E-data collection in Nyagatare District. AIRS Rwanda managed the IRS vehicles so that the teams used 72 vehicles for spray operators’ transportation during the first 18 days of the spray campaign and reduced the number to 44 vehicles during the last two days. This saved U.S. \$3,864.

Table 17 shows the number of vehicles assigned to each district. The September 2017 spray campaign used significantly fewer vehicles than previous spray operations because of the walk-to-work strategy.

Table 17: Distribution of Vehicles in the Districts

District	First 18 Days			Last 2 Days			E Data Collection
	Vehicles for Spray Operators	Vehicles for Supervision	Total	Vehicles for Spray Operators	Vehicles for Supervision	Total	
Gisagara	9	2	11	6	2	8	
Kirehe	26	3	29	16	3	19	
Nyagatare	37	3	40	22	3	25	18

Total	72	8	80	44	8	52	18
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4.5 IRS PAYMENTS

Before the start of spray operations, AIRS Rwanda conducted a one-day refresher training for the three finance assistants. The participants were briefed on their responsibilities to ensure efficient management of funds and facilitation of logistical support. Their responsibilities included:

- Distributing and collecting signed contracts from all the seasonal staff (spray operators, TLs, washers, security guards, and mobilizers)
- Collecting all timesheets for seasonal staff before preparing payroll
- Preparing payroll once it had been approved by the district coordinator and submitted based on the schedule of payments created by the finance manager at the start of the IRS campaign
- Following up with the Savings and Credit Cooperatives (SACCOs) banks (micro-finance banks) to ensure that all the seasonal staff had received their payments and signed their pay receipts
- Collecting invoices from food vendors and taking them to the AIRS Rwanda finance office for payment
- Collecting and reconciling IRS vehicle logs sheets

AIRS Rwanda paid IRS support staff at the district level through their bank accounts by electronic transfer; and paid other seasonal staff at the sector level, including spray operators, TLs, mobilizers, washers, and security guards, by transfer of funds to SACCO micro finance institutions in each sector, having established an agreement with each SACCO for this service. After each payment, a copy of the 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 implementation process, experiences and achievements for the September 2017 spray round
- Review IRS challenges in the three targeted districts and identify recommendations for the next spray cycle
- Reach 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 following categories of people attended:

- District and sector authorities, including army and police commanders in the district
- Hospitals and health center representatives
- MOH/MOPDD representatives
- AIRS Rwanda staff

The number of participants who attended the review meetings is shown in Table 18.

Table 18 Evaluation Meetings Participants

District	Review Meeting Dates	Participants		Total
		Men	Women	
Gisagara	TBD			
Kirehe	November 15, 2017	26	20	46
Nyagatare	October 19, 2017	41	14	55
Total		67	34	101

Discussions in the review meetings were centered on supervision and individual sector IRS performance.

Recommendations from the review meetings included:

- The district/sector authorities should enhance oversight of the recruitment process of spray operators to encourage recruitment of CHWs with previous IRS experience, and to ensure recruitment strictly adheres to criteria set by the MOH.
- The sector and district IRS support staff should coordinate closely with the sector authorities to avoid disruption of IRS activities without sufficient notice.
- The sector authorities should always participate actively in mobilization and implementation of spray operations in their respective sectors to make the work of spray operators easier

during spraying.

- District and sector authorities including health facilities should continue providing storerooms at no cost during the time of IRS operations, so that money saved by not renting storerooms can be used to spray more structures in the future.
- Continued surveillance by village leaders is needed to ensure that the community does not wash or paint the walls before nine months are over.
- Continued surveillance by all leaders is needed to ensure the community members observe all other malaria control interventions.

5.2 INVENTORY

Following completion of IRS operations, AIRS Rwanda transported all commodities from the sector stores to the district stores. The sector storekeepers updated their stock records and handed them 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 F for IRS commodities stock.

6. MONITORING AND EVALUATION

M&E for the IRS campaign closely followed the processes in the annual AIRS Rwanda Work Plan and the AIRS M&E Concept Paper developed by the AIRS Bethesda team.

6.1 KEY OBJECTIVES

AIRS Rwanda M&E activities aim to:

- Emphasize accuracy of data entry and validation processes through comprehensive training and supervision at all levels
- Streamline and standardize data flow, minimize errors, and facilitate timely reporting
- Ensure IRS data security and storage for future reference through the establishment and enforcement of proper protocols
- Document lessons learned and good practices observed in the implementation of project activities to encourage application of best practices in 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 spraying 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; helped M&E and technical staff members produce real-time reports for quick feedback; and helped prevent errors in data collection and entry through programmed audit checks and other data quality assurance measures.

Spray operators collected spray data, which TLs 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 for anomalies and addressed issues with data center staff. Data clerks entered all data within 48 hours of spraying for quality control purposes and timely generation of weekly client spray progress reports. They also filed and archived daily spray operator and IEC/mobilizer forms at each data center, and conducted a daily electronic backup to the AIRS Rwanda server and to an external hard drive for 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 ensure that data quality assurance and control of IRS data were 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 data collection/verification and data entry through comprehensive training and supervision at all levels
- Recruited data clerks and trained them 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 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 the target for tracking spray progress and performance at the sector and district levels.

6.2.2 E-DATA COLLECTION PILOT

During the September 2017 spray campaign, AIRS Rwanda pre-populated electronic maps and mobile devices for data collection and operations management in Nyagatare District. The platform was a cloud-based data recording and management system that allowed spray personnel to electronically collect spray data and GPS coordinates using tablets. The maps and digital data collection/management tool allowed teams to:

- Use maps as a guide during spray operations
- Capture data directly on mobile forms that were loaded onto tablets
- Employ preprogrammed data entry controls on mobile devices to reduce illogical-data errors
- Provide management teams with real-time data availability via a shared, cloud-based monitoring and reporting platform to immediately address campaign challenges and improve spray progress
- Understand with greater confidence and precision the true number of eligible structures

MAPPING

Prior to the mobile data collection pilot in Rwanda, the Humanitarian Open Street Source Team (HOT) provided maps and GIS data to better understand the true number of eligible structures to guide spray operations in Nyagatare District. Once mapped, the GIS data collected during enumeration activities was imported into a cloud-based mobile data collection system, Fulcrum, with GPS points loaded onto tablets/smartphones to guide work in the field.

APPLICATION DEVELOPMENT

Abt’s Data Science, Statistics and Enabling Technologies Division was chosen to develop the electronic data collection tool. The application used the maps developed by HOT and allowed E-data TLs to see a targeted map of the area that was about to be sprayed. Abt staff created an application, based on Abt’s paper-based spray operator data collection tool, that allowed trained E-data TLs to electronically collect all household-level information for the spray campaign.

IMPLEMENTATION

AIRS Rwanda implemented the E-data collection pilot in Nyagatare District, where E-data TLs were collecting household information using tablets. With the support of the home office M&E specialist, Meghan Tamaro, AIRS Rwanda performed the following tasks during supervision of E-data collection implementation:

- Ensured that all tablets had maps and the E-data application downloaded
- Assisted and supervised the E-data TLs who had been tasked with collecting data at the household level
- Worked with the M&E team to ensure that the electronic data collection tool was working as expected and troubleshoot issues as they arose
- Provided guidance to E-data TLs and supervisors on how to perform data quality checks using the new electronic system
- Conducted field visits to supervise spray operator teams, and ensured that supervisors were monitoring performance and compliance issues as outlined in the AIRS Rwanda supervision matrix
- Emphasized to spray operator and M&E teams the need to collect data on non-sprayed (as well as sprayed) structures
- Trained the database manager, M&E manager, and all data clerks on the new data cleaning tool that was being used for the E-data collection pilot

AIRS Rwanda embraced the Core-funded E-data collection pilot in Nyagatare District as a modern method of data collection during IRS operations, but found areas for improvement as follows:

- **Mapped structures provided by HOT.** In implementing the E-data system, AIRS Rwanda used pre-mapped structures that were specified only down to the sector level, not the village level, which is where the progress of spray operations should be tracked. AIRS Rwanda recommends that the application should be used to set boundaries of each village using GPS coordinates in order to map targeted structures village by village.
- **Time constraints during preparations of E-data collection system.** The E-data collection pilot was introduced to AIRS Rwanda in June 2017 and therefore was not in the 2017 work plan. Key activities such as procurement of the tablets, trainings, and developing the application overlapped with IRS operations activities. This created significant challenges that should be avoided in future spray campaigns.
- **The application used in the E-data collection system (Fulcrum) and the cleaning tool used.** A web-based data collection tool, Fulcrum, was developed for the pilot. The tool allowed detailed household-level data entry in the field, as well as the entry of the paper-based totals from spray operator forms. The entry of the totals took more time than anticipated because the geography filter did not filter according to parent region selected (district, sector, cell and village respectively), and this created inefficiencies. Additionally, the Excel-based cleaning tool developed to clean incoming data did not work well, because the sheer volume of data coming into the tool slowed it down and limited its functionality. This meant that data cleaning in Nyagatare District was delayed several days and was not fully completed. The Fulcrum system and cleaning tool need improvement to facilitate quick data entry and cleaning.

6.3 DATA QUALITY ASSURANCE AND CONTROL

AIRS Rwanda used the AIRS M&E supervisory toolkit, which consists of the two tools described below.

- Error eliminator (EE) forms for mobilizer and spray data are designed to 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 forms 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 forms for mobilizer data.
- Data collection verification (DCV) forms are designed to check the accuracy of data collected by spray operators in the field. Supervisors used the DCV forms to ensure that the data written on the daily spray operator forms matched the information reported by households. Supervisory staff (sector coordinators, district IEC assistants, district coordinators, M&E assistants, and Abt staff) used this form to interview households a few days after spraying. The AIRS team incorporated the DCV form in the mHealth checklists accessed via smart phone. Data collected on the mHealth DCV form 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 that the data collected agreed with the spray operator structure data.
- Supervisory staff visited ~3,153 structures (~1.4%) with the DCV form, and compared the data collected using this form with data collected by spray operators on the data collection forms. AIRS Rwanda staff addressed and rectified any discrepancies.

Table 19 shows the number of M&E forms AIRS Rwanda completed during the September 2017 spray operations, errors found, and measures taken.

Table 19 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	24,633	<p>Spray operator and TL forms where insecticide reported on forms did not match with actual insecticide received</p> <p>Total population sleeping under nets (new indicator) not matching with total population living in the structure</p>	<p>The AIRS Rwanda team worked closely with the logistics team to use insecticide distribution cards and other logistics tools to cross-check insecticide issued versus returned. The team urged spray operators to indicate on the spray operator forms the number of insecticide bottles they received immediately after they received them.</p> <p>During morning briefings, TLs were urged to check their teams' forms daily before handing them over to their supervisors, and supervisors were urged to do the same.</p>
Error eliminator for mobilizer data	2,477	<p>Mobilizer forms without mobilizer codes</p> <p>Errors in summations</p>	<p>AIRS Rwanda reminded cell and sector IECs to make sure that they filled out all mobilizer forms completely before submission to data centers. They advised sector IECs to verify all village IEC forms</p>

			before submission to data centers.
Data collection verification	4,963	Cases where the number of people residing in structures and rooms did not match with the data spray operator forms. Cases where spray operators did not record “found and not sprayed” structures on the spray operator form	Corrections were immediately made in the database, and spray operators were advised to report accurate data. The TLs were advised to diligently track all structures found (sprayed and unsprayed) by their teams during spraying, and cross-check these with the spray operator forms.

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. More detail is provided below about the activities 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 prevented data clerks from entering data incorrectly. For this particular campaign, Abt’s Client Technology Center 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). Abt’s Client Technology Center reviewed the IRS cleaning/reporting tool to help data clerks clean and reconcile data. Enough data clerks were hired to allow enough time for one clerk to use the IRS cleaning/reporting tool every day to clean data. As a result, data cleaning in Kirehe was completed one day after 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 in Gisagara and Kirehe Districts. They initially entered spray totals 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 also corrected the paper spray forms and the database, where necessary.

In Nyagatare District, data clerks entered spray totals only into the Fulcrum system, while details were submitted on a daily basis by E-data TLs using tablets. However, data cleaning was incomplete due to the limited capacity of the Excel-based cleaning tool to handle such a huge amount of data. After entering spray totals into Fulcrum, data clerks downloaded both the totals and details from Fulcrum in a comma separated values (csv) file and imported them to the Excel cleaning tool for data cleaning.

Since data cleaning in Nyagatare District was not completed due to the slow functioning of the Excel cleaning tool, AIRS Rwanda used spray totals data in this End-of-Spray Report rather than following the traditional practice of using spray details.

Table 20: Data Collected on Tablets (Details) vs Paper (Totals)

Fulcrum System				
Details	Totals	Difference (Totals-Details)	Percentage Difference	Corresponding Store /Operational Site
7,544	8,292	748	9.0	Gatunda
6,544	8,362	1,818	21.7	Karama
10,971	13,823	2,852	20.6	Karangazi
7,442	9,289	1,847	19.9	Katabagemu
4,128	4,605	477	10.4	Kiyombe
4,326	5,109	783	15.3	Matimba
5,959	8,019	2,060	25.7	Mimuri
5,755	6,631	876	13.2	Mukama
4,283	6,153	1,870	30.4	Musheri
9,988	10,920	932	8.5	Nyagatare
8,080	9,035	955	10.6	Rukomo
3,603	4,559	956	21.0	Rwempasha
10,380	13,291	2,911	21.9	Rwimiyaga
7,932	9,028	1,096	12.1	Tabagwe
96,935	117,116	20,181	17.2	Total

6.3.2 RANDOM SPOT CHECKS

The M&E and database managers performed daily data verification activities for the Access database and Fulcrum to guarantee data quality. They scanned the database and ran spray progress reports to identify anomalies and data entry errors. If they found discrepancies that they could not reconcile at the data center level, the M&E manager contacted the field supervisor to resolve the issue. At the end of every day, the M&E assistant used the 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, 231,258 of the 232,966 structures found were sprayed, resulting in 99.3% spray coverage. A total of 919,735 people were protected, including 14,433 pregnant women and 131,734 children under five (see Table 21).

Table 21: Summary of Rwanda IRS Results for September 2017 Campaign

District	Total Structures Found	Total Structures Sprayed	Spray Coverage (%)	Total Population Protected			
				Men	Women	Pregnant Women	Children <5 Years
Gisagara	26,686	26,614	99.7%	51,365	57,507	1,383	14,886
Kirehe	87,859	87,528	99.6%	168,113	181,716	4,418	48,969
Nyagatare	118,421	117,116	98.9%	223,014	238,020	8,632	67,879
Total	232,966	231,258	99.3%	442,492	477,243	14,433	131,734

6.4.1 SCHOOLS IN IRS TARGET DISTRICTS⁷

AIRS Rwanda sprayed 140 dormitories in 13 schools in the three IRS-targeted districts, protecting 4,282 people. AIRS Rwanda used 176 insecticide bottles for this (see Table 22).

⁷ Spraying of special structures such as dormitories in schools is reported only in the End-of-Spray Report, not in the weekly spray progress reports sent to PMI. ⁸ Only spray operators were found unfit.

Table 22: IRS Results for Schools in IRS Districts

District	Targets for schools	Number of Targets for Dormitories	Number of Schools sprayed	Number of Dormitories sprayed	Population Protected				Found Rooms	Sprayed Rooms	Mosquito Nets Available	Insecticide Used (Bottles)
					Men	Women	Pregnant Women	Children < 5 years				
Gisagara	2	7	2	7	311	568	0	0	0	0	879	18
Kirehe	2	8	2	8	395	293	0	0	11	11	440	58
Nyagatare	9	125	9	125	1055	1660	0	1	187	181	703	100
Total	13	140	13	140	1,761	2,521	0	1	198	192	2,022	176

6.4.2 INSECTICIDE USE

AIRS Rwanda used a total of 182,584 bottles (plus 176 bottles for other structures and schools) during the September 2017 campaign. Those 182,408 bottles of insecticide include 5,024 bottles provided by the MOH to spray the Musha sector in Gisagara District. On average, one bottle sprayed 1.27 structures (see Table 23). Each spray operator used on average 6.8 bottles per day, and sprayed on average 8.8 structures per day.

Table 23: Insecticide Use

District	Total Structures Sprayed	Total Bottles Used	Average Number of Sprayed Structures per Bottle	Average Number of Bottles per Spray Operator per Day	Number of Structures Sprayed per day per Spray Operator
Gisagara	26,614	19,354	1.38	6.3	8.7
Kirehe	87,528	70,764	1.24	7.4	9.2
Nyagatare	117,116	92,290	1.27	6.7	8.5
Total	231,258	182,408	1.27	6.8	8.8

7. ENVIRONMENTAL COMPLIANCE

7.1 ENVIRONMENTAL COMPLIANCE DOCUMENTATION

The PMI AIRS Director of Environmental Compliance and Safety conducted an SEA from April through May 2017 to support the PMI IRS Program in Rwanda. The previous SEA had authorized the use of pyrethroids, carbamate, and OP classes of the World Health Organization Pesticide Evaluation Scheme (WHOPES)-recommended pesticides in all high-risk areas of Rwanda from 2012 through 2016. The updated SEA reauthorizes the use of the same three classes of WHOPES-recommended insecticides, and expands the authorization to include the use of chlorfenapyr and clothianidin (when recommended by the WHO Prequalification) nationwide for the period of 2017–2021. The SEA was prepared in accordance with the provisions of US 22 CFR (216) regarding the use and application of pesticides, and approved by USAID in 2017.

7.2 PRE-SEASON ENVIRONMENTAL ASSESSMENT

The AIRS Rwanda team conducted pre-spray environmental assessments from August 7 to 11, 2017 in Kirehe and Nyagatare Districts and from October 4 to 6, 2017 in Gisagara District at the sector-level operational sites. AIRS Rwanda entered data on smart phones, which was transmitted to a central database on an automated server at Abt's Bethesda office, to generate a work list. The work list was instantly shared with the AIRS Rwanda chief of party, 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 storage facilities, determining the suitability of soak pits from the previous IRS round, and siting locations for new soak pits. All 39 storage facilities at the operational sites were provided to AIRS Rwanda free of charge as an in-kind contribution to the IRS campaign. Some of the stores required minor refurbishments, which generally included fixing double locks and reinforcing doors and windows. AIRS Rwanda hired contractors from the sectors to build new soak pits in some of the sites. In other sites the contractors cleared the soak pits of bushes, added and compacted murrum in the wash area, and fixed a polyethylene sheet onto the murrum. Finally, the contractors repaired and stabilized the fencing around the soak pits. Table 24 shows the details of the refurbishments at the operation sites.

Table 24: Construction and Refurbishments at IRS Operation Sites

District	Number of Operation Sites	Site Refurbished (Soak Pit, Storeroom, Fence, Etc.)
Gisagara	5	5 new soak pits constructed (Gishubi, Kansi, Kigembe, Nyanza and Musha) All 5 offices and storage facilities provided by sector and cell authorities
Nyagatare	18	9 soak pits refurbished 11 new soak pits constructed All 18 offices and a storage facility provided by sector and cell authorities
Kirehe	16	11 soak pits refurbished 5 new soak pits constructed (one each in the Kigina, Kirehe, Nyamugali II, Mahama and Mpanga II sectors) All 16 offices and storage facilities provided by sector and cell authorities

During September 2017 spray campaign, AIRS Rwanda piloted the two new soak pits using the new design in both Kirehe and Nyagatare Districts. The new soak pits were constructed with a sloped wash area, which piped effluent to a separate soak pit. Each soak pit had a fabricated metal cover with locks, which prevents birds and other animals from accessing the soak pit. The covers also prevent leaves and trash from falling into the pit, and inhibit the growth of vegetation, thus eliminating or reducing annual maintenance and potential disturbance of the soak pit layers.

AIRS Rwanda embraced the new soak pit design, since it is more durable and has more space in the wash area. The cost of the new design (approximately U.S. \$774) far exceeds the cost of the traditional soak pits currently being used in other operational sites. The cost of constructing a traditional soak pit is approximately U.S. \$145; it costs about U.S. \$70 to renovate an existing soak pit. Figure 5 shows a comparison between the two soak pit designs.

Figure 5: New Soak Pit Design (Left) & Traditional Soak Pit (Right)



7.3 SAFETY AND ENVIRONMENTAL COMPLIANCE DURING THE SPRAY CAMPAIGN

Before IRS training, all spray operators, washers, and supervisors underwent medical tests in August 2017 to ensure their fitness to participate in the IRS operations. The tests comprised a routine physical examination, pregnancy tests for all women (including storekeepers, sector supervisors, and sector coordinators), and hematocrit and liver function tests (AST, ALT). During the medical examinations, medical personnel found 30 spray operators and washers unfit for IRS operations. Thirteen of them were pregnant women, to whom AIRS Rwanda assigned mobilization duties in their cells. AIRS Rwanda replaced the 30 who were found unfit to carry out IRS activities before IRS training and operations. Table 25 contains the number of spray operators, washers, and supervisors who underwent medical checkups in each IRS district.

Table 25: Medical Checkup for IRS staff

District	Spray Operators, Washers, Storekeepers and Supervisors Examined		Spray Operators ⁸ Found Unfit	
	Men	Women	Men	Women
Nyagatare	410	693	0	4
Kirehe	346	496	0	11
Gisagara	122	149	10	5
Total	878	1,338	10	20

During IRS operations, AIRS Rwanda required all staff to adhere to 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 for exposure to insecticide. PPE included coveralls, gloves, boots, helmets, face shields, neck protection, and dust masks for use during spraying.

Enclosed trucks were used to transport insecticides from the central warehouse to district warehouses. The trucks were certified according to the PMI/AIRS best management practice⁹ 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 procedure 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 for compliance with PMI environmental best management practices.

AIRS Rwanda monitored soak pits throughout operations; used plastic sheeting at the wash areas to ensure that insecticide-contaminated effluent did not pollute the environment; replaced the sheeting where and when it was necessary; and fenced and gated the soak pit and wash areas to ensure there was no unauthorized access. 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

⁸ Only spray operators 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>

before leaving the operational sites for the day. AIRS Rwanda conducted mid-spray environmental compliance inspections during the spray operations in the three IRS districts to ensure adherence to mitigation measures put in place during spray operations. AIRS Rwanda staff, working with the district health environmental officers, used smart phones to conduct the inspections.

The inspection teams assessed the use of PPE during spraying and washing activities; store records and arrangements; transportation of spray operators; and use of warning signs and first aid kits. They inspected fire extinguishers in storerooms. They also ensured correct handling and packing of waste during the operations in preparation for disposal at the end. The teams monitored preparation 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

A team was in charge of adverse effects in each district. 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; their role was to address adverse effects that community members and/or the spray operations support staff might experience during spray operations. Before the start of the IRS operations, the teams received refresher training at each district on management of IRS adverse effects. Only one incident was reported in Nyagatare District (Musheri sector).

Musheri sector incident – Nyagatare District:

A vehicle incident occurred around midday on Thursday, September 21, 2017. The vehicle transporting one seasonal worker (a sector coordinator) and a driver's assistant (hired by the vehicle vendor) was moving uphill. Suddenly, the truck slid backwards and its brakes failed, so that the driver was unable to stop quickly. The driver's assistant, seated at the back, was injured when he reacted by jumping out of the truck. He was immediately transported to Nyagatare Hospital for treatment, but then had to be transferred to nearby Kizugiro Hospital, which unlike the first hospital had a working X-ray machine. He had fractured his humerus. He was treated at Kizugiro Hospital, where his treatment was covered by the group rental insurance provided by the vehicle vendor. Later, AIRS Rwanda provided transportation fees for him to go a referral hospital for further treatment.

7.5 POST-SEASON ENVIRONMENTAL ASSESSMENT

AIRS Rwanda conducted the post-season environmental assessment in the three districts using smart phones. 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 plastic sheets, 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 waste at different sites according to the type generated during the IRS operations. The IRS waste disposal sites included recycling plants for plastics and carton boxes, and dump site and incineration plants at the district hospitals. The incinerators used for IRS wastes had both primary and secondary combustion chambers, with separate burners and blowers for forced air and turbulence. The primary and secondary operating temperatures were recorded manually on a daily basis (minimum 850° C for wastes with chlorine content <1%). The residence time for the gas in the secondary chamber was 2–3 seconds. There was post-combustion gas treatment in the form of a bag filter. The chimney/stack height was 6 meters. IRS waste was incinerated separately without mixing with other hospital waste. Incineration was supervised and witnessed by IRS's ECO and/or the environmental health officer of the district hospital.

AIRS Rwanda disposed of wastes as described below.

Nyagatare

AIRS Rwanda sent 273 kg of contaminated waste (22,212 used masks) from Nyagatare District to the Nyagatare District Hospital incineration plant. A total of 92,390 empty insecticide bottles, 1,639 hard hats,¹⁰ 1,464 inner parts, 1,913 pieces of headgear, including 2,720 face shields and assorted plastics items (damaged barrels, jerry cans and basins) were sent to the Rotassairwa plastics recycling plant. AIRS Rwanda donated 7,699 uncontaminated carton boxes to Cards from Africa Company at Samuduha, and disposed of 635 used gloves and other uncontaminated waste including dry cell batteries, at the Nduba dumping site.

Kirehe

AIRS Rwanda sent 392 kg of contaminated waste (15,898 used masks) from Kirehe District to Kirehe Hospital incineration plant. A total of 70,786 empty insecticide bottles, 1,903 face shields and assorted plastics items (damaged barrels, jerry cans and basins) were sent to the Rotassairwa recycling plant. AIRS Rwanda donated 5,899 uncontaminated cardboard boxes to Cards from Africa Company at Samuduha. AIRS Rwanda disposed of 524 used gloves and other uncontaminated waste such as dry cell batteries at the Nduba dumping site.

Gisagara

AIRS Rwanda sent 95 kg of contaminated waste (4,990 used masks) from Gisagara District to Gisagara Hospital incineration plant. A total of 19,372 empty insecticide bottles, 427 face shields and assorted plastics items (damaged barrels, jerry cans and basins) were sent to the Rotassairwa recycling plant. AIRS Rwanda donated 1,618 uncontaminated cardboard boxes to Cards from Africa Company at Samuduha. AIRS Rwanda disposed of 145 used gloves and other uncontaminated waste such as dry cell batteries at the Nduba dumping site. See Annex G for certificates of incineration.

¹⁰ The hard hats and inner parts have accumulated over time, and because they are old models it has not been possible to get compatible accessories with which to match them to make them functional.

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. MOPDD staff worked with AIRS staff to facilitate IEC and spray operator TOTs. The training created a pool of trainers for the future (depending on their availability).

Those trained in the IEC and spray operator TOTs then trained IEC implementers and spray operators at the district and sector levels: cell and village heads and CHW spray operators. AIRS Rwanda supervised IRS operations in collaboration with the MOPDD and district/sector staff (vice mayor for social affairs, district health director, district environmental health officer, and sector social affairs officers). The MOPDD district and sector staff received orientation on IRS supervisory activities.

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

After completing the IRS in October 2017, AIRS Rwanda provided technical support as described below to the MOH's IRS in eight sectors of Gisagara District and Mahama refugee camp in Kirehe District.

8.2 TECHNICAL SUPPORT FOR MOH IRS OPERATIONS

AIRS Rwanda, with PMI approval, lent materials and equipment to the MOH to support spray operations in Gisagara and in the Mahama refugee camp. Table 26 shows the list of materials, all of which were returned to the AIRS Rwanda warehouse after the spray campaign.

The MOH IRS started on October 30, 2017 in the Mahama refugee camp and on November 6, 2017 in Gisagara District. AIRS Rwanda appointed two staff to provide full-time support to the two districts (one in each), and provided technical support for trainings, environmental compliance, stores management, and data entry and management during MOH IRS operations.

Table 26: List of Materials Lent to MOPDD

Number	Item Description	Unit	Quantity lent
1	Xpert spray pumps	Pce	80
2	Helmets (complete)	Pce	102
3	Water tanks (1,000 L)	Pce	2
4	Rinsing barrels (100 liters)	Pce	14
5	Pump repair kits	Box	2
6	Boots	Pair	102
7	Gloves	Pce	204
8	Coveralls	Pce	204
9	Sheeting	Pce	70
10	Washing brushes	Pce	21
11	Toothbrushes (for cleaning nozzles)	Pce	88
12	Jerry cans	Pce	20
13	Basins	Pce	20
14	Metallic buckets	Pce	4
15	Digital thermometers	Pce	2
16	Fire extinguishers	Pce	4
17	Reflective jackets	Pce	25
18	Pliers	Pce	2
19	Wrenches	Pce	2
20	Screwdrivers	Pce	20
21	Neck protectors	Pce	176
22	Strainers	Pce	70
23	Spades	Pce	4
24	Sandboxes	Pce	8
25	Aprons	Pce	9
26	Computers for data entry	Pce	10

8.3 IRS CAPACITY STRENGTHENING FOR DISTRICT AND SECTOR MANAGERS

AIRS Rwanda in collaboration with PMI and the MOH/RBC/MOPDD conducted an assessment in 2016 to determine the country's capabilities and identify which areas needed strengthening. Among the latter were trainings of district and sector managers from districts classified as high malaria endemic that had not received training in 2015. AIRS Rwanda trained these district and sector managers in June–August 2017 on IRS planning and implementation.

Between June 20 and June 22, 2017, AIRS Rwanda in collaboration with PMI and the MOPDD conducted a three-day training to strengthen the skills and knowledge of IRS district managers from Gatsibo, Kirehe, Ngoma, Nyanza and Huye Districts. The general objective of the training was to strengthen the

trainee' ability to plan, implement, supervise, and evaluate IRS operations at the district and sector levels.

The specific objectives of the training were to:

- Outline the steps to prepare for an IRS campaign
- Describe best practices in community spray operations
- Evaluate IRS warehouse and storeroom management, ensuring adherence to minimum standards
- Assess IRS environmental compliance, using a standardized checklist, and recommend improvements for any activities that did not meet the standard
- Guide community mobilizers and community leaders to effectively deliver key messages for IRS
- Use IRS data to effectively monitor the program and make informed decisions
- Train seasonal workers using participatory methods and interactive facilitation techniques
- Promote gender awareness in IRS and explain steps that every individual can take to ensure greater gender inclusion in IRS

Participants during capacity strengthening for IRS district managers comprised hospital directors, M&E officers, district logistics officers, district hospital environmental health officers, procurement officers, and the in-charge of CHWs at district hospitals. The 42 participants included 31 men and 11 women.

Between July and August of 2017, AIRS Rwanda in collaboration with PMI and the MOPDD conducted four-day trainings in Gatsibo, Kirehe, Nyanza and Huye respectively to strengthen the capacity of IRS sector managers on operations implementation. The general objective of the training was to ensure that sector managers can effectively demonstrate current best practices for spray operators, storekeepers, community mobilizers, and other seasonal workers, and supervise these workers. The specific objectives of the training were to:

- Correctly explain and demonstrate key technical skills for spray operators, storekeepers, and community mobilizers
- Demonstrate best approaches to seasonal worker trainings
- Discuss the importance of planning a gender-inclusive training
- Describe best practices in community spray operations
- Guide community mobilizers and community leaders to effectively deliver key messages for IRS
- Use IRS data to effectively monitor the program and make informed decisions
- Train seasonal workers using participatory methods and interactive facilitation techniques

In total, 214 participants (133 men and 81 women) attended the capacity strengthening for IRS sector managers in the four districts. Table 27 below shows the numbers trained by gender in each district.

Table 27: IRS Capacity Strengthening for Sector Managers

District	Men	Women	Total
Nyanza	26	24	50
Huye	30	20	50
Kirehe	30	22	52
Gatsibo	47	15	62
Total	133	81	214

8.4 REVISION OF THE RWANDA NATIONAL STRATEGIC PLAN FOR INTEGRATED VECTOR MANAGEMENT

As part of the capacity-building assistance after the 2016 assessment, AIRS Rwanda jointly with the MOPDD and PMI agreed on the need to contextualize IRS guidelines. This was achieved through revision of the Rwanda National Strategic Plan for Integrated Vector Management (IVM), since IRS is a key component of IVM. AIRS Rwanda hired a consultant, Dr. John Githure, who worked in country with the RBC/MOPDD and partners for a period of 30 days during the period of August 15 through September 20, 2017 to review the strategic plan, which was set to expire in 2017. The review of the plan was also motivated by the fact that the MOPDD had developed the Extended Malaria Strategic Plan 2013–2020 (EMSP), which provides guidance on the priority interventions that will be implemented in accelerating and scaling up malaria control interventions by all stakeholders. The EMSP also embraces IVM as a major approach in its implementation plan, with the aim of maintaining the effectiveness of vector control despite the current threat of insecticide resistance in Rwanda. Finally, the review of the IVM strategy helped the RBC/MOPDD to align it with the EMSP.

9. ENTOMOLOGY

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

In this report, we provide data on wall bioassays; all other components are reported in a separate entomology report.

9.1 WALL BIOASSAYS

AIRS Rwanda conducted cone bioassays in 24 sprayed structures on three different wall surfaces – mud, plastered and not painted (PNP), and, plastered and painted (PP) in Kirehe and Nyagatare Districts within one week of the spraying (T0) and two consecutive months post spraying (T1 & T2) to assess the quality and decay rates of the sprayed insecticide. Tests were also conducted on control surfaces known to have no insecticide. The tests were conducted using susceptible *An. gambiae* s.s. (from the Kisumu colony). Two- to five-day- old female mosquitoes were introduced into transparent cones fixed at different heights on the treated surfaces (0.5 m, 1 m, and 1.5 m). These mosquitoes remained in contact with the wall for 30 minutes and were then cautiously removed from the cones and transferred to clean paper cups covered by a net. Mortality was recorded after a 24-hour holding period.

9.2 FUMIGANT EFFECT OF PIRIMIPHOS-METHYL

AIRS Rwanda also assessed the fumigant effect of pirimiphos-methyl in Actellic one month post spraying in one sector (Nyagatare) of Nyagatare District. This test was conducted in six houses with different types of wall surfaces (two PPs, two PNPs and two mud) by placing a small wire cage covered with untreated polyester netting material on a stool one meter high, placed approximately 10 cm from a sprayed wall. Ten female *An. gambiae* s.s. were added to the cage and exposed for 30 minutes. A knockdown rate of 30 minutes was observed, and then mosquitoes were removed from the cage using an aspirator and transferred to paper cups and provided with sugar solution. Mortality was recorded after a 24-hour holding period. The average test mortality rates were 90%, 100% and 85% on PP, PNP and mud surfaces respectively.

9.3 RESULT OF CONE BIOASSAYS

The mortality rate of the anophelines of the susceptible reference Kisumu strain exposed to the treated walls was 100% on three different wall surfaces tested one week (T0) and the two consecutive months (T1 & T2) after spraying. The mortality rates were 100% regardless of the position of the cones on the treated walls. This demonstrates the homogeneity of the treatment and the good quality of the treatment.

10. GENDER MAINSTREAMING

AIRS Rwanda implemented all planned activities in the gender mainstreaming initiative in the operational plan. These are described below.

- *Training:* AIRS Rwanda incorporated gender sessions in all IRS training materials for discussion during the IRS training (TOT, mobilizer, and spray operator training); and appointed gender focal points at the district and sectors levels among the IRS support staff.
- *Increased recruitment of women:* AIRS Rwanda used micro-planning meetings with all district and sector authorities to discuss the importance of increasing the number of women spray operators by recruiting only CHWs with previous IRS experience. AIRS Rwanda also continued to advocate to the MOH to increase the number of women. As a result, out of the 5,668 people AIRS Rwanda hired as seasonal staff, 30.7% (n=1,739) were women. More than half of hired spray operators (59.7%) were women and 373 TLs, 47.7% were women. AIRS Rwanda revised all vehicle tender advertisements and encouraged vehicle vendors to hire at least 30% women drivers during IRS operations. The project employed three women pump technicians in the three targeted districts to work with the current pump technicians at district warehouses to encourage women to apply for technical positions traditionally considered men's jobs. AIRS Rwanda will continue to advocate for recruitment of more women for all IRS activities.
- *Gender-friendly work environment:* AIRS Rwanda ensured the work environment was suitable for mixed-gender teams by constructing separate standalone double bathrooms and showers for both men and women in each operational site.
- *Distribution of Afripads to women seasonal workers:* AIRS Rwanda distributed 1,600 sanitary pads (608 in Kirehe and 992 in Nyagatare Districts) to women seasonal workers during September 2017. This product, a "Deluxe Menstrual Kit," contains reusable sanitary pads that enable women to manage their periods effectively for 12+ months. AIRS Rwanda procured sanitary pads to eliminate menstruation as a possible barrier to women's participation in the spray campaign. Before distribution, AIRS conducted training for all district and sector gender focal points (34 women), who then conducted a session on female hygiene and the care and use of the reusable pads for all women seasonal workers at each operational site.
- *Alternative duties for pregnant IRS workers:* AIRS Rwanda assigned 13 pregnant spray operators the responsibility of mobilization in their cells of residence.
- *Gender awareness guidelines and messages:* AIRS Rwanda developed new gender awareness guidelines in Kinyarwanda and posted these at each operational site to encourage professionalism and mutual respect. In addition, AIRS Rwanda prepared gender messages and disseminated these regularly to all seasonal workers throughout the spray campaign, to enhance gender awareness and encourage women and men to express any gender-related issues encountered during IRS operations.
- *Gender norms survey:* Since September 2015 and during subsequent spray campaigns including in September 2017, AIRS Rwanda has conducted four gender norms and attitudes surveys. The surveys are conducted before the start of the spray campaigns and at the end. The objective

of the surveys was to assess gender norms and attitudes among IRS seasonal workers with regard to decision-making and agency (ability to act on decisions) of men and women within the home. The results from the 2016 spray campaign showed that an average pre score for all respondents was 6.93. The post score rose significantly by 0.84 points to 7.76 ($p < 0.001$), suggesting a shift in attitudes towards more egalitarian perspectives following seasonal employment with AIRS. A separate report will summarize the results across the four AIRS countries that participated in this survey.

II. CHALLENGES, LESSONS LEARNED AND RECOMMENDATIONS

II.1 CHALLENGES

AIRS Rwanda experienced the following challenges during the IRS campaign:

- During September 2017 spray campaign, 5 of the 17,410 DOS checklists completed recorded cases of spray operators not mixing insecticide properly. We also found 117 cases involving spray operators who were directly observed during spraying not to be following spray techniques properly (improper overlap of spray swaths; not maintaining the correct speed of spray, i.e., 2 m of vertical wall surface in 5 seconds; improper spray distance (45 cm). CommCare supervisory reports noted that a few spray operators were not inspecting houses to ensure that all belongings had been removed before spraying houses.
- During the first week of spray operations, some teams that sprayed in remote villages (Zone B in the walk-to-work strategy) did not manage to deliver data and empty bottles to the data entry stations and district warehouses in a timely manner, because they were having to drive long distances and often on bad roads.
- After a successful dress rehearsal, during which everyone's PPE fit correctly, during the first week of spraying a few spray operators and washers were wearing PPE that did not fit them well. The teams had had to return the PPE post dress-rehearsal, and not everyone was able to find PPE that fit when it came time for the actual spraying.
- Performance Monitoring Tracking Reports from the CommCare application were incomplete because the application performed badly.
- The E-data collection pilot in Nyagatare revealed some problems that included too little time for advance preparation (e.g., tablets arrived too late, the training period was too short); targeted structures that were not segregated up to the village level; connectivity issues in some operational sites near Uganda and Tanzania; and poor performance of the Excel cleaning tool and the system for entering totals data through Fulcrum.
- TLs observed mistakes during supervision of spray techniques but were not reporting them on DOS checklists as red flags, perhaps because they had corrected the problem during supervision.
- Supervisors noted that unsprayed structures were not recorded or marked during the first week of spraying, although this issue was not as prevalent as in past campaigns. This was addressed immediately and improvement was noted by the second week of spraying.
- Absence of some households during spraying because of farming duties meant that some structures could not be sprayed.
- Flooding due to heavy rain caused wastewater to infiltrate slowly into soak pits in the Mushikiri and Kirehe sectors in Kirehe District; and in the Musheru, Rwimiyaga II, Katabagemu

I and Matimba sectors in Nyagatare District.

- During the recruitment of spray operators, we encountered a large number of spray operators who were more than 40 years old, which is normally contrary to the recruitment criteria set by the MOH/RBC/MOPDD. The project does not discriminate on the basis of age, per U.S. labor law and Abt's own Freedom from Harassment policy.

11.2 LESSONS LEARNED AND RECOMMENDATIONS

- AIRS Rwanda used more insecticide (7,200 bottles) in Kirehe and Nyagatare Districts than had been planned, and so ran short of insecticide to cover all the targeted sectors in Gisagara. AIRS Rwanda made arrangements with the MOPDD, to make up the deficit stock; AIRS Rwanda covered the operational costs in one site in Gisagara District.
- AIRS Rwanda will continue to enforce messages to spray operators to agitate their pumps frequently before and during spraying to avoid clogging of spray pumps and CFVs. Proper cleaning of CFVs at the end of each work day and provision of screwdrivers to each TL would help alleviate the clogging.
- AIRS Rwanda will continue to communicate to our spray teams through morning briefings, job aid messages and regular supervision to ensure that they all adhere to best practices regarding mixing of insecticide, spray techniques, and removing all belongings in the sprayed houses. Also, regular use of DOS checklists will be emphasized to all TLs and supervisors so that issues of quality of spraying are immediately addressed in the field. We will also reinforce to all spray operators that they are not to exceed 10 structures per day, to ensure high quality of spraying in all sprayed structures.
- AIRS Rwanda will follow up with storekeepers and instruct them to keep coveralls and boots of spray operators and washers organized and labeled by team after the dress rehearsal, so that spray operators can retrieve the PPE that fits them.
- If the E-data collection strategy will be implemented in future campaigns, AIRS Rwanda will ensure that: preparations are made far in advance; the number of training days for E-data TLs will be increased; a robust and fast cleaning tool and Fulcrum system has been developed and obtained; and satellite maps include village boundaries. It will also be important to update the application to collect data on insecticide use.
- To improve TL DOS reporting, AIRS Rwanda will enhance supervision of TLs and encourage them to consistently report issues/red flags noted during supervision even if they have already corrected the spray operators' behavior.
- CHW supervisors at operational sites will be engaged to help coordinate IEC in the sectors and enhance coordination of IRS activities at the community level. AIRS will continue to engage local leaders in mobilizing communities for IRS.
- AIRS Rwanda will adhere to the recruitment procedure for spray operators by engaging 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 smooth IRS implementation and achieving high spray coverage.

- 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 insecticide used, as recorded in the database, with daily logistics records.
- Cell offices provided storage facilities and IRS operation sites where space was unavailable at sector offices.
- Micro-planning meetings with district and sector authorities will discuss the importance of increasing the number of women spray operators by recruiting only CHWs with previous IRS experience. AIRS Rwanda will also continue to advocate with the MOH to increase the number of women mobilizers during IRS operations.
- AIRS Rwanda will be more diligent in supervision of soak pit construction and repairs to ensure that rainwater runoff does not get into soak pits. In addition, siting of soak pits will be done with care, especially in areas that have bedrock very near the surface.
- AIRS Rwanda will continue to distribute sanitary napkins to women seasonal workers in forthcoming spray operations.

ANNEX A: MOH LETTER ON INSECTICIDE SELECTION 2016/2017

REPUBLIC OF RWANDA



MINISTRY OF HEALTH
P.O. Box: 84 KIGALI
www.moh.gov.rw

Ms Marcia Musisi- Nkambwe
USAID Country Mission Director
KIGALI-RWANDA

Dear Mission Director

Kigali, on 20 JUL 2016
N° 20/2395/RBC-IHPDC/2016



Re: Choice of Insecticide for Indoor Residual Spraying 2016 to 2017 in Rwanda

I am honoured to take this opportunity to thank USAID/PMI for all the support it has been providing in the fight against malaria in Rwanda.

Considering the National Strategic Plan for Insecticide Resistance Management in Malaria Vectors 2013-2017, it was planned a rotation of insecticides at a two-year basis as a resistance management strategy for mitigation of occurrence of insecticide resistance. It is in that perspective that there will be a change of the current class of insecticide "Carbamates"(Bendiocarb) that was used in IRS since September 2013 and start using Organophosphate (Pirimiphos Methyl "Actellic") in the spray round of September 2016

We would appreciate again your support under the lead of Malaria and Other Parasitic Diseases Division for the implementation of this strategy with special attention to the environmental compliance and IEC/BCC in accordance to the product.

Yours Sincerely



Dr. Patrick NDIMUBANZI
Minister of State in Charge of
Public Health and Primary Health Care

Cc

- The Permanent Secretary/MoH
- Director General of RBC
- The Deputy DG/RBC
- The Head of IHPDC/RBC
- ✓ The Head of Malaria and OPDD/RBC

Copy Vector Control
unit and file



ANNEX B: INSECTICIDE RESISTANCE TESTING RESULTS^{11 12}

District	Sites	Period	Deltamethrin 0.05%	Permethrin 0.75%	Lambda cyhalothrin 0.05%	Pirimiphos methyl 0.25%	Bendiocarb 0.1%	Fenitrothion 1%	DDT 4%
Bugesera	Gashora	Jan 16	81	68	78	100	97	100	
Nyanza	Busoro	Mar 16	93	98	93	100	99	100	
Gisagara	Gakoma	Mar 16	98	91	97	100	100	100	
Nyagatare	Mimuli	May 16	58	54	29	100	94	100	
Nyagatare	Nyagatare	May 16	68	82	65	100	100	100	
Ngoma	Remera	Mar 17	82	64	67	100	90	100	
Nyagatare	Nyagatare	Mar 17	80	80	58	100	100	100	
Kirehe	Bukora	May 17	98	97	97	100	100	100	
Nyagatare	Mimuli	Jul 17	98	98	85	100	100	98	

ANNEX C: LOCAL PROCUREMENT

Description	Quantity/ Number
IRS Transportation	
Rented vehicles used in micro-planning and logistics assessments	3
Rented vehicles used in IRS implementation	79
IRS supervision vehicles (country office)	3
Rented vehicles that facilitated the post-IRS activities	3
Printing and Photocopying	
Stock cards	5,000

¹¹ Values represent mosquito mortality after 24 hours following one hour exposure to insecticide impregnated papers

¹² 98–100% mortality indicates susceptibility; 80-97% mortality suggests possibility of resistance that needs to be confirmed and < 80% mortality suggests resistance

Description	Quantity/ Number
Goods-issued notebooks	195
Request book	37
Goods receipt note	10
Release request book	6
Spray operator form	27,314
TL form	4,855
Village IEC form	17,902
Cell IEC form	1510
IRS cards	190,151
Spray performance sheets (sector) A3	54
Spray performance sheets (district) A3	8
Daily health TL checklist	7,518
Spill response	153
Material data safety sheet	68
Emergency response	142
Daily summary report for sector coordinators	595
Insecticide distribution card	858
Error eliminator form for spray data	9,208
Photocopies of assorted documents	60,000
Sector store commodity ledger book	10
Training Manuals	
Training and facilitation skills for IRS	2
Approaches for training IRS seasonal workers	2
Facilitator guide for spray operators	78
Facilitator guide for storekeepers	2
Facilitator guide for TLs	78
Facilitator guide for health workers	2
Facilitator guide for wash person	39
Facilitator guide for security guards	39
Facilitator guide for drivers	2
Facilitator guide for data entry clerks	2
Facilitator guide for community mobilizers	78
Facilitator guide for pump technicians	2
Assorted Materials	
Sisal rope – cylinder roll, 80 m length, 2 mm diameter	20
Bathing soap (protex – 250 mg)	694
Dry cell batteries (for torches) tiger head	9,603
Duracell batteries for digital thermometers	79
Powder soap 100 g white	3,272

Description	Quantity/ Number
Powder (face) tin	1,544
Neck protector	882
Reflective jackets for TLs	244
Reflective jackets for supervisors	238
Screw driver	61
Liquid washing soap (jerry cans) 5 liters	5
Liquid hand washing soap (small bottle/tin)	12
Lubricant oil, original 125 ml (general purpose)	684
Empty sacs (100 kg)	706
Empty boxes (cartons) standard	510
Cloth line (roll)	11
Chalk (packets of 100 sticks)	414
Aspirin (tin of 1,000 tablets)	3
Toothbrush (for cleaning nozzles) with soft bristles	250
Heavy duty brush (with soft bristles for washing coveralls)	140
Washing/laundry soap (Tembo pieces)	1,856
Fire extinguishers (5 kg)	16
Torches (high-quality)	2,230
Polyethylene sheeting rolls	3
Polyethylene sheeting/tarpaulin	166
Polyethylene sheeting/normal	86
Pump hangers (wooden)	46
Banners	36
Jerrycan, plastic 20 liters	258
Plastic cup (calibrated cups)	536
Rinsing barrels (100 ltrs)	150
Plastic spade	25
Digital thermometer	5
Dustbin, plastic	6
Dustbin (sanitary)	1
Megaphone	2
PMI logo printed on metal	7
Stick measure (45 cm)	53
Stick measure (60 cm)	11
Stop watch	47
Measuring cylinder/jug	20
Hazardous sign (site)	2
Tape measures	10
Smart phones for mHealth activity	39

Description	Quantity/ Number
Stationery	
Clear sheet protector, A4 size	400
Pens, blue color	5,831
Notebooks	5,721
Paper reams	37
HP cartridges 53A	4
Permanent markers (box)	81
Flipchart pads	15
Flipchart stand	2
Meter ruler (100 cm)	61
Register book	19

ANNEX D: SPRAY OPERATOR TRAINING PROGRAM

Timing	Day 1	Day 2	Day 3	Day 4	Day 5
	Your Equipment	Your Skills	Practice Sessions	Practice Sessions	Practice Sessions
8:00–8:30	Opening: Welcome & Introductions	Review of Day 1	Review of Day 2	Review of Day 3	S19: Course Review (Review of Key Concepts)
8:30–09:15	S1: Introduction to Malaria Prevention and Indoor Residual Spraying	S6: Introduction to Spray Techniques	S7: Spray Technique Practice (cont'd.)	S7: Spray Technique Practice (cont'd.)	S14: Field Simulation Trainings of Spray Operators (cont'd.)
09:15–10:15	S2: Spray Operator Safety Procedures (Use of PPE; Safety of Population and Environment; and Insecticide Exposure, Spill and Treatment)	S7: Spray Technique Practice	S7: Spray Technique Practice (cont'd.)	S14: Field Simulation Trainings of Spray Operators	S14: Field Simulation trainings of Spray Operators (cont'd.)
10:15–10:30	Break	Break	Break	Break	Break
10:30–11:30	S3: Using Your Equipment (Introduction to the Spray Pump, Parts of Compression Pump, Handling and Pump Maintenance)	S7: Spray Technique Practice (cont'd.)	S7: Spray Technique Practice (cont'd.)	S14: Field Simulation Trainings of Spray Operators (cont'd.) S15: Calibration of Compression Pump	S20: IRS Payment: Timesheet SACCO/Account Number
11:30–12:30		S7: Spray Technique Practice (cont'd.)	S11: Triple-Rinse Practice; and Cleaning of Nozzles and CFVs		
12:30–13:30	Lunch	Lunch	Lunch	Lunch	Lunch
13:30–14:30	S4: Insecticide Mixing Procedures Clogging of CFVs and how to address primary causes of	S8: Working with the Community	S12: Recordkeeping for IRS (Identifying Eligible Structures; Marking Houses; Daily Spray Record and Practice; Completing	S16: Spray Operator Ethics	Final Assessment Closing

Timing	Day 1	Day 2	Day 3	Day 4	Day 5
	Your Equipment	Your Skills	Practice Sessions	Practice Sessions	Practice Sessions
14:30– 15:30	S5: Beginning the Spray Day (Starting the Day, Morning Meeting, Checking out Equipment and Daily Evaluation)	S9: Gender Awareness in IRS	the Daily Spray Operator Forms)	S17: Comprehensive Skills Practice	
15:30– 16:30	Dress Rehearsal	S10: Close of the Spray Day	S13: Walk-to-Work Strategy, and E-data Collection	S18: Performance Monitoring (Spray Operator Targets)	
16:30 16:45	End-of-day	End-of-day feedback	End-of-day	End-of-day feedback	

ANNEX E: JOB AID MESSAGES SENT TO SEASONAL STAFF

Time	Recipient	Message	Total Number To Be Submitted in a Spray Season
What time of day should this message be sent? Sprayers are not allowed to have phones during the work day.	Who will receive this message		
06:30h	Spray operators, TLs, supervisors, and sector coordinators	Full PPE use remains mandatory for the length of the spray operation.	2
06:50h	Spray operators, TLs, supervisors, and sector coordinators	To ensure the safety of all seasonal staff and community, report health status and any adverse effect to your supervisor.	1
07:00h	Spray operators and TLs	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.	2
07:30h	TL	Remember, your spray nozzle should be 45 cm from the surface. Spray pressure is between 35 and 55 psi.	2
09:00h	Spray operators, TLs, supervisors, and sector coordinators	Eating, drinking or smoking during the spraying period will result in dismissal. It is not allowed.	2
13:30h	TLs	TLs MUST carefully check the filled spray operators' data collection forms at the close of the day before submitting to the supervisors.	2
13:30h	Sector coordinators	a. Number of team members. Structures found. Number of structures sprayed. Number of insecticide units used.	1
14:00h	Cell and sector IECs and sector coordinators	Ensure mobilizers notify the communities to prepare a day ahead of the arrival of the spray team.	2

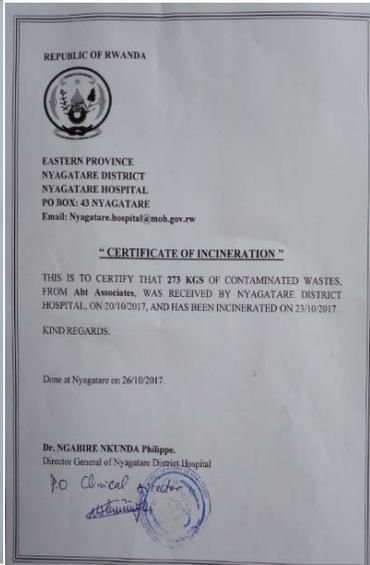
Time	Recipient	Message	Total Number To Be Submitted in a Spray Season
14:30h	Spray operators, TLs, washers, security guards, supervisors, and sector coordinators	Other work-related harassment is unwelcome: deliberate or repeated unsolicited verbal, physical, or visual contact, or solicitation of favors, that is offensive, abusive, intimidating, hostile, denigrating, or demeaning.	1
14:30h	Spray operators, TLs, washers, security guards, supervisors, and sector coordinators	The PMI AIRS Project takes any allegations of sexual harassment seriously. All complaints should be made to your Gender Focal Point at 0786477460 . Please also contact the Rwanda National Police Gender Based Violence Unit at 3512 for further support.	1
15:00h	Spray operators, TLs, washers, security guards, supervisors, and sector coordinators	PMI AIRS Project will not tolerate sexually oriented conduct, whether it is intended or not, that is unwelcome.	2
15:00h	Spray operators, TLs, washers, security guards, supervisors, and sector coordinators	Sexual harassment is defined as: sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature.	1
16:00h	Spray operators and TLs	Remember that only heavy, non-edible, bulky items should be packed in the center of the room and covered with the polyethylene sheet before spraying.	2
16:30h	M&E assistants	Attention! {case.names} have not submitted their SMS report for today.	20
		14	41

ANNEX F: 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 pump (Hudson)	1,667	0	1667	0	1,667
Sprayer pump (Goizper)	0	300	300	0	300
Goizper repair kit	0	50	50	13	37
Pump strainer (nylon filter)	150	500	650	350	300
Hose for Hudson pump	0	150	150	15	135
Cover assembly	0	100	100	100	0
Hudson tip Jet 8002 E Nozzle (ceramic nozzles)	0	200	200	0	200
CFV	1,650	250	1,900	276	1,624
Lance for Xpert pump	0	250	250	150	100
Repair kit (Hudson pump)	15	0	15	12	3
Pressure gauge	50	200	250	153	97
Gasket nozzle XP	560	500	1,060	1,060	0
Wash valve pin	124	0	124	0	124
Dust mask	15,974	35,640	51,614	43,100	8,514
Hard hat (lightweight helmet)	3,028	600	3,628	1,300	2,328
Face shield (visor)	1,669	600	2,269	1,993	276
Head gear (bracket)	2,876	600	3,476	887	2,589
Inner part	2,737	600	3,337	1,996	1,341
Apron	137	50	187	69	118
Portable first aid kits	19	144	163	115	48
Standard nitrile gloves (long)	1,709	1,224	2,933	1,304	1,629
Nitrile glove (full arm length)	153	72	225	46	179
Poly/cotton coverall	4,878	2,500	7,378	3,176	4,202
Black PVC Boots	2,421	900	3,321	226	3095
Insecticide (OP Actellic 300CS)	18,094	164,493	182,587	182,584	0
USAID – PMI logo	0	2,000	2,000	1,250	750
Sprayer bag – backpack	0	1,927	1,927	0	1927

Polythene sheeting/tarpaulin for soak pit and bathrooms (5x5)	14	166	180	78	102
Rinsing barrels (100 ltrs)	227	150	377	42	335
Sandbox (plastic box)	97	0	97	0	97
Water tank (1,000 ltrs)	69	0	69	0	69
Neck protector	3,309	1,764	5,073	0	5,073
Reflective jacket for supervisors (orange)	145	238	383	47	336
Reflective jacket for TLs (green)	80	244	324	0	324

ANNEX G: WASTE DISPOSAL CERTIFICATES



ANNEX H: 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	24	10																								34	
Sector supervisors	80	70																								150	
Spray operators			630	957																						1,587	
TLs			195	178																						373	
Data entry clerks					9	8																				17	
Logisticians							1	2																		3	
District storekeepers							2	1																		3	
Sector storekeepers							16	23																		39	

ANNEX I: ENVIRONMENTAL MITIGATION AND MONITORING REPORT

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
Ia. Pre contract inspection and certification of vehicles used for pesticide or spray team transport	ECO and district coordinators inspected vehicles to be used during IRS operations to see if they met IRS standard requirements. A total of 90 vehicles were inspected and hired for the support of the IRS operations in the three districts. Nyagatare used 55, Gisagara used 9, and Kirehe used 26 vehicles.	Vehicles that did not meet PMI IRS requirements (insurance, strong benches for spray operator to sit on, etc.) were not contracted, and old fire extinguishers were replaced with new ones.	
Ib. Driver training	92 drivers were trained on safety issues (including wearing coveralls while on IRS field operations). They all signed the AIRS Motor Vehicle and Driver Policy before starting their work.	During the 2017 spray campaign, we had one vehicle accident. The vehicle transporting one seasonal worker (a sector coordinator) and a driver's assistant (hired by the vehicle vendor) was moving uphill. Suddenly, the truck slid backwards and its brakes failed, so that the driver was unable to stop quickly. The driver's assistant, seated at the back, was injured when he reacted by jumping out of the truck. He was immediately transported to Nyagatare Hospital for treatment, but then had to be transferred to nearby Kizugiro Hospital, which unlike the first hospital had a working X-ray machine.	To encourage the drivers to keep a close watch on the vehicle operating system To encourage morning briefings regular checks on safety precautions to drivers and seasonal personnel contracted by vehicle vendors Medical insurance for drivers and their driver's assistants will be included in the requirements during vehicle/IRS transportation request for bids.
Ic. Cell phone, PPE, and spill kits on board during pesticide transportation.	Spray operator transportation vehicle inspections revealed that all vehicles had spill kits on board during the transportation of spray operators. Also, all drivers had cell phones and PPE during pesticide transportation in each operational site.		

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
Id. Initial and 30-day pregnancy testing for women candidates for jobs with potential pesticide contact	Training and screening of spray operators in order to see those who were unhealthy or pregnant. All women spray operators and washers were tested for pregnancy and 30 (13 pregnant cases and 17 unfit out of the total screened) were eliminated.	Thirteen pregnant women were assigned to cell IEC mobilizer positions.	
Ie. Health fitness testing for all operators	All spray operators, washers, and supervisors were medically tested for health and fitness. A total of 2,216 spray operators, washers and supervisors were screened for health and fitness and the 30 found to be unfit were excluded from participating in IRS operations.	In this year's spray campaign, we used the updated lists of medically tested spray operators 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 spray operators; there was no case of adverse effects resulting from insecticide contact.		
Ig. Training on mixing pesticides and the proper use and maintenance of spray pumps	All spray operators were trained on mixing pesticides before spraying. Triple rinsing of empty bottles in the field was emphasized during the spray operator training.	All spray operators had formal training on mixing insecticide before spraying. Triple rinsing of empty bottles in the field was emphasized during the spray operator training.	
Ih. 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 551 smart phone-based end-of-day cleanup inspections during the campaign and in no cases were the unavailability of soap or water for cleanup reported.	No outstanding issues.	
Ii. Enforce clean up procedures	The seven barrel progressive rinsing procedure was performed by all	All noncompliance issues were immediately corrected.	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
	spray operators. Among the 551 end-of-day clean-up inspections conducted, there were no cases of unsupervised clean-up.		
2a. IEC campaigns to inform homeowners of responsibilities and precautions	IEC campaigns were effectively carried out before the campaign. A total of 2,865 village IECs (2,603 men and 262 women) conducted IEC campaigns to inform homeowners of responsibilities and precautions. Village IEC was supervised by 190 cell IECs (123 men and 67 women).	No outstanding issues.	
2b. Prohibition of spraying houses not properly prepared	Households were prepared before spraying activities were conducted. During the campaign, 2,394 homeowner preparation inspections were conducted and there were 18 cases of houses not being properly prepared. No spray operators sprayed a house that was not prepared.	These noncompliance issues were addressed in morning briefings of spray operators.	
2c. Two hour exclusion from house after spraying	Supervisors informed homeowners of a two-hour exclusion from house after spraying.	Spray operators and supervisors supported each other in emphasizing the message to homeowners of two-hour exclusion from the house.	
2d .Homeowners are instructed to wash skin with soap and water after showing symptoms of insecticide exposure such as itchy skin. If the symptoms do not subside, the homeowner is advised to visit a health clinic.	Eighteen supervisory inspections identified reports of itchy skin by the homeowners after entering the home. In each case the homeowner followed instructions to wash itchy skin with soap and water and the symptoms subsided. None of the 18 homeowners reported to the health clinic due to symptoms of insecticide exposure.		

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
3a. Indoor spraying only	Sector coordinators and supervisors emphasized indoor spraying only. There were no cases of spray operators spraying outdoor surfaces. All spray operators observed this requirement.		
3b. Training on proper spray technique	Spray operators were trained in spraying techniques. There were few cases of spray operators not being in compliance with the insecticide mixing procedure, spray speed and 5 cm swath overlap guidelines.	The few issues raised on spraying techniques were addressed immediately by IRS supervisors in the field. In some sectors in Gisagara, follow-up training was conducted for spray operators who were observed to be weak after the end-of-day clean-up on Days 1 and 2 of IRS.	
3c. Maintenance of pumps	Two pump technicians (1 male and 1 female) were placed at each district warehouse to repair and maintain pumps before and during IRS operations. In addition, the technician made site visits to fix the pumps with leakages. There were few reported cases of a leaking pump and they were immediately repaired.	Leaking pumps were repaired by pump technicians after being identified by spray operators. No outstanding issues were reported	A greater effort has been made during TOT and spray operator trainings to ensure that any leakages are reported on time so that repairs are done before going out to the field.
4a. Choose sites for disposal of liquid wastes according to PMI best management practices.	Contaminated liquid waste to be disposed in soak pits. All soak pits for the disposal of liquid waste were chosen, inspected and determined to be ready for operation prior to the beginning of the spray campaign. The pre-seasonal environmental compliance inspection was conducted from August 7 to 11, 2017 in Kirehe and Nyagatare Districts; and October 4 to 6, 2017 in Gisagara District, to verify the		

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
	soak pits that required rehabilitation and also best sites to construct new soak pits. Constructed two new soak pits, one each in both Kirehe and Nyagatare Districts.		
4b. Construct soak pits with charcoal to adsorb pesticide from rinsewater.	Construction of new soak pits was completed before spraying operations. Rehabilitation and reconstruction of some soak pits was based on PMI best management practice guidelines.		
4c. Maintain soak pits as necessary during season.	There were six reported cases of the soak pit flooding at Mushikiri and Kirehe sectors in Kirehe District; and Musheru, Rwimiyaga 2, Katabagemu I and Matimba sectors in Nyagatare District. They were not adequately draining water, but the gravel in the soak pits was found to be adequate. The soakpit flooding was mainly due to heavy downpours which caused wastewater to infiltrate slowly into the soak pit.	Two new soak pits constructed, and an existing one was re-excavated to remove mud that was slowing the flow of wastewater. The insecticide-contaminated mud was then buried in a separate pit.	Soak pits will be covered with plastic sheeting during the day when not in use, to prevent waterlogged ground.
4d. Inspection and certification of solid waste disposal sites before spray campaign	The ECO certified solid waste disposal sites before the spray campaign. Site visits to all IRS waste disposal areas were completed before the start of operations.	All our waste disposal sites were in good condition before IRS disposal started. There were no issues of concern.	
4e. Monitoring waste storage and management during campaign	All waste at district sectors was properly stored in district stores prior to final disposal.	There were no outstanding issues.	
4f. Monitoring disposal procedures post campaign	All IRS waste was accompanied to disposal sites by storekeepers and logistic assistants.	The ECO was in post during inspection activities, and storekeepers and logistic assistants successfully delivered IRS waste to	Check on cardboard use at Cards from Africa to be sure they are not being diverted elsewhere.

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
		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 158 storekeeper performance inspections, there were 3 instances of noncompliance with stock-keeping guidelines. These cases were all addressed immediately.	Branding and updating stock records was emphasized	Noncompliance 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	Increased use of insecticide in Kirehe and Nyagatare Districts. During this spray campaign, the insecticide usage rose from average 1.28 structures per bottle in 2016 to average ~1.24 structures per bottle in Kirehe and Nyagatare Districts. The higher usage rate could be attributed to more rooms being sprayed in this campaign in both districts than in the past spray campaigns. In addition, we sprayed approximately 4,366 more structures in both Kirehe and Nyagatare than what we had targeted because of the increased acceptance of IRS from the community.	Sector teams and TLs were instructed to supervise the insecticide usage rate by spray operators.
5c. Visual examination of houses sprayed to confirm pesticide application	AIRS Rwanda continued to use the DOS checklist to ensure that all spray operators in the field adhered to standards for quality of spraying, and to standardize spray quality supervision by TLs and other supervisors. TLs used the DOS checklist to supervise insecticide mixing and triple rinsing of		

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
	insecticide bottles, full PPE use by all spray operators, use of CFVs during spraying, household preparation, and application of proper spray techniques. TLs used the DOS form to supervise each spray operator on their team at least once per day. TLs corrected any mistakes (red flags) made by the spray operators and noted the errors on the DOS checklist.		
5d. Perform physical inventory counts during the spray season.	Inventory check was completed by coordinators, storekeepers, and supervisors during the spraying periods in all districts and sectors.	In IRS operations sites where supervisors conducted inventory checks, records of the stock were complete.	

ANNEX J: MONITORING AND EVALUATION PLAN MATRIX – SEPTEMBER 2017 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% Round 2: 1; 100%	Round 1: 1; 100%	Round 1: 1; 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: 1; 100% Round 2: 0; 0% ¹³	Round 1: 1; 100%	Round 1: 1; 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% ¹⁴ Round 2: 1; 100%	Round 1: 1; 100%	Round 1: 1; 100%

¹³ AIRS Rwanda received international insecticide procurement on August 22, and IRS operations started on September 19, 2016.

¹⁴ AIRS Rwanda received international procurement on January 22, and we started IRS operations on February 15, 2016.

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 Round 2: N/A	NA	NA
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 Round 2: Achieved	Achieved	Achieved
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 Round 2: completed	Completed	Completed
1.3 In-Country Logistics, Warehousing, and Training								
1.3.1 Number and percentage of logistics and warehouse managers trained in IRS supply chain management	<i>Data source:</i> Training records <i>Reporting frequency:</i> Each spray campaign	By spray campaign By gender	Round 1: 26 15 men 11 women Round 2: 39 22 men 17 women	Round 1: 25; 100% 14 men 11 women Round 2: 45; 100% 17 men 28 women	Round 1: 33 17 men 16 women Round 2: 38 19 men 19 women	Round 1: 34; 100% 14 men 20 women Round 2: 38; 100% 15 men 23 women	47 19 men 28 women	45 19 men 26 women
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% Round 2: 32;100%	43; 100%	43;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 Round 2: completed	Completed	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 2: Implement safe and high quality IRS programs and provide operational management support								
2.1 Planning and Design of IRS Programs								
2.1.1 Annual PMI AIRS country work plan developed and submitted on time	<i>Data source:</i> Project records <i>Reporting frequency:</i> Annually	By spray campaign	Completed	Completed	Completed	Completed	Completed	Completed
2.1.2 Percentage reduction in project operational expenses per structure from the previous year, excluding insecticide costs	<i>Data source:</i> Project financial records <i>Reporting frequency:</i> Annually	By spray campaign	5%	13.1%	5%	4.6%	5%	4.6%
2.2 Support of Safety and Health Best Practices and Compliance with USAID and Host Country Environmental Regulations								
2.2.1 SEA/letter reports submitted on time based on schedule agreed upon with the PMI COR team	<i>Data source:</i> Project records – submitted SEAs/letter reports <i>Reporting frequency:</i> Each spray campaign	By spray campaign	Completed	Completed	Completed	Completed	Completed	Completed
2.2.2 Number of spray personnel trained in environmental compliance and personal safety standards in IRS implementation ¹⁵	<i>Data source:</i> Project records – Training reports <i>Reporting frequency:</i> Each spray season	By spray campaign By gender	Round 1: 3,215 Men: 2,301 Women: 919 Round 2: 5,593 Men: 3,941 Women: 1,652	Round 1: 3,220 Men: 2,269 Women: 951 Round 2: 5,726 Men: 4,120 Women: 1,606	Round 1: 4,047 Round 2: 5,269	Round 1: 3,793 Men: 2,721 Women: 1,072 Round 2: 4,915 Men: 3,508 Women: 1,407	5,750 Men: 4,125 Women: 1,625	5,621 Men: 3,941 Women: 1,680

¹⁵ Those are: sector coordinators and supervisors, spray operators and TLs, logisticians, pump technicians, environmental officers, sector IECs, 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 men: 30 women: 24 Round 2: 88 men: 44 women:44	Round 1: 38 men: 19 women: 19 Round 2:93 men:67 women:26	Round 1: 30 Round 2: 38	Round 1: 33 men: 23 women: 10 Round 2: 41 men: 34 women: 7	42 men:35 women:7	: 59 men: 47 women: 12
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 Round 2: 0	0	0
2.2.5 Number and percentage of soak pits and storehouses inspected and approved prior to spraying	<i>Data source:</i> Project records – Reports submitted by district environmental officers <i>Reporting frequency:</i> Each spray season	By spray campaign By regular soak pit By mobile soak pit By storehouse	Round 1: 40 Regular soakpit: 20 Mobile soakpit: 0 Storehouse: 20 Round 2: 72 Regular soakpit: 36 Mobile soakpit: 0 Storehouse: 36	Round 1: 40 Regular soakpit: 20 Mobile soakpit: 0 Storehouse: 20 Round 2: 70 Regular soakpit: 35 Mobile soakpit: 0 Storehouse: 35	Round 1: 52 Regular soakpit:26 Mobile soakpit: 0 Storehouse:26 Round 2: 66 Regular soakpit:33 Mobile soakpit: 0 Storehouse:33	Round 1: 50 Regular soakpit: 25 Mobile soakpit: 0 Storehouse: 25 Round 2: 66 Regular soakpits: 34 Mobile soakpit: 0 Stores: 32	78 Regular soakpit :39 Mobile soakpit: 0 Storehouse: 39	78 Regular soakpit :39 Mobile soakpit: 0 Storehouse: 39

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
2.3 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: 56 Round 2: 56	84 ¹⁶	84 ¹⁷
2.3.2 Number of IRS print materials disseminated	<i>Data source:</i> Project records <i>Reporting frequency:</i> Semiannually	By spray campaign By type of printed material and message(s)	Round 1: 0 Round 2: 0 Brochures	Round 1: 13,358 Round 2: 0 brochures	N/A	Round 1: N/A Round 2: N/A	N/A	N/A
2.3.3. Number of people reached with IRS messages via door-to-door-mobilization	<i>Data source:</i> Mobilization data collection forms <i>Reporting frequency:</i> Daily per mobilization conducted	By spray campaign By gender	Round 1: 269,084 men: 119,947 women: 149,137 Round 2: 480,643 men: 209,965 women: 270,678	Round 1: 267,024 men: 116,647 women: 150,377 Round 2: 554,302 men: 199,858 women: 354,444	Round 1: 332,581 men:145,285 women: 187,296 Round 2: 411,767 men: 179,877 women: 231,890	Round 1: 340,068 men: 154,788 women: 185,280 Round 2: 412,655 men: 185,779 women: 226,876	465,582 men: 211,192 women: 254,390	496,330 men: 223,588 women: 272,742

¹⁶ This is: 2 radio spots per day for 2 weeks in 3 districts.

¹⁷ This is 2 radio spots per day for 2 weeks in 3 districts.

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 Spray Targeted Structures According to Technical Specifications								
2.4.1 Number of structures targeted for spraying	<i>Data source:</i> Previous spray campaign data, enumeration data (targeted); daily spray operator forms (results) <i>Reporting frequency:</i> Daily per spray campaign	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 Round 2: 200,278	226,526	232,966
2.4.2 Number of structures sprayed with IRS	<i>Data source:</i> Daily spray operator forms <i>Reporting frequency:</i> Daily per spray campaign	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 Round 2: 198,970	192,547	231,258
2.4.3 Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	<i>Data source:</i> Daily spray operator forms <i>Reporting frequency:</i> Daily per spray campaign	By spray campaign	Round 1: 85% Round 2: 85%	Round 1: 99.4% Round 2: 98.1	Round 1: 85% Round 2: 85%	Round 1: 98.1% Round 2: 99.3%	85%	99.3%
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	Round 1: 503,259 Round 2: 883,674	Round 1: - 517,194 men: - 244,275 women: - 272,919 Pregnant women: - 8,489; Children <5: -74,279 Round 2:- 889,326 men: 427,914	Round 1: 602,198 Round 2: 774,778	Round 1: 618,696 men: 299,219 women: 319,477 Pregnant women: 10,256 Children <5: 90,089 Round 2: 812,714 men: 392,834	: 925,805	919,735 men: 442,492 women: 477,243 Pregnant women: 14,433 Children <5: 131,734

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
				women: 461,412 Pregnant Women: 14,375 Children <5: 132,568		women: 419,880 Pregnant women: 13,718 Children <5: 118,913		
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> Semiannual	By spray campaign	Completed	Completed	Completed	Completed	Completed	Completed
3.2 Conduct a post-spray data quality audit within 60 days of completion of spray operations	<i>Data source:</i> Spray operations reports <i>Reporting frequency:</i> Per spray campaign	By spray campaign	Round 1: NA Round 2: NA	Round 1: NA Round 2: NA	Round 1: NA Round 2: completed	Round 1: N/A Round 2: In Process	N/A	N/A
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 – <i>Activity reports</i> <i>Reporting frequency:</i> Semiannually	By spray campaign By guideline/ checklist/tool	Round 1: NA Round 2: 1	Round 1: NA Round 2: 1	Round 1: N/A Round 2: 14	Round 1: N/A Round 2: 14	14	12
4.2 Number of articles/best practices documents published	<i>Data source:</i> Project records – <i>Activity reports</i> <i>Reporting frequency:</i> Semiannually	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 Round 2: 1	1	1
4.3 Number of best practice presentations given at national/regional/international workshops and conferences	<i>Data source:</i> Project records – <i>Activity reports</i> <i>Reporting frequency:</i> Semiannually	By spray campaign By IRS Technical Area	Round 1: 1 Round 2: 1	Round 1: 1 Round 2: 1	Round 1: 2 Round 2: 2	Round 1: 2 Round 2: 2	3	3

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
4.4 Number of enterprises engaged through public private partnerships	<i>Data source: Project records – Activity reports</i> <i>Reporting frequency: Semiannually</i>	By spray campaign	Round 1: 4 Round 2: 5	Round 1: 4 Round 2: 4	Round 1: 2 Round 2: 2	Round 1: 2 Round 2: 2	5	5
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: Entomological reports</i> <i>Reporting frequency: Annually</i>	By spray campaign	Round 1: 12 Round 2: 12	Round 1: 12 Round 2: 12	Round 1: 12 Round 2: 12	Round 1: 12 Round 2: 12	12	12
5.1.2 Number and percentage of entomological monitoring sentinel sites measuring all the five primary PMI entomological monitoring indicators	<i>Data source: Entomological reports</i> <i>Reporting frequency: Annually</i>	By spray campaign	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%; Round 2: 12; 100%	12; 100%	12; 100%
5.1.3 Number and percentage of entomological monitoring sites measuring at least one secondary PMI indicator	<i>Data source: Entomological reports</i> <i>Reporting frequency: Annually</i>	By spray campaign	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%; Round 2: 12; 100%	12; 100%	12; 100%
5.1.4 Number and percentage of insecticide resistance testing sites that tested at least one insecticide from each of the four classes of insecticides recommended for malaria vector control	<i>Data source: Entomological reports</i> <i>Reporting frequency: Annually</i>	By spray campaign	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	Round 1: 12; 100% All four classes of insecticide are being tested at each of the 12 sites Round 2: 12; 100% Round 2: 12; 100%	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	Round 1: 12; 100% All four classes of insecticide are being tested at each of the 12 sites Round 2: 12; 100% Round 2:	12; 100% All the four classes of insecticide will be tested at each of the 12 sites	12; 100% All four classes of insecticide are being tested at each of the 12 sites

	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	
			will be tested at each of the 12 sites	100% All four classes of insecticide are being tested at each of the 12 sites	classes of insecticide will be tested at each of the 12 sites Round	12;100% All four classes of insecticide are being tested at each of the 12 sites		
5.1.5 Number of wall bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS*	Data source: Entomological reports Reporting frequency: Per spray campaign	By spray campaign	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) Round 2: 1 bioassay (24 ¹⁸ houses)	1 (24 houses)	1 bioassay (24houses)
5.1.6 Number of wall bioassays conducted after the completion of spraying at monthly intervals to evaluate insecticide decay*	Data source: Entomological reports Reporting frequency: Per spray campaign	By spray campaign	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) Round 2: 4 (24)	2(24 houses)	(24 houses)
5.1.7 Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites*	Data source: Entomological reports Reporting frequency: Per spray campaign	By spray campaign By Type of Insecticide	4 replicates per 6 insecticides	4 replicates per 6 insecticides	4 replicates per 6 insecticides	4 replicates per 6 insecticides	4 replicates per 6 insecticides	4 replicates per 6 insecticides

¹⁸ Round 2: wall bio assays were conducted in 2 sectors per district, and tested in 6 houses per sector: 6 Houses *2 sectors*2 districts=24 houses

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
5.2 Support Epidemiological Malaria Data Collection and Analysis								
5.2.1 Collect routine epidemiological data	<i>Data source: Project Reports 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 Round 2: N/A	N/A	N/A
5.2.2 Number of targeted health facilities with routine epidemiological malaria data collection supported by the PMI AIRS Project	<i>Data source: Epidemiological reports 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	N/A	N/A
Component 6 (Cross-Cutting): Capacity Building, Knowledge Transfer, Gender Inclusion								
6.1 Increasing the Role of Women and Addressing gender Barriers								
6.1.1 Number of people trained to deliver IRS in targeted districts ¹⁹	<i>Data source: Project records – Training reports Reporting frequency: Semi annually</i>	By spray campaign By spray campaign By gender Percentage of Women Trained	Round 1: 1,179 men: 525 women: 654; 55.4% Round 2: 1973 men: 872 women: 1101; 55.8%	Round 1: 1,152 ²⁰ men: 509 women: 643; 55.8% Round 2: 2,005 men: 882 women: 1,123	Round 1: 1,389 men: 619 women: 770; 55.5% Round 2: 1,735 men: 772 women: 963; 55.5%	Round 1: 1,384 men: 637 women: 747; 54% Round 2: 1,833 men: 827 women: 1,006; 54.8%	2,223 men: 1,003 women: 1,220	2,203 men: 976 women: 1,227
6.1.2 Total number of people trained to support IRS in	<i>Data source: Project records – Training reports</i>	By spray campaign	Round 1: 3,274;	Round 1: 3,237	Round 1: 3,760	Round 1: 3,814	5,789	5,825

¹⁹ This includes only: spray operators, TLs, sector coordinators and supervisors and clinicians.

²⁰ This includes only: spray operators, TLs, 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
targeted districts	<i>Reporting frequency: Semi annually</i>	By spray campaign By gender Percentage of women trained	men: 2,394 women: 880; 26.9% Round 2: 5,622; men: 3,957 women: 1,665;\29.6%	men: 2,278 women: 959; 29.6% Round 2: 5,761 men: 4,139 women: 1,622; 28.1%	women: 26.8% Round 2: 5,256 women: 29.6%	men: 2,730 women:1,084 women: 28.4% Round 2: 4,975 men: 3,540 women: 1,435; 28.8%	men:4,119 women: 1,670	men: 4,056 women:1,769
6.1.3 Number of women recruited (i.e., number of women on the selection list) for IRS employment	<i>Data source: Project records – Recruitment reports reports Reporting frequency: Semi annually</i>	By Country By Percentage of women recruited	Round 1: 903; 29.2% Round 2: 1,625; 28.9%	Round 1: 903: 29.2% Round 2: 1,485; 27.5%	Round 1: 1,033: 27.1% Round 2: 1,343: 35%	Round 1: 1,085: 28.4% Round 2: 1,309; 28.4%	1:35%	1,739; 30.7%
6.1.4 Number of people trained as IRS Training of Trainers	<i>Data source: Project records – Training reports Reporting frequency: Semi annually</i>	By spray campaign By gender Percentage of women trained	Round 1: 172; men: 78 women: 94 54.7% Round 2: 289; men: 132 women: 157;54.3%	Round 1:160 men: 73 women: 87 54.4% Round 2: 307 men: 161 women:146	Round 1: 109; Round 2: 168	Round 1: 105 men: 63 women: 42; 40% Round 2: 158 men: 87 women: 71; 44.9%	432 men: 238 women: 194	184 men:104 women:80

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
6.1.5 Total number of people hired to support IRS in targeted 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 men: 2,121 women: 866; 28.9% Round 2: 5,573; men: 3,948 women: 1,625; 29%	Round 1: 3,096 men: 2,193 women: 903; 29.2% Round 2: 5,395 men: 3,909 women: 1,486	Round 1: 3,700 women: 29% Round 2: 6,946 women: 29.1%	Round 1: 3,528 men: 2, 539 women: 989 women: 28% Round 2: 4,605 men: 3,296 women: 1,309; 28.4%	5,259 ²¹ men: 3,764 women: 1,495; 28.4%	5,668 men: 3,929 women: 1,739; 30.6%
6.1.6 Number of women hired in supervisory roles in targeted districts (this number includes site supervisors, TLs, M&E assistants, and others who supervise seasonal staff)	<i>Data source: Project records – Contracts signed</i> <i>Reporting frequency: Semi annually</i>	By spray campaign Percentage of women hired	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% Round 2: 291; 45.7%	55%	332; 42.6%
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: 5,543; 100%	Round 1: NA Round 2: 5,329; 100%	Round 1: 3,508; 92.3% Round 2: 4,941; 94%	Round 1: 3,557; 28.6% Round 2: 4,745; 29.8%	5,501 ²² ; 100%	5,380 men: 3,718 women: 1,662

²¹ Those are: spray operators, TLs, coordinators, supervisors, sector IEC, Storekeeper, cell and Village IECs, Washers, Guards, Finance assistants, Pump Technicians, and Cleaners

²² Coordinators and supervisors, spray operators and TLs, logisticians, sector IECs ,cell and village mobilizers, and washers.

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
6.2 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 men: 33 women: 30; 47.6% Round 2: 100; men: 52 women: 48;48%	Round 1: 40 men: 21 women:19 47.5% Round 2: 50; men:38 women: 12 24.0%	Round 1:38 Round 2:46	Round 1: 34 men: 24 women: 10; 29.4% Round 2: 43 men:36 women: 7 16.3%	52	319 men:215 women:104
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	Completed	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 Round 2: completed	Completed	Completed

ANNEX K: SUCCESS STORY

PMI AIRS Trains IRS Managers on Planning and Operations



Dr. Jean Baptiste Rugamba, Director of Ngarama District Hospital, practices spraying a wall during the training.

Photo:

www.pmi.gov
www.africairs.net

Indoor Residual Spraying (IRS), a proven intervention in preventing and controlling malaria in Africa, requires complex planning and implementation. Strengthening the capacity of National Malaria Control Programs in Africa to manage IRS programs is a key component of the U.S. President’s Malaria Initiative (PMI) Africa Indoor Residual Spraying (AIRS) Project. In collaboration with Rwanda’s Ministry of Health’s Malaria and Other Parasitic Diseases Division (MOPDD) and with the support of the Government of Rwanda and USAID/PMI, the PMI AIRS Project conducted trainings at district and sector levels to strengthen the skills and knowledge of more than 250 key stakeholders on IRS planning and spray operations in the districts of Kirehe, Gatsibo, Nyanza, Huye and Ngoma.

During the June to August 2017 capacity building trainings, PMI AIRS used the curriculum developed by AIRS headquarters. The training adopted a strategy similar to the trainings conducted in Rwanda in 2015 by the AIRS Operations Director in which District and Sector IRS Managers from three districts were trained. Managers of IRS from eight districts in Rwanda have now received training on IRS planning and spray operations implementation.

“Our aim is to strengthen the capacity of district and sector managers in all ‘high burden’ malaria districts so that they are able to plan and implement IRS at the district and sector levels,” said Mr. Dunia Munyakanage, the acting Director of Vector Control at MOPDD. He added that this training would bring us closer to achieving the goal of empowering all IRS managers from the 13 high burden malaria districts on IRS planning and implementation.

Dr. Jean Baptiste Rugamba, Director of Ngarama District Hospital in Gatsibo District, said, “This capacity strengthening training is a unique opportunity for us District and Sector Managers to learn how we can overcome issues encountered during previous spray operations conducted in Gatsibo District. We have learned lots of lessons during this capacity building training which will not only serve in planning and implementation of IRS activities but also be used in our usual daily activities.”