PMI | Africa IRS (AIRS) Project

Indoor Residual Spraying (IRS 2) Task Order Four

RWANDA
END OF SPRAY REPORT

SPRAY CAMPAIGN: SEPTEMBER 8 - OCTOBER 4, 2014

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ACRONYMS

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

EXECUTIVE SUMMARY

Abt Associates supports the implementation of indoor residual spraying (IRS) in Rwanda on a three-year Africa Indoor Residual Spraying (AIRS) project funded by 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 – October 2014 targeting 169,904 structures in 28 of 42 sectors in three districts, Bugesera (7 sectors), Gisagara (13 sectors), and Nyagatare (8 sectors), using Bendiocarb (a carbamate).

The following are project achievements and key highlights of the September 2014 spray campaign (see Table 1), which lasted 24 operational days:

- A total of 173,086 structures were sprayed out of 174,411 structures found by spray operators in the targeted districts, accounting for a coverage rate of 99.2%. In total, 705,048 residents were protected, including 103,408 (14.7%) children under five years old and 11,119 (1.6%) pregnant women.
- A total of 176,654 structures were mobilized and 65,332 brochures were distributed during the mobilization exercise.
- A total of 4,403 individuals were trained using PMI funds to support IRS activities in the three districts. Of these, 1,088 were spray operators (SOPs) (444 males and 644 females), 212 were team leaders (128 males and 84 females), and 2,349 were village IEC mobilizers (2,116 males and 233 females). Almost 60% of all SOPs trained to implement IRS were female. Overall, 28.6% (n=1,261) of all IRS trained personnel in September 2014 were female.
- A total of 144,925 sachets of insecticide were used to spray 173,086 structures in the three IRS districts, with a utilization ratio of approximately 1:1.2 (sachet to structures sprayed).
- A total of 195 dormitories in 43 schools and 4 prisons were sprayed in the target districts protecting 8,443 residents. A total of 370 sachets of insecticide were used.
- All (2,425 kg) IRS insecticide contaminated wastes, including 145,295 empty sachets and 35,026 used masks, were incinerated at three different incineration plants- Nyagatare Hospital incineration plant for wastes from Nyagatare, Kibilizi Hospital incineration plant for wastes from Gisagara and ADEPR Nyamata Hospital incineration plant for wastes from Bugesera. Other solid wastes, including used gloves, worn-out boots, damaged barrels and other plastic items were recycled at the Entreprise pour la Protection de l'Environnement et Development Rural (EPEDR) Recycling plant. A total of 1,401 uncontaminated paper cartons were donated to Cards from Africa in Kigali. Other uncontaminated wastes, such as empty boxes and papers, were disposed of at the Nduba dumping site.
- Wall bioassays conducted within one week of spraying in September 2014 to assess the quality of spraying in the target districts recorded 100% mortalities of susceptible *An. gambiae s.l.* One month post-IRS, average percentage mortalities of 100% were recorded for the three districts.

TABLE 1: AIRS RWANDA IRS CAMPAIGN SUMMARY: SEPTEMBER 2014

Number of districts covered by PMI-supported IRS	3 districts (Bugesera, Gisagara, and Nyagatare)
Insecticide	Carbamates
Number of structures covered by PMI-supported IRS	173,086
Number of structures targeted by PMI-supported IRS	174,411
Spray coverage	99.2%
Population protected by PMI-supported IRS	705,048 (11,119 pregnant women, 103,408 children less than 5 years old)
Dates of PMI-supported IRS campaign	September 8 - October 4, 2014
Length of campaign	24 days
Number of people trained with USG funds to deliver IRS[1]	1,501

[1] Based on the PMI indicator definition for 5.1.1. This includes only spray personnel such as spray operators, team leaders, supervisors, and clinicians.

1. COUNTRY BACKGROUND

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

Among the malaria control strategies applied in Rwanda, IRS has been featured since 2007. Beginning in 2008, declining malaria incidence in some areas prompted adjustments, from district-wide blanket IRS coverage, to more targeted focal spraying to cover high risk areas. With time, the focal targets were reconsidered because of generalized increases in malaria caseloads, but the expansion to cover entire districts depended on the availability of resources. Much of the IRS in Rwanda has been funded by the President's Malaria Initiative (PMI).

In August 2011, Abt Associates was contracted by PMI to implement IRS in Rwanda under the Africa Indoor Residual Spraying (AIRS) Project. PMI and the Rwanda Ministry of Health (MOH), through MOPDD, identified three high-burden malaria districts in which to implement IRS. The three IRS districts were Bugesera, Gisagara and Nyagatare, with a total of 242,461 structures. A total of 236,610 structures in 42 sectors were sprayed in August - September of 2012 using a pyrethroid (Deltamethrin WG 250). Considering that malaria transmission takes place year round and peaks during the periods of October - December and March - May, a second spray round was conducted in February 2013 using a pyrethroid (Deltamethrin WG 250) to supplement the August - September 2012 spray round. This was done in order to ensure protection for the population during the two major transmission seasons. Twenty sectors were selected for the February 2013 IRS campaign in the three IRS districts. The sector selection was based on their high malaria prevalence, as was evidenced from malaria cases reported in 2012 from the health facilities serving the sectors.

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[2] 2012 Population and Housing Census, Nov 2012

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

[4] Malaria Strategic Plan 2012-2017

In September 2013, a total of 37 sectors were selected in the same three districts for IRS. In February 2014, a total of 20 out of 42 sectors in the three IRS districts were selected based on their high malaria prevalence as was reported in the epidemiological data from health facilities. Working in collaboration with the MOH/MOPDD and other stakeholders, Abt Associates was tasked to achieve at least 85 percent spray coverage in the IRS target districts targeting 124,012 structures using a carbamate in Nyagatare and a pyrethroid in Bugesera and Gisagara districts.

In September 2014, a total of 28 out of 42 sectors in the three IRS districts were selected with a total 169,904 structures. In addition, the project provided technical support in the following activities:

- Training, capacity building, and advocacy at the national and district level as a means of achieving IRS sustainability. This included building the capacity of government officials and partners to undertake high-quality IRS.
- Daily and weekly monitoring of the IRS program via supervision of data collection and data entry using the *AIRS 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).
- Safe and correct insecticide application, thus minimizing human and environmental exposure to IRS insecticides, in compliance with the Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP) and Supplemental Environmental Assessment (SEA).
- Coordination of information, education and communication (IEC), sensitization, and mobilization activities with other stakeholders to raise the populations' awareness and acceptance of IRS and to encourage ownership.
- Entomological monitoring including assessing malaria vector density and species composition in intervention areas; establishing vector feeding time and location; monitoring the quality of insecticide application and insecticide decay rates and assessing vector susceptibility and mechanisms of resistance.
- Training of sentinel site technicians in entomological techniques.

2. PRE-SEASON ACTIVITIES

2.1. SELECTION OF IRS DISTRICTS AND SECTORS

Three districts, Bugesera, Gisagara and Nyagatare, were selected for IRS during the September 2014 campaign (see Figure 1 below). The IRS districts were selected based on the malaria burden as was reported in epidemiological data from health facilities. A total of 169,904 structures were targeted for spraying in 28 sectors.

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

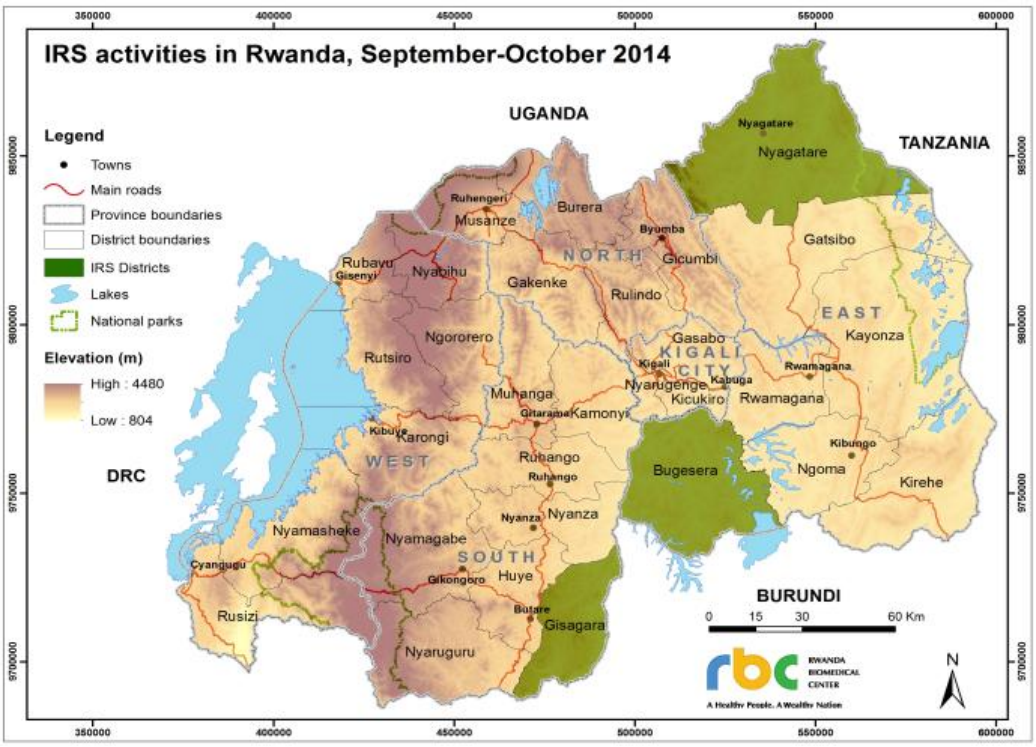


Table 2 shows a summary of the number of target structures and the target population in the 28 sectors.

TABLE 2: TARGET STRUCTURES FOR IRS ROUND 12

District	Number of Sectors	Number of Target Structures	Target Population		
			Females	Males	Total
Bugesera	7 of 15	38,275	78,421	72,571	150,992
Gisagara	13 of 13	74,805	155,230	136,794	292,024
Nyagatare	8 of 14	56,824	121,164	112,892	234,056
Total	**28 of 42**	**169,904**	**354,815**	**322,257**	**677,072**

2.2. DISTRICT PLANNING MEETINGS

Following the choice of the target sectors in the three IRS districts, collaboration and coordination between stakeholders was intensified. Micro-planning meetings with district and sector authorities in the three districts and 28 sectors were conducted in June-July 2014. In total, 124 participants (74 males and 50 females) attended micro-planning meetings in Bugesera, Gisagara and Nyagatare districts. In each of the districts, a one-day planning meeting was organized to discuss and develop an IRS operational plan with local leaders. In addition, the roles and responsibilities of each of the partners were discussed and agreed upon. The issues discussed during the micro-planning meetings included:

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

2.3. INSECTICIDE SELECTION

A carbamate, Bendiocarb (Ficam 80 WP), was used during the September 2014 IRS campaign in the three districts. The selection was based on data obtained from insecticide susceptibility assays that were carried out in 2013. The susceptibility assays showed that the predominant local vector species (i.e. *Anopheles gambiae*) exhibited varying levels of susceptibility to the different classes of insecticides. Within the carbamate class, the local vector species in the IRS target districts sites showed between 84% and 100% mortalities.

In addition, the Rwanda insecticide resistance management (IRM)[5] plan states that in a bid to manage the development of insecticide resistance, specifically pyrethroid resistance, IRS will be conducted with a phased transition to a carbamate for two years (2013 and 2014) followed by a phased transition to organophosphate (pirimiphos methyl, Actellic CS) for two years in 2015 and 2016. Rotation will be the main strategy implemented in the mid-term of four years with a hope that IRS will graduate from sector-wide spraying to focalized cell-level spraying by 2017. A switch to carbamates was thus implemented (see Annex 1, MoH Letter on Insecticide Choice for 2013/2014, dated March 22, 2013).

2.4. LOGISTICS NEEDS AND PROCUREMENT

The central AIRS 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

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

the target districts. Besides reference to the inventory records from the previous IRS campaign, a logistics needs assessment was conducted in April-May 2014. During the logistics needs assessment the following were considered:

- Available stock of materials, consumables, and equipment;
- Transport arrangements, including vehicle hiring for spray operations and supervision;
- Estimation of insecticide, PPE, and spray equipment required to meet the needs of spraying; and
- Mobilization and distribution of equipment, materials, and supplies (see Annex 2).

2.4.1. INTERNATIONAL PROCUREMENT

Internationally procured commodities included 128,520 sachets from South Africa and 7,317 sachets from AIRS Zambia's stock balance, all of which were carbamate insecticide (Ficam VC 80 WP). Table 3 shows the items and quantities that were procured internationally.

TABLE 3: INTERNATIONAL PURCHASES

Description	Quantity in Stock Before Campaign	Quantity Received	Total Quantity	Quantity Used	Quantity Damaged	Quantity in Stock after the Campaign
Spray pump repair kits	39	0	39	10	0	29
USAID stickers	1,094	2,700	3,794	807	0	2,987
Respiratory masks	46,842	0	46,842	35,159	0	11,683
First aid kits	99	59	158	110	0	48
Latex nitrile gloves	7,938	0	7,938	2,960	2,960	4,978
Insecticide sachets (Ficam VC 80WP)	25,687	135,837	161,524	145,295	0	16,229
Pressure gauges	26	0	26	9	0	17
Shutoff valves	150	0	150	56	0	94
Spray control valves	450	0	450	150	0	300
Shutoff cocks	50	0	50	28	0	22
Male fittings for strainer housing	177	0	177	24	0	153
Nozzle gaskets	231	0	231	99	0	132

Pump strainers	800	0	800	238	0	562
Aprons	110	0	110	104	6	104
Digital thermometers	54	0	54	50	4	50

2.4.2. LOCAL PROCUREMENT

Local procurement involved an open competitive tendering process in which a solicitation for quotes for the services of items was performed. The selection was done by the Abt Associates Rwanda procurement committee based on the lowest cost, technically acceptable bid according to the criteria given in the solicitation for the quotations. The services/items procured locally included the following. Please see Annex 2 for the detailed list.

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

2.4.3. MATERIAL DISTRIBUTION TO THE DISTRICTS AND OPERATION SITES

Following the February 2014 IRS campaign, IRS materials, such as coveralls, boots, helmets, gloves, masks and pumps, were retained in the district storage facilities. Other items, such as respiratory masks and gloves, were distributed from the central warehouse to the district stores in August 2014 and insecticide was distributed in the first week of September 2014. Further distribution of the materials to the operation sites was done based on the number of target structures to be sprayed and the number of support staff (see Table 4).

TABLE 4: IRS COMMODITY DISTRIBUTION

District	Coveralls	Boots	Helmets	Gloves	Respiratory Masks	Carbamate Sachets	Pumps
Bugesera	806	484	342	1389	9098	33,487	363
Nyagatare	1154	661	495	880	12,363	52,077	624
Gisagara	1403	639	547	1941	17,393	68,520	528

2.5. HUMAN RESOURCE REQUIREMENTS

The project recruited and deployed a total of 193 seasonal staff that provided support during the IRS operations across the three districts. Seasonal staff were comprised of 1 district coordinator, 3 district IEC assistants, 17 data clerks, 4 district storekeepers, 28 sector store keepers, 3 logistics assistants, 3 pump technicians, 3 finance assistants, 28 sector coordinators, 72 sector supervisors, 28 sector IEC assistants, and 3 office cleaners.

Implementation of IRS operations in the sectors was conducted by spray operators (1,026), team leaders (212), washers (89), cell IEC mobilizers (148), and village IEC mobilizers (2,349). A total of 76 nurses (side effect managers) and security guards (67) provided IRS support at the sector level. Staff was recruited 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. AIRS Rwanda hired 28.0% (n=1,166) females as

seasonal staff. It is noteworthy that more than half of hired spray operators and team leaders (58.7 %) were female. Table 5 enumerates the IRS seasonal support staff by gender and district. In Feb 2014, 26.6% (n=849) of all seasonal staff were females and 56% of spray operators and team leaders were female.

TABLE 5: SEASONAL IRS STAFF HIRED BY DISTRICT

Staff Position	Bugesera		Gisagara		Nyagatare		Total		% Females Hired
	Male	Female	Male	Female	Male	Female	Male	Female	
District Coordinators	1	0	1	0	1	0	3	0	0.0%
District IEC Assistants	1	0	1	0	0	1	2	1	33.3%
Data Clerks	2	2	5	2	3	3	10	7	41.2%
District Storekeepers	1	1	1	0	0	1	2	2	50.0%
Sector Storekeepers	3	4	10	3	4	4	17	11	39.3%
Logistics Assistants	0	1	0	1	1	0	1	2	66.7%
Finance Assistants	1	0	0	1	0	1	1	2	66.7%
Sector Coordinators	4	3	6	7	6	2	16	12	42.9%
Sector Supervisors	6	10	10	22	6	18	22	50	69.4%
Sectors IEC Assistants	1	6	10	3	5	3	16	12	42.9%
Spray Operators	89	148	195	246	140	208	424	602	58.7%
Team Leaders	31	18	64	29	33	37	128	84	39.6%
Cell IEC Supervisors	31	3	36	23	28	27	95	53	35.8%
Village IEC Mobilizers	537	43	900	146	679	44	2,116	233	9.9%
Security Guards	23	1	27	0	16	0	66	1	1.5%
Adverse effect Managers	10	6	17	15	16	12	43	33	43.4%
Washers	2	19	13	24	14	17	29	60	67.4%
Pump Technicians	1	0	1	0	1	0	3	0	0.0%
Cleaners	0	1	1	0	1	0	2	1	33.3%
Total	**744**	**266**	**1298**	**522**	**954**	**378**	**2,996**	**1166**	**28.0%**

2.6. IRS TRAININGS

Prior to the commencement of IRS activities, a team of Abt Associates staff members reviewed and updated the IRS training manuals and materials, including IRS brochures, data forms, supervision checklists and the IRS structure cards. In addition, training sites and external trainers were identified in advance of the trainings. The trainings 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; and
- Supervision of IRS activities.

2.6.1. TRAINING OF TRAINERS

A refresher training of trainers (ToT) was organized and conducted in collaboration with MOPDD on August 18-20, 2014. Since all participants had gone through the ToT during the February 2014 and/ or September 2013 IRS rounds, the ToT was mainly aimed at refreshing the participants' skills and knowledge of IRS. During the training, they received instructions on methods to conduct IRS training and supervision of the IRS implementers. The training consisted of both theory and practical sessions through group discussions, demonstrations, lectures and question and answer methods. The participants included 28 IRS sector coordinators and 97 IRS sector supervisors. After the ToT, the participants were assigned to different training sites in the IRS target districts to conduct IRS training for SOPs and Team Leaders (TLs). The number of trainers deployed to each of the training sites was based on the number of participants to be trained at each of the training sites. The number of trainers is shown in Table 6.

TABLE 6: NUMBER OF TOT PARTICIPANTS, BY GENDER

IRS Role	Number of Participants		Total
	Male	Female	
Sector Coordinators	16	12	28
Sector Supervisors	36	61	97
Total	**52**	**73**	**125**

FIGURE 2: IRS PRACTICAL TRAINING SESSION

2.6.2. SPRAY OPERATOR AND TEAM LEADER TRAINING

The SOP and TL training was organized and conducted in close collaboration with district and sector authorities for five days during the period of September 1 - 5, 2014. In the three target districts, training sites were provided by sector authorities or rented by Abt Associates. The major objective of the training was to equip the SOPs and TLs with the skills to conduct quality IRS.

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

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

- A native of the sector;
- A community health worker (CHW);
- Able to read and write; and
- Below 40 years of age.

The SOPs and TLs were taken through intensive five-day theory and practical sessions (see Annex 3) which covered content in:

- Introduction to malaria control;
- Spray techniques;
- Handling and managing insecticides;
- Handling and maintaining spray pumps;
- Personal and environmental safety;
- Leading a spraying team;

- Data collection and filling out data collection forms; and
- Basics of IEC for IRS.

A total of 1,300 SOPs were trained and details are provided in Table 7. A total of 95 facilitators (ToT participants) conducted the training.

TABLE 7: NUMBER OF SPRAY OPERATORS TRAINED TO IMPLEMENT IRS

District	Training Sites	Spray Operators - Newly Trained			Spray Operators - Previously Trained			Facilitators		
		Male	Female	% Female	Male	Female	% Female	Male	Female	% Female
Bugesera	8	28	45	61.6%	96	129	57.3%	20	17	45.9%
Gisagara	13	43	60	58.3%	227	231	50.4%	29	41	58.6%
Nyagatare	7	8	36	81.8%	170	227	57.2%	23	27	54.0%
Total	**28**	**79**	**141**	**64.1%**	**493**	**587**	**54.4%**	**72**	**85**	**54.1%**
		220 (16.9%)			**1,080 (83.1%)**			**157**		

2.6.3. DATA COLLECTION TRAINING

Between August and September 2014, 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, team leaders, IEC mobilizers and data entry clerks. The training focused on the following key topics:

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

2.6.4. LOGISTICS TRAINING

All the staff who would be involved in logistics and storekeeping during the implementation of IRS was trained. Sector coordinators, sector supervisors and IEC assistants were given basic skills in logistics and store management during the ToT sessions. A comprehensive, two-day training was conducted for 35 logistics assistants and storekeepers (20 males and 15 females). Participants were trained on the following topics:

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

2.6.5. WASHER TRAINING

A total of 89 washers were given a one-day refresher training/orientation at 28 operational sites in the three IRS districts before the commencement of IRS operations. Sector coordinators, sector supervisors and sector storekeepers were responsible for the refresher training at their respective operational sites. The washers were instructed on the use of PPE, washing insecticide contaminated PPE, soak pit maintenance, effluent waste disposal, and the insecticide effects on humans and the environment. They were also advised of how to respond to insecticide adverse effects that they might experience. Table 8 shows the numbers of washers trained by gender per district.

TABLE 8: WASHERS TRAINED BY GENDER PER DISTRICT

District	Male	Female	% Females
Nyagatare	14	17	54.8%
Gisagara	13	24	64.9%
Bugesera	2	19	90.5%
Total	**29**	**60**	**67.4%**

2.6.6. FIRE AND TRANSPORTATION SECURITY TRAINING

Sixty-seven security guards were given an orientation on fire security and a general security protocol for IRS stores. Seventy-eight IRS drivers were given an orientation on safety procedures while transporting insecticides and the use of first aid kits. They were also trained on measures to take:

- while transporting spray operators to and from the field; and
- in case an accident occurred leading to an insecticide spill.

Table 9 shows the number staff in all roles trained to deliver IRS.

TABLE 9: PEOPLE TRAINED TO DELIVER 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	
Sector Coordinators	16	12																							**28**
Sector Supervisors	36	61																							**97**
Spray Operators			444	644																					**1,088**
Team Leaders			128	84																					**212**
Data Entry Clerks					10	9																			**19**
Logisticians							1	2																	**3**
District Storekeepers							2	2																	**4**
Sector Storekeepers							17	11																	**28**
Finance Assistants																					1	2			**3**
Pump Technicians									3	0															**3**
District IEC Assistants											2	1													**3**
Sector IEC Assistants& Supervisors											50	52													**102**
Cell IEC Mobilizers													95	53											**148**
Village IEC Mobilizers													2,116	233											**2,349**
AE Teams (Clinicians)															43	33									**76**
Envir Comp Officers															5	1									**6**
Washers																	29	60							**89**
Security Guards																			**66**	**1**					**67**
Drivers																							78	0	78
TOTAL M/F	**52**	**73**	**572**	**728**	**10**	**9**	**20**	**15**	**3**	**0**	**52**	**53**	**2,211**	**286**	**48**	**34**	**29**	**60**	**66**	**1**	**1**	**2**	**78**	**0**	**4,403**
TOTAL/Training	**125**		**1,300**		**19**		**35**		**3**		**105**		**2,497**		**82**		**89**		**67**		**3**		**78**		**4,403**

3. INFORMATION, EDUCATION AND COMMUNICATION

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

3.1. TRAINING

3.1.1. TRAINING OF TRAINERS

A two-day ToT on mobilization was conducted in Kigali from August 21-22, 2014 by AIRS Rwanda in collaboration with MOPDD. The trainees included the District IEC Assistants, Sector IEC Assistants, Sector Supervisors and Sector Coordinators. They were trained on how to conduct training of IEC mobilizers at the cell and village level, and how to coordinate and supervise all IEC/IRS activities. A total of 105 candidates (52 males and 53 females) participated in this training, 3 District IEC Assistants, 28 Sector IEC Assistants, 28 Sector Coordinators, and 46 Sector Supervisors.

The main objective of the training was to strengthen participants' knowledge and capacity to train and disseminate IEC and behavior change communication (BCC) messages to IEC community mobilizers and to also effectively plan, coordinate and supervise IEC IRS activities. The training included both theory and practical sessions among which were mock sessions to practice IRS mobilization and filling of data collection tools. The trainees were also taught how to develop and update a community mobilization plan.

3.1.2. TRAINING OF IEC COMMUNITY MOBILIZERS

The training of IEC mobilizers was conducted on August 26-27, 2014 in Bugesera, Gisagara and Nyagatare districts in designated training sites in the sectors. The trainees were village and cell leaders who were recruited based on the following criteria: one had to be a cell or village leader and/or in charge of security at the village level, was of good conduct, respectable, able to read and write, and known by the community. The trainings, which were held at the sector level, were facilitated by the Sector IEC Assistants together with Sector Coordinators and Sector Supervisors with help from District Coordinators, District IEC Assistants and local leaders at the sector and cell levels. Overall coordination was done by AIRS Rwanda staff. The IEC mobilizers were trained on the basics of malaria control and IRS and 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;
- Discuss with structure owners their role before, during and after spray operations to ensure a safe and successful IRS campaign; and

- Create a more long-term or sustainable awareness of the program by involving and engaging key community stakeholders.

A total of 2,497 mobilizers (286 females and 2,211 males) at the cell and village level were trained. Each sector and cell team also developed an individual community mobilization implementation plan. Table 10 below shows the number of mobilizers trained by district.

TABLE 10: NUMBER OF IEC MOBILIZERS TRAINED TO IMPLEMENT IRS

District	Number of IEC Mobilizers Trained				TOTAL	% Females Trained
	Cell		Village			
	Male	Female	Male	Female		
Bugesera	31	3	537	43	614	7.5%
Gisagara	36	23	900	146	1,105	15.3%
Nyagatare	28	27	679	44	778	9.1%
TOTAL	**95**	**53**	**2,116**	**233**	**2,497**	**11.5 %**

3.2. DOOR-TO-DOOR MOBILIZATION

Door-to-door mobilization of structures was conducted for two to four days in each village during the period of September 6 - October 2, 2014. During this exercise, village mobilizers reached eligible structures with IRS messages and distributed IRS structure cards to those who lost or never received cards, and brochures to eligible structures. They also collected data using the IEC Mobilizer Form and communicated the dates of spraying to the structure owners. They marked the outside doors of the structures that were mobilized with the IRS structure number found on the IRS card which was issued to that particular structure, (Figure 3). A total of 176,654 structures were mobilized with a 98.3% IRS acceptance rate recorded. Some 65,332 brochures were distributed. Table 11 shows the results of the mobilization activity during the IRS spray round. Sector IEC Assistants, with support from the Sector and Cell Social Affairs Officers, oversaw the implementation of this activity. They also reviewed the data collected and IRS cards issued to the structures to ensure accuracy and completeness of the data.

FIGURE 3: MOBILIZATION

TABLE 11: RESULTS OF IRS MOBILIZATION

District	Structures Sensitized	Adults Reached with IRS Messages		Structures Accepting IRS	% Structures Accepting IRS	Brochures Distributed
		Male	Female			
Bugesera	44,320	39,627	50,309	42,661	96.3%	17,615
Gisagara	74,243	69,990	91,388	73,530	99.0%	31,123
Nyagatare	58,091	59,146	67,994	57,522	99.0%	16,594
TOTAL	**176,654**	**168,763**	**209,691**	**173,713**	**98.3%**	**65,332**

3.3. IEC COORDINATION

During the entire period of spraying, local leaders at all levels readily provided support. Sector executives and social affairs officers were very instrumental in linking spray operations teams to target communities. Each of the IRS districts had a district IEC staff member who coordinated and supervised district IEC activities. They worked closely with the District Vice-Mayors in charge of social affairs and district health officers to supervise the district IEC activities. Sector IEC staff worked closely with sector and cell social affairs, and sector coordinators to supervise the sector IEC activities. The Sector IEC supervisors issued the village mobilizers the materials (structure cards, brochures and IEC data collection tools) a day before the mobilization date of the village. The supervision team ensured that the cell and village mobilizers mobilized all eligible structures; all structure owners were informed of the date of spraying, at least a day in advance, and that the data collected 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 as they gave them directions to the mobilized structures. The IEC mobilizers also noted structures that were not sprayed on the planned day and coordinated with spray operators to have them sprayed the following day.

3.4. OTHER IEC ACTIVITIES

3.4.1. COMMUNITY MOBILIZATION MEETINGS BY LOCAL LEADERS

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

3.4.2. MONTHLY COMMUNITY WORK (UMUGANDA)

In order to promote community cohesion, Rwanda has set aside the last Saturday (8 am to 11 am) of each month as a community service day, locally referred to as 'Umuganda'. On this day, all other activities are usually halted except for the Umuganda activities. During Umuganda the community conducts communal activities and also takes time to discuss ways of promoting development activities in the society. During the spray campaign period Umuganda was conducted on September 27, 2014.

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

3.4.3. MASS MEDIA COMMUNICATION

Radio spots were aired twice daily from September 3 - 17, 2014 in Gisagara, Bugesera and Nyagatare districts. The key messages relayed during the radio spots were the importance of IRS in the fight against malaria, the IRS campaign dates, the role of the community in IRS activities (before, during and after spraying), adverse effects management, and information on the funding agency.

Mass media communication was further enriched using 31 banners which were placed at IRS district offices (3) and at sector administrative offices (28). The message printed on the banners was "*Birakureba*" (Kinyarwanda for "This concerns you"). Table 12 presents details the mass media communication activities done during the IRS operations.

TABLE 12: MASS MEDIA COMMUNICATION ACTIVITIES

Dates	Type of IEC Activity/Material	Frequency/Number Produced
September 3 - 17, 2014	Radio spots aired 2 times per day for each radio station	30 times on Radio Huye station, Gisagara 30 times on Radio Huguka, Bugesera 30 times on Radio Nyagatare station
August 26 - October 4, 2014	IRS Banner	1 banner at each IRS district office and 1 at each sector administrative office

4. IMPLEMENTATION OF IRS ACTIVITIES

The 12th round of IRS implementation was carried out over a 24-day period from September 8 - October 4 in Bugesera, Gisagara and Nyagatare districts.

4.1. IRS SUPERVISION

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

- Spray operators were grouped into teams of five. Each team was supervised by a team leader.
- A sector supervisor was responsible for supervising three teams. Supervisors reported directly to the sector coordinator, who in turn reported to the district coordinator.
- A full-time AIRS staff member was appointed to be in charge of each district to coordinate routine daily supervision by working closely with the district staff and all other supervisors (from AIRS and other stakeholders). At least three AIRS staff was in the field Monday through Thursday every week in each district to provide supportive supervision to the district staff.
- A supervision plan was put in place to ensure consistency and coordination of supervision and proper follow-up of corrective measures in order to improve the spray operations performance.
- Local government officers (sector social affairs officers, in charge of CHW's at both district hospitals and health centers, M&E officers at district hospitals and district 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 was also augmented by the use of supervision checklists (see Annex 4), which were used as tools to assess the daily performance of spray operators and team leaders, adherence to environmental compliance requirements, data collection and data entry.
- Regular meetings were held at all levels (national, district and sector) to review the progress of IRS and check on implementation of recommendations reached during the operations.

Table 13 summarizes the institutions/stakeholders which participated in supervision.

TABLE 13: INSTITUTIONS/ STAKEHOLDERS THAT PARTICIPATED IN IRS SUPERVISION

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

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

4.2. LOGISTICS

4.2.1. IRS STORAGE AND INSECTICIDE STOCK MANAGEMENT

District level storage facilities served as distribution centers for IRS materials, equipment, and supplies which were used during the IRS operations. The district storage facilities were managed by a logistics assistant and a storekeeper who ensured distribution and close supervision of supplies and materials at the operation sites storage facilities. There were 28 storage facilities at the operation sites in the three districts, 19 of which were provided at the sector offices at no cost, as the district/sector authority's contribution to the IRS campaign. The other 9 facilities were rented at a location near the sector offices. Each of the Sector Storekeepers was in charge of storage management at the sector level with oversight from the District Logistics Assistant and Storekeeper.

Insecticide, other materials, and equipment stocks were carefully tracked and managed from the central warehouse to the district storage facility and subsequently to the operation sites storage facilities. Empty insecticide sachets were tracked daily at the sector and district stores. They were accounted for by recording how many insecticide sachets each spray operator or team or sector had received and used. All stock records were documented on stock cards.

4.2.2. IRS VEHICLES

A total of 83 vehicles were contracted for the support of the IRS operations in the three districts. Table 14 shows the number of vehicles assigned to each district.

TABLE 14: DISTRIBUTION OF VEHICLES IN THE DISTRICTS

District	Vehicles for SOPs	Vehicles for Supervision	Total
Bugesera	18	1	19
Gisagara	34	2	36
Nyagatare	26	2	28
Total	**78**	**5**	**83**

4.3. IRS PAYMENTS

Before the start of the spray operations, one-day refresher training was conducted bringing together the three Finance Assistants. The participants were briefed on responsibilities to ensure efficient management of funds and facilitation of logistical support. They were taken through their responsibilities which included:

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

IRS support staffs hired by AIRS at the district level were paid through their bank accounts by electronic transfer. Other seasonal staffs at the sector level including SOPs, Team Leaders, Mobilizers, Washers and security guards were paid by transfer of funds to SACCO micro finance institutions in each sector. An agreement was established between each SACCO and AIRS in order to have this service made. After each payment, a copy of payroll signed by recipients was returned to the AIRS main office in Kigali as proof of payment.

5. POST-SEASON ACTIVITIES

5.1. POST SEASON REVIEW MEETINGS

IRS evaluation/review meetings were conducted at the district level in order to:

- Review the overall IRS programmatic implementation process for the September 2014 spray round, experiences and achievements of the IRS round;
- Review IRS challenges in the three IRS target districts and come up with recommendations for the next spray cycle; and
- Reach a consensus on the recommendations and way forward for next spray cycles.

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

- District and Sector Authorities, including Army and Police Commanders in the district;
- Hospitals and health centers;
- MOH/MOPDD representatives; and
- Abt Associates staff.

The number of participants who attended the review meetings is shown in Table 15.

TABLE 15: EVALUATION MEETINGS PARTICIPANTS

District	Review Meeting Dates	Participants		Total
		Male	Female	
Bugesera	October 10, 2014	27	7	34
Gisagara	October 8, 2014	26	22	48
Nyagatare	October 9, 2014	21	12	33
Total		**74**	**41**	**115**

The summary of recommendations from the review meetings were:

- The district/ sector authorities should enhance oversight of the recruitment process of SOPs so that only CHWs with previous IRS experience are considered and that such recruitment should strictly adhere to all criteria laid down by the MOH.
- The agreed plan for the recruitment of SOPs whereby the President in-charge of CHWs at the sector takes overall responsibility for recruiting and list verified by the health facility in-charge, Sector Social Affairs and signed off by the Sector Executive Officer should be enhanced.

- The sector and district IRS support staff coordinates closely with the Sector authorities so that IRS activities are not disrupted without sufficient notice. Cell and village leaders should dedicate more time and effort to IRS mobilization and implementation and each should provide feedback on structures in their villages that may have been missed by SOPs.

5.2. INVENTORY

Following completion of IRS operations, all of the commodities at the sector stores were transported to the district stores. The sector storekeepers updated their stock records and handed them over to the district storekeepers/logistics assistants. At the district stores, stock records were updated to show the remaining stock including the commodities that were retrieved from the sector stores and the district inventories were updated accordingly. Table 16 shows a summary of the remaining stock. See Annex 4 for detailed inventory.

TABLE 16: STOCK OF IRS COMMODITIES

Item	Quantity Before the Campaign	Unit	Quantity Used	Remaining Stock after the Campaign
Coveralls	5,485	Piece	3,363	5,485
Boots	1,829	Pair	1,784	1,367
Helmets	3052	Piece	1,384	3,026
Head Gear	3,163	Piece	1,384	2,986
Inner part for Helmets	3,139	Piece	1,384	2,760
Face Shields	2230	Piece	1,384	2,136
First Aid kits	158	Piece	110	48
Latex Nitrile Gloves	7938	Pair	2.960	4,978
Respiratory Masks	46842	Piece	35,159	11,683
Spray Pumps	1772	Piece	1515	1772
Spray Pump Repair Kits	39	Kit	10	29
Nozzle Tips 8002E	73	Piece	73	0
Pump Hoses	70	Piece	70	0
Pressure Gauges	26	Piece	9	17
Extension Assembly	46	Piece	23	23
Bendiocarb Sachets	161,524	Sachet	145,295	16,229*

**Expiry date: July 2016*

6. MONITORING AND EVALUATION

Monitoring and evaluation for the September 2014 IRS campaign closely followed the processes outlined in the annual AIRS Rwanda Work Plans and the AIRS M&E Concept Paper developed by the AIRS Home Office team.

6.1. KEY OBJECTIVES

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

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

6.2. DATA MANAGEMENT

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

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

6.2.1. DATABASE PREPARATION

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

- Reviewed the database, based on challenges and lessons learned from the last spray

campaign, to make sure that data quality assurance and control of IRS data are upheld at all levels.

- Ensured IRS data security and storage for future reference through establishment and enforcement of proper protocols.
- Streamlined and standardized data information flow to minimize errors and facilitate timely reporting.
- Emphasized accuracy of both the data collection/verification and the data entry process through comprehensive trainings and supervision at all levels.
- Recruited and trained data clerks in data entry and data management.
- Facilitated training of data entry clerks, data cleaners, and M&E Assistants on the database.

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

6.3. DATA QUALITY ASSURANCE AND CONTROL

During the September 2014 spray round, AIRS Rwanda used the AIRS M&E Supervisory Toolkit, which consists of the following two tools to standardize and improve IRS supervision:

- Error Eliminator (EE) forms for mobilizer and spray data verify the completeness and correctness of data collected while in the field. These forms were used to ensure that data collection forms were filled out completely and properly. They highlight common errors that had been recorded in previous spray campaigns, to make it easier for supervisors to identify and make corrections where necessary. During the spray campaign, the EE for spray data were completed daily by team leaders, sector supervisors and coordinators, district IEC Assistants and Coordinators, M&E Assistants and Abt staff. The EE for mobilizer data was completed on daily basis by cell IEC Supervisors, Sector IEC Assistants, District IEC Assistants, District Coordinators, M&E Assistants and Abt staff.
- Data Collection Verification (DCV) forms check the accuracy of data collected in the field. Supervisors used the DCV to ensure that the data written on the Daily Spray Operator Forms matched the information reported by households. Sector Coordinators, District IEC Assistants, District Coordinators, M&E Assistants and Abt staff visited villages and interviewed households using the DCV form a few days after spraying.

(See Annex 4: Summary of Supervision Checklists Completed by AIRS Staff).

Data quality assurance measures were performed daily during the IRS campaign by a variety of AIRS staff (i.e., team leaders, supervisors, sector coordinators, sector and district IEC Assistants, district coordinators, M&E Assistants and Abt staff). We provide more detail below about the specific activities we performed to ensure high-quality data, regarding physical data verification (spray and mobilization), database quality control, and random spot checks.

6.3.1. PHYSICAL DATA VERIFICATION

Physical data verification was performed at three different levels:

- Spray Operator/Mobilizer and Village IEC Level: 100% of spray and mobilizer data collected on SOP and Village IEC forms were reviewed, arithmetically verified, and signed off by the team leaders and sector supervisors.
- District Level: Sector and District Coordinators collected the Daily Spray Operator and Village IEC forms from team leaders and checked the accuracy of the spray and mobilizer data (100% of forms). Spray and mobilizer forms were then handed over to the M&E Assistant for data entry. Data forms were transmitted from the sectors to the district office every evening.
- Data Entry Level: Data clerks reviewed each form (100%) for typos and transcription errors and verified the arithmetic before entering the data into the database.

6.3.2. DATABASE QUALITY CONTROL

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

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

6.3.3. RANDOM SPOT CHECKS

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

Finally, AIRS supervisory staff conducted field checks by visiting random structures found by spray operators (based on spray form records) and interviewed the residents to collect spray campaign information. Using the DCV, supervisory staff visited ~2,000 structures (~2%) and compared the data collected from the field checks with data collected by spray

operators on the data collection forms. Any discrepancies were addressed and rectified with the appropriate AIRS staff.

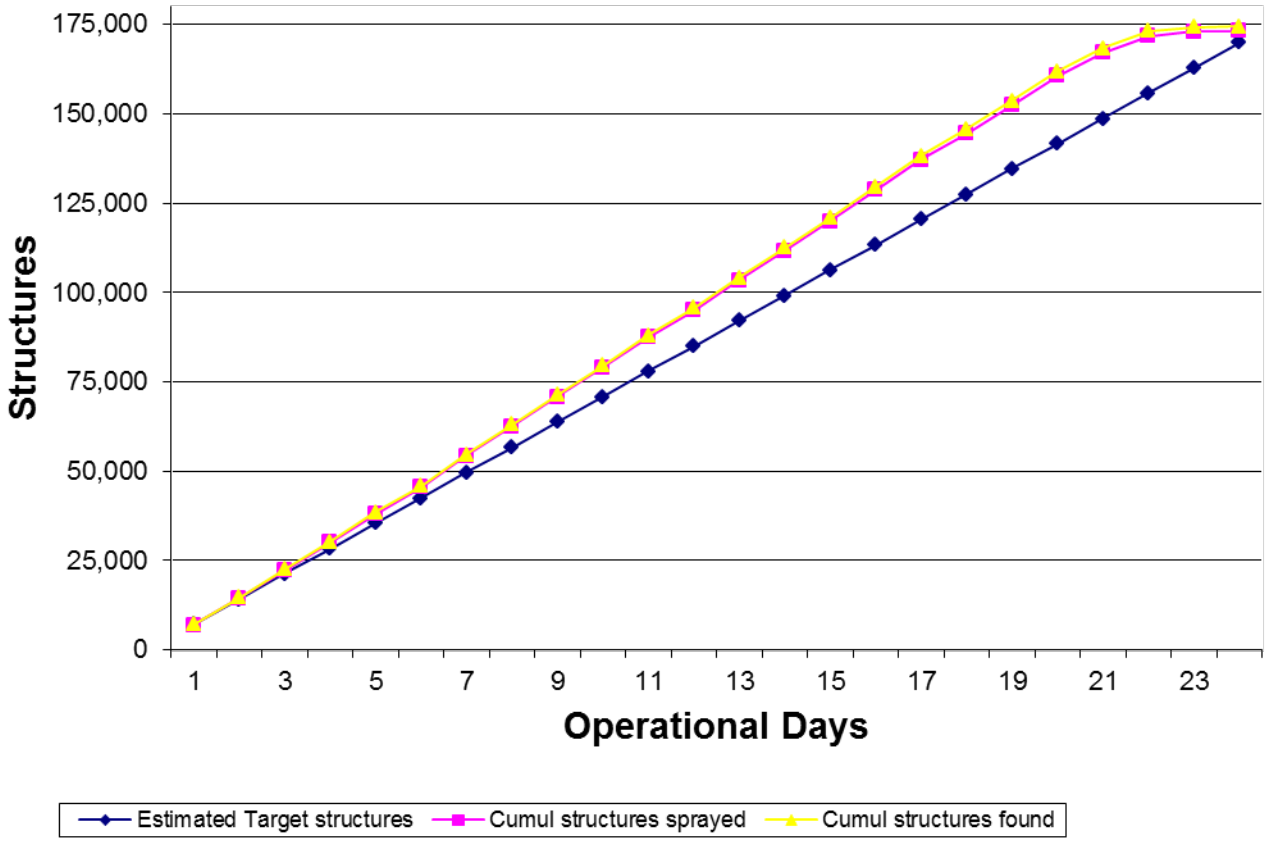
6.4. IRS RESULTS

During the spray campaign, 173,086 structures of the 174,411 structures found were sprayed, resulting in 99.2% spray coverage. A total of 705,048 people were protected, including 11,119 pregnant women and 103,408 children under five years old (see Table 17).

TABLE 17: SUMMARY OF RWANDA IRS RESULTS FOR SEPTEMBER 2014 CAMPAIGN

District	Total Structures Found	Total Structures Sprayed	Spray Coverage (%)	Total Population Protected			
				Male	Female	Pregnant Women	Children <5 Years
Bugesera	38463	38201	99.3	72559	79100	2416	23233
Gisagara	75619	74913	99.1	145530	165345	4534	45443
Nyagatare	60329	59972	99.4	116579	125935	4169	34732
Total	**174,411**	**173,086**	**99.2**	**334,668**	**370,380**	**11,119**	**103,408**

FIGURE 4: IRS DAILY TRACKER



6.4.1. SCHOOLS AND PRISONS IN IRS TARGET DISTRICTS6

During the September 2014 spray campaign, a total of 195 dormitories were sprayed in 43 schools and 4 prisons in the three IRS target districts, protecting 8,443 people. Three hundred and seventy (370) insecticide sachets were used (see Table 18).

TABLE 18: IRS RESULTS FOR SCHOOLS, PRISONS AND REFUGEE CAMPS IN IRS DISTRICTS

District	Targets for schools/ prisons	# Targets for Dormitories	# Schools sprayed	# Prisons sprayed	# Dormitories sprayed	Population Protected				Found Rooms	Sprayed Rooms	Mosquito Nets Available	Insecticide Used
						Male	Female	Pregnant Women	Children < 5 years				
Bugesera	4	11	3	-	8	311	262	0	0	12	12	142	42
Gisagara	33	311	24	2	128	2,307	2,931	0	0	541	520	4,322	193
Nyagatare	16	165	16	2	59	1,429	1,203	1	1	172	170	2,224	135
Total	**53**	**487**	**43**	**4**	**195**	**4,047**	**4,396**	**1**	**1**	**725**	**702**	**6,688**	**370**

6.4.2. INSECTICIDE USAGE

The total number of sachets used during the September 2014 campaign was 145,295 (144,925 plus 370 sachets for structures and schools in the three target districts). On average, one sachet sprayed 1.2 structures (see Table 19). The average number of sachets used by a spray operator per day was 6.3, and each operator, on average, sprayed 7.5 structures per day in the three target districts.

TABLE 19: INSECTICIDE USAGE

District	Total Structures Sprayed	Total Sachets Used	Average Number of Sachets per Sprayed Structure	Average Number of Sachets per SOP per Day	Number of Structures sprayed per day per SOP
Bugesera	38201	31306	1.2	5.9	7.2
Gisagara	74913	64828	1.2	6.5	7.5
Nyagatare	59972	48791	1.2	6.3	7.8
Total	**173,086**	**144,925**	**1.2**	**6.3**	**7.5**

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

7. ENVIRONMENTAL COMPLIANCE

7.1. PRE-SEASON ENVIRONMENTAL ASSESSMENT

During the period of August 4-8, 2014, the Rwanda AIRS team conducted pre-spray environmental assessments in the three IRS districts at the operation sites at the sector level. This was done using smartphones which were pre-programmed with environmental assessment checklists. Data was entered in the e-forms on the smartphones while at the field operational sites and submitted to a central database on an automated server at Abt Associates' Bethesda office. A work list was generated which was then instantly shared with the AIRS Chief of Party (COP), Technical Manager and the Environmental Compliance Manager to guide them on the actions to be taken in preparing the operation sites for IRS. The assessments involved identifying storage facilities and determining the suitability of soak pits that were used in the previous IRS round, and siting locations for new soak pits. In total, 9 storage facilities were rented while 19 were provided by the sector authorities at the sector and cell office premises. Some of the stores required minor refurbishments which generally included fixing double locks and reinforcing doors and windows. The soak pits were cleared of bushes that had grown in and around them, murram was added in the wash area and compacted, a polythene sheet fixed onto the murram, and poles were fixed to further stabilize the fence. The various materials especially the charcoal and sawdust were also replaced in the pit. Table 20 shows the details of the refurbishments that were done at the operation sites.

TABLE 20: CONSTRUCTION AND REFURBISHMENTS AT IRS OPERATION SITES

District/Province	Number of Operation Sites	Site Refurbished (soak pit, storeroom, fence, etc.)
Bugesera/ Eastern Province	7	7 soak pits refurbished 1 office and storage facility provided by sector authorities 6 office and storage facilities rented
Nyagatare/ Eastern province	8	6 soak pits refurbished 3 new soak pits constructed 5 office and storage facility provided by sector and cell authorities 3 offices and storage facilities were rented
Gisagara/ Southern Province	13	8 soak pits refurbished 5 new soak pits constructed 13 offices and storage facilities provided at the sector and cell offices

The 2012 SEA that was amended in 2013 in preparation for the February 2013 IRS campaign was sufficient for the September 2014 IRS campaign. A letter report was submitted to highlight the environmental compliance plan for the September 2014 IRS campaign.

7.2. SAFETY AND ENVIRONMENTAL COMPLIANCE DURING THE SPRAY CAMPAIGN

Prior to the start of operations, all spray operators, washers and supervisors underwent medical tests to ensure their fitness to participate in the IRS operations. The tests were comprised of a routine physical examination, pregnancy tests for all females (including storekeepers, sector supervisors, sector coordinators) and hematocrit and liver function tests (AST, ALT). Anyone who was found unfit did not participate in the operations. During the medical examinations conducted in August 2014, 12 SOPs and washers were found unfit for IRS operations and were replaced immediately before IRS training and operations. The disqualified candidates either exhibited high levels of transaminases (8), or were found to be pregnant (4). Table 21 shows the number of SOPs, washers and supervisors that underwent medical checkup in each IRS district.

Table 21: Medical Checkup for IRS staff

District	SOPs, Washers and storekeepers examined		SOPs, Washers a storekeepers found unfit	
	Male	Female	Male	Female
Nyagatare	194	283	6	2
Bugesera	128	199	0	4
Gisagara	265	332	0	0
Total	**587**	**814**	**6**	**6**

During IRS operations, all staff who took part in IRS were required to adhere to the requirements for environmental and human safety related to IRS. Mitigation measures were instituted through the provision of appropriate PPE to all spray personnel and others who had potential exposure to insecticide. PPE included coveralls, gloves, boots, helmets, face shields, and dust masks for use throughout the spray period.

Transportation of insecticides from the central warehouse to the district warehouses was done using enclosed trucks. Distribution from the district warehouse to the operations sites was done using trucks covered with tarpaulins. Each vehicle was equipped with kits for spill management and first aid, Material Safety Data Sheets and accident/emergency procedures sheets. Spray operators were transported from the operational sites to the field using Daihatsu/Toyota trucks that were retrofitted with railings on the periphery and seating benches. Prior to their engagement, all the vehicles were inspected against the PMI BMPs to ensure compliance with safety and environmental requirements.

Soak pits were monitored throughout operations. Plastic sheeting was used at the wash areas to ensure that insecticide contaminated effluent does not pollute the environment was replaced where and when it was deemed necessary. The soak pit and wash areas were fenced and gated to ensure that non-authorized entities did not access the premises. The progressive (triple) rinsing system was used at each soak pit for washing spray pumps. Trained washers washed the PPE over the soak pits at the end of each spray day. The spray operations teams also washed their bodies in the provided washrooms at the end of every work day before leaving the operational sites to retire for the day. Mid-spray environmental compliance inspections were carried out during the spray operations in the three IRS districts to ensure that mitigation measures put in place during spray operations were

adhered to. The inspection was done by Abt AIRS staff in conjunction with the district environmental officers using smartphones as well as paper checklists.

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

7.3. MANAGEMENT OF INSECTICIDE ADVERSE EFFECTS AND OTHER INCIDENTS

Each of the three IRS districts had a team in charge of adverse effects. The team was comprised of a coordinator, a doctor who was based at the district hospital and two nurses based at each health center affiliated with each IRS operation site. These teams were responsible for addressing any adverse effects experienced by community members and/or the spray operations support staff during the spray operations. Before the start of the IRS operations, this team received refresher training at each district on management of IRS adverse effects. During the September 2014 spray campaign, one case of side effects was reported throughout the period of the operations. The associated symptoms of the reported case were mild, limited to localized irritations of eyes and the skin. This case was attended to appropriately and the person affected recovered within a few hours of attention. Table 22 below provides a summary of the adverse effects that were reported in all districts and were attended to at either a health center or district hospital.

During the operations, there were two IRS vehicle accidents: one in Bugesera and one in Gisagara. In Bugesera a pedestrian was hurt, while in Gisagara a vehicle overturned and a boy was hurt. Both victims were treated in the respective district hospitals and recovered fully.

Four days after the completion of the IRS operations, an incident of a child who died, aged 1 year and 2 months, was reported in Gikonko sector of Gisagara District. The child allegedly consumed insecticide that was likely part of the insecticide batch that was used in the 2014 IRS campaign. The mother of the child worked in the sector as a washer during the campaign. Police conducted investigations which have not yielded any information about how the insecticide got to the village.

Table 22: Number of Adverse Effects Cases

District	Number of Cases	Symptoms
Bugesera	0	
Nyagatare	1	Skin irritation Eye irritation
Gisagara	0	

7.4. POST-SEASON ENVIRONMENTAL ASSESSMENT

The post-season environmental assessment was conducted in the three districts using smartphones. During the assessment it was confirmed that all IRS items were collected from the operation sites and that insecticides and IRS wastes were taken to district storage facilities. Soak pits and their surroundings were well cleaned, covered, and the doors securely locked. AIRS agreed with the district and sector authorities that the sectors would provide security for the soak pits and wash areas to ensure that they are not vandalized during the non-spraying season. Stores were cleaned/ decontaminated before being handed over to the owners.

7.5. IRS WASTE DISPOSAL

IRS wastes were disposed at different sites according to the type generated during the IRS operations. Contaminated wastes were sent to 3 different incineration plants whose combustion temperature is 1100° Celsius for incineration. A total of 792 kg of contaminated wastes from Nyagatare district, comprising of 48,926 empty insecticide sachets and 11,618 used masks were sent to the Nyagatare District Hospital incineration plant. A total number of 575 kg of contaminated wastes from Bugesera district comprising of 31,348 empty insecticide sachets and 8,398 used masks were sent to ADEPR Nyamata Hospital incineration plant. A total of 1,058 kg of contaminated wastes from Gisagara district comprising of 65,021 empty insecticide sachets and 15,010 used masks from Gisagara District were sent to Kibilizi Hospital incineration plant. Incineration certificates were issued by each of the incineration plants (Annex 5). Other wastes, including 394 pairs of worn-out boots, 2865 used gloves, and assorted plastics items (77damaged barrels, 1 jerry can and 110 basins) were disposed of at the Entreprise pour la Protection de l'Environnement et Development Rural (EPEDR) Recycling plant. A total of 1,401 uncontaminated carton boxes were donated to Cards from Africa Company at Samuduha. Other uncontaminated wastes such as papers were disposed of at the Nduba dumping site.

8. CAPACITY BUILDING OF THE MINISTRY OF HEALTH

In collaboration with MOPDD and with the support of the Government of Rwanda and PMI, AIRS Rwanda conducted five trainings between May and July 2014 to strengthen the skills and knowledge of stakeholders on IRS planning and implementation, monitoring and evaluation, logistics, and procurement at both district hospitals and health centers in the districts of Bugesera, Gisagara, and Nyagatare, where IRS is implemented. Participants during capacity building trainings were comprised of District vice Mayors, Hospital Directors, M&E officers, District Logistics, District Hospital Environmental Health Officers, in charge of Social Affairs at sector levels and in charge of health community workers. Table 23 shows the numbers of stakeholders trained by gender.

Table 23: Stakeholders trained by gender

Type of Training	Male	Female	Total
M&E	12	4	16
Logistics	11	5	16
IRS Operations (Bugesera, Gisagara & Nyagatare)	74	50	124
Total	**97**	**59**	**156**

IRS implementation was also conducted in close collaboration with the MOH and district staff to promote sustainability. The MOPDD staff participated in the facilitation of the IEC and SOP ToTs. These trainings created a pool of trainers who will be very useful in the future depending on their availability. The trained IEC and SOP ToTs in turn facilitated the trainings for the IEC implementers and spray operators at the district and sector levels. The beneficiaries of these two trainings (IEC implementers and SOPs) were the cell and village heads, and community health workers (SOPs) who were involved in IEC and spraying activities respectively. Supervision of IRS operations was conducted in collaboration with MOPDD, district/sector staff (Vice Mayor-Social Affairs, District Health Director, District Environmental Health Officer, Sector Social Affairs Officers and community health workers' supervisors). This staffs were all given orientations on IRS supervisory activities.

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

9. ENTOMOLOGY

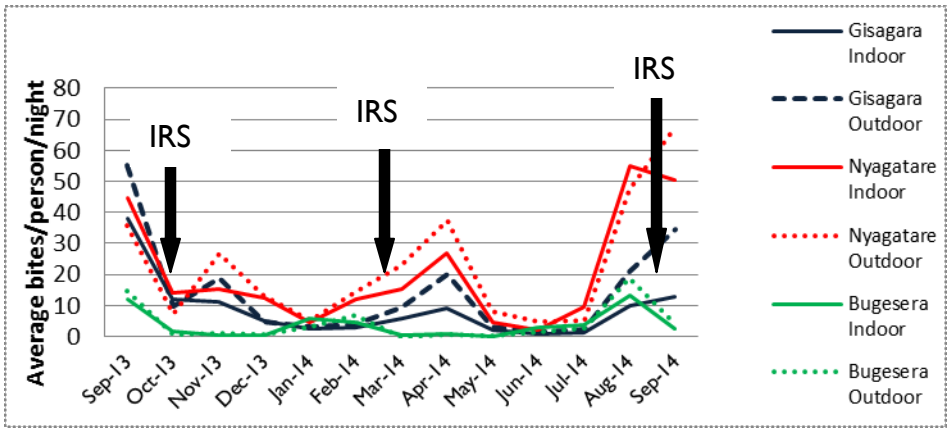
Entomological monitoring is essential in any insecticide-based vector control intervention such as IRS. It helps to assess the quality of the vector control intervention as well as its efficacy. The entomological monitoring data is used to justify decisions such as the type of insecticide and selection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

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

9.1. VECTOR SPECIES COMPOSITION, DENSITIES, FEEDING TIME AND LOCATION

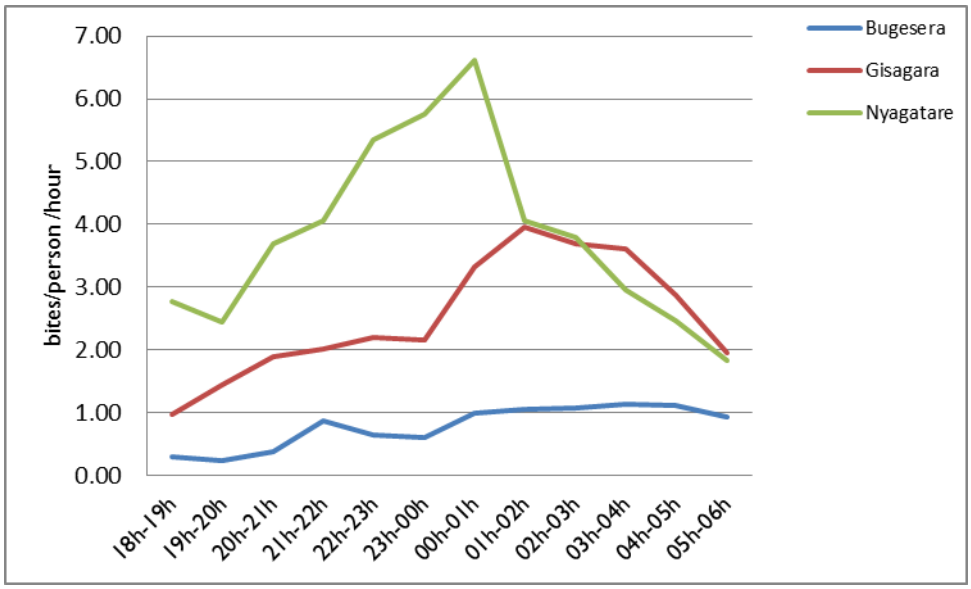
Monthly vector collections were done to assess the vector species composition, density and behavior in the three IRS districts using human landing collections (HLC) and pyrethrum spray catches (PSC). Vector density was calculated as the average number of An. gambiae s.l collected per house per day from PSC data.
An. gambiae s.l. was the only important malaria vector that was identified during the entomological monitoring collections. According the PCR result from KEMRI *An. arabiensis* accounted only for 34.5% of the An gambiae s.l. population, which is far less that the 76% observed in 2013. *An. gambiae* s.l. generally showed more exophagic than endophagic behavior in the three districts. In Bugesera, both indoor and outdoor biting remained low (average less than 4 bites/person/night) compared to the other districts, but a rise was observed in August 2014 (13.24-indoor and 18.65-outdoor bites/person/night). In September 2014 a decline to 2.65 bites/person/night (indoor) and 3.65 bites/person/night (outdoor) was observed. Both Gisagara and Nyagatare districts showed similar trends in biting patterns through the months following the February 2014 spray campaign; in both districts biting rates rose over the period February-April despite the February/March 2014 IRS application. This rise in biting could be attributed to a rise in breeding sites that were created by rains that were experienced during that period and rice paddies. During the period May through July human biting ranged between 1-9 bites /person/night. In August however the biting rates rose to 9.9 (indoor) and 20.8 (outdoor) bites/person/night in Gisagara and 55.17 (indoor) and 47.42 (outdoor) in Nyagatare, (see Figure 5 and annex 6). The reduced biting that was observed in the earlier months of the year could be attributed to the decline in vector densities which was observed after the IRS application in February 2014. By August increase in biting corresponded with a rise in vector density which could be explained by the fact that insecticide levels on the walls had plummeted to values below threshold levels to keep the vector densities low. In September, biting remained relatively the same as in August in both Gisagara and Nyagatare.

Figure 5: *An. gambiae s.l.* Average Monthly Biting Trends



Hourly biting rates per person varied across the three districts; they were highest in Nyagatare, followed by Gisagara and then Bugesera showed the least bites/person/hour. The relatively higher biting in Gisagara and Nyagatare could be due to the fact that apart from the rains there are more rice paddies in these two districts than in Bugesera. In the two districts, biting was observed to rise at around 2000h, peaked at 0001h and remained high until 0003h. In Bugesera, hourly biting rose at around 2200h and remained relatively constant through the rest of the night. Figure 6 below shows average *An. gambiae s.l.* bites per person per hour through the night across the three districts.

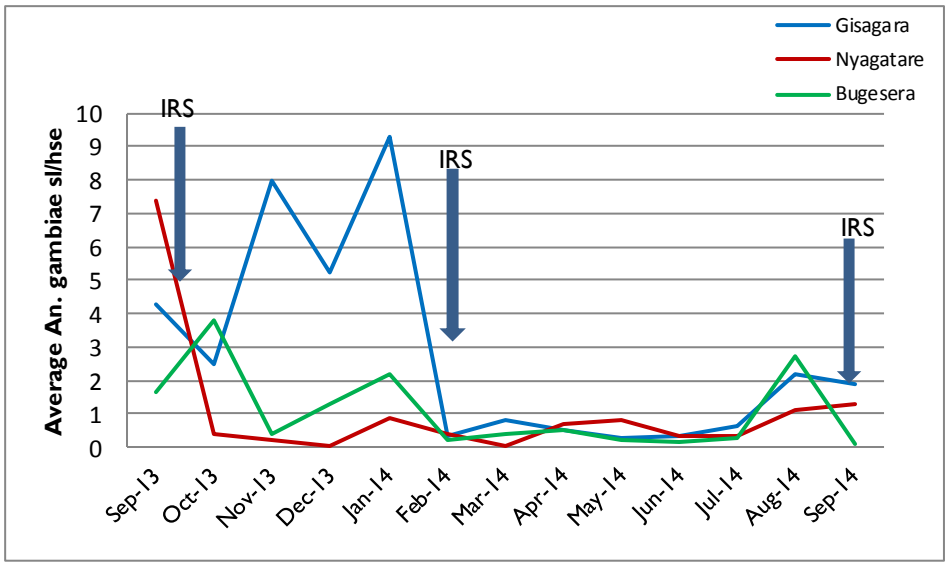
Figure 6: Average *An. gambiae s.l.* Hourly Biting



Vector density (average *An. gambiae s.l.*/house/day) remained low (less than one *An. gambiae s.l* /house/day) in the three districts during the period February to July 2014 which could be accredited to the February 2014 IRS application. A rise in vector density was observed in August 2014 to 2.2, 1.1 and 2.7 average *An. gambiae s.l.*/house/day in Gisagara, Nyagatare and Bugesera, respectively This rise was observed during the period when insecticide levels on the walls from the February 2014 IRS had dropped to levels that might not have been sufficient to keep the vector densities low, in addition to environmental factors which might have favored the proliferation of the vector. Following the September 2014 IRS application

a decline in the densities was observed. In September however a decline in the densities was observed, (see Figure 7 and Annex 7).

Figure 7: *An. gambiae* s.l. Density



Ovary dissection of the *An. gambiae s.l.* collected by HLC was performed to determine the parity rates. Results did not show any definite trend in Bugesera during the reporting period Erratic declines were however observed in Nyagatare and Gisagara in March, May and June 2014 which could be the effect of the Feb/March IRS application (see Annex 8).

9.2. WALL BIOASSAYS

Cone bioassays were conducted in 36 sprayed structures in the three districts. In each district, two different sectors were sampled and in each sector, six structures were sampled. Control tests were conducted alongside on surfaces that were known to have no insecticide. The cone bioassays were conducted used susceptible *An. gambiae s.l.* (Kisumu colony)

Cone bioassays conducted within one week of spraying to assess the quality of spraying in September 2014 showed 100% mortality of susceptible *An. gambiae s.l.* indicating quality spraying took place. Bioassay tests which were conducted in the month of October (one month post IRS) also recorded 100% mortality of the *An. gambiae s.l.* in all the test sites.

Monthly WHO cone bioassay tests were conducted following the February 2014 IRS campaign. Test mortality of over 80% was observed in all the three districts up to three months after spraying but dropped below this level in two of the three districts four months post spraying. At four months post IRS percentages mortalities had gone below the 80% threshold in Gisagara (78%) and Bugesera (63%) but was recorded as 81% in Nyagatare. At five months post IRS, monthly average percentage mortalities of 66.7, 53.6 and 70 were recorded for Gisagara, Bugesera and Nyagatare respectively (Figure 8).

The mud wall type showed the lowest insecticide retention rate throughout the assessment period while the plastered and painted (PP) wall type showed the highest insecticide retention rate except for the fifth monthly assessment when the decay rate was slightly higher than for 'plastered and not painted'(PNP) wall type. At five months post IRS the three

wall types recorded percentage mortality rates of 65.6, 68.9 and 56.1 for PP, PNP and Mud wall surfaces respectively (see Figure 9).

FIGURE 8: Wall Bioassay Test Results (Feb-July 2014)

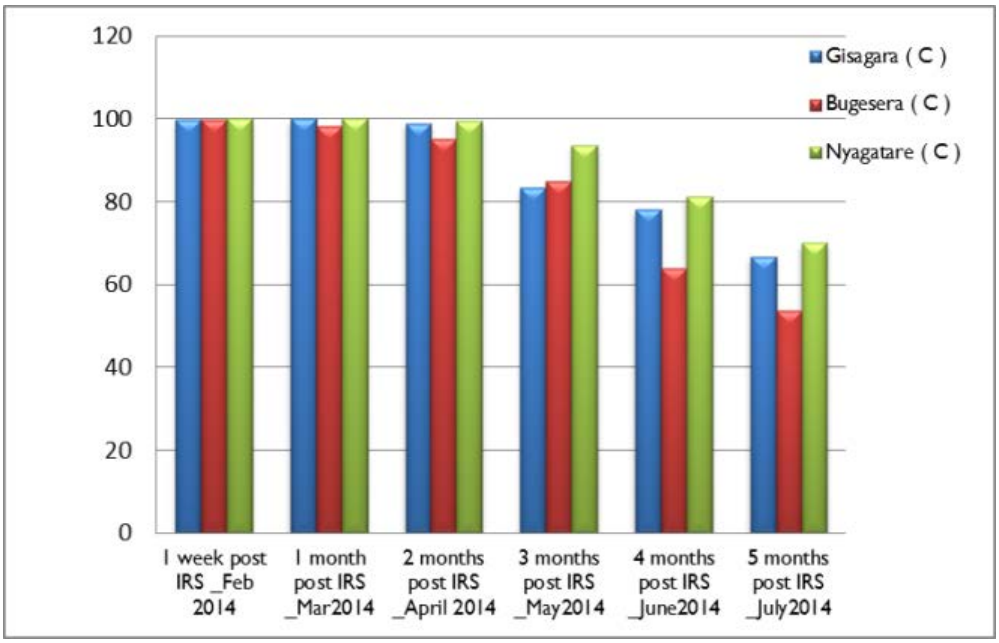
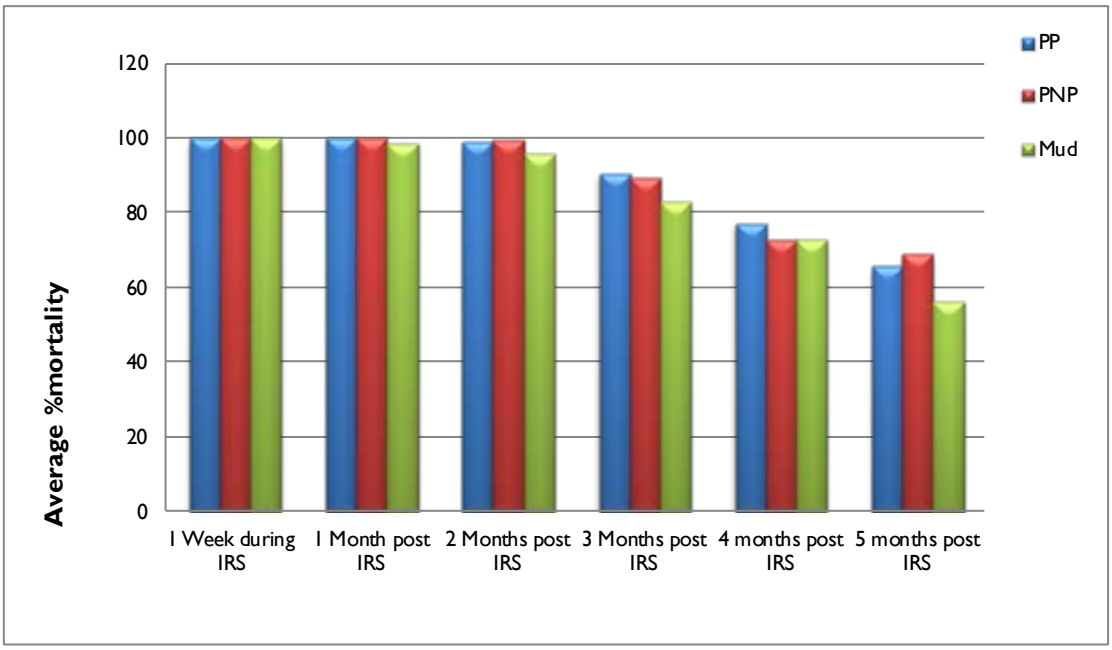


FIGURE 9: Wall Bioassay Tests Results Feb 2014-Jul 2014 (by Wall Type)



9.3. ENTOMOLOGY LABORATORY

Through the support of USAID/ PMI Rwanda's Malaria and Other Parasitic Diseases Division of the Ministry of Health has put up a modern entomology laboratory at the National University of Rwanda school of Public Health. This was done by rehabilitating an existing structure at the National University of Rwanda school of Public Health .The facility cost over $US 200,000 to erect and equip, (see Annex 9 for the list of equipment).

The laboratory will be dedicated to providing evidence base for making vector control decisions and will focus on:

- Morphological and molecular identification of malaria vectors including Polymerase Chain reaction (PCR) for identification of sibling species of *Anopheles gambiae* complex and identification of knock down resistance (KDR) mechanisms
- Measuring insecticide susceptibility profiles and LLINs quality control
- Rearing of *Anopheles gambiae s.s.,* susceptible strain for use in bioassays
- Training of internship students, medical and environmental

The official inauguration was done September 16, 2014 and was presided over by the Minister of Health, Dr. Agnes Binagwaho, and US Mission Deputy Chief of Mission, Mr. Eric Wong, and was attended by USAID Mission Director, Peter Malnak, USAID/ PMI, CDC, WHO, UNICEF, National University of Rwanda, National Malaria Control Program Managers from 12 countries that form the Eastern Africa Roll Back Malaria Regional Network (EARN), other government officials and implementing partners.

10. CHALLENGES, LESSONS LEARNED AND RECOMMENDATIONS

10.1. CHALLENGES

The main challenges experienced during the IRS campaign included:

- Approximately 15% of IRS structure cards are lost by structure owners.
- Absence of some households during time of spraying because of farming, market days, work days, funerals and some refusals meant that some structures could not be covered, even after mop-up.
- Competing government functions/meetings during IRS at the sector level requiring the mobilizers and spray operators (village leaders) led to occasional interruption of spraying operations in some instances.

10.2. LESSONS LEARNED AND RECOMMENDATIONS

- Engagement of community health workers supervisors at operational sites level for IEC coordination in the sectors enhanced coordination of IRS activities at the community level. Further, while local leaders are critical in mobilizing and enhancing IRS acceptability, their role and engagement in IRS needs to be re-evaluated to maximize their involvement.
- Building the capacity of local leaders by training them on all components of IRS operations enhanced their interest and ownership of the project activities.
- The procedure for recruitment of SOPs by the 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 should be adhered to.
- Enhanced supervision by the AIRS staff, MOPDD, district and sector staff and regular feedback meetings were instrumental to the smooth implementation and high spray coverage recorded.
- Data cleaning conducted regularly during IRS data entry was instrumental in identifying any errors and taking immediate remedial action. This also provided an opportunity for comparing insecticide used as per the database and daily logistics records.
- Data collection verification was conducted by all supervisors to validate the accuracy of data collected in the field by interviewing household owners. This provided an

opportunity to confirm the correctness of SOP data records on regular basis leading to improved integrity of the IRS campaign.

ANNEXES

ANNEX 1: MOH LETTER ON INSECTICIDE SELECTION 2013/ 2014

REPUBLIC OF RWANDA

Kigali, On 22nd March 2013
N° 20/1227 /RBC/IHDPC/2013

MINISTRY OF HEALTH
PO BOX.84 KIGALI
www.moh.gov.rw

Mr Peter MALNAK
USAID Country Mission Director
KIGALI-RWANDA.

Re: Choice of insecticide for Indoor Residual Spraying 2013 to 2014 in Rwanda.

Dear Mission Director,

I am pleased to take this opportunity to thank the USAID/PMI team for their active involvement in the large consultation in the process of selection of insecticide to be used for the next IRS rounds for malaria prevention throughout respectively the stakeholders technical workshop on Rwanda insecticide resistance strategy held on February 27th, 2013, and the stakeholders meeting on approval of technical specifications for malaria commodities held on March 21th, 2013.

Considering the strategies proposed in the insecticide resistance strategy document for mitigation of occurrence of insecticide resistance, I am pleased to inform you that Rwanda is planning to change the class of the current insecticide to the Carbamates for the period of 2013 to 2014. The active ingredient on insecticide recommended for the above period is *Bendiocarb*.

We would appreciate again your support under the lead of the Malaria and Other Parasitic Diseases Division-RBC for the implementation of this strategy with particular attention to ensure environmental compliance and strengthen appropriate IEC/BCC as recommended by the stakeholders meeting.

Sincerely Yours,

Dr Agnes BINAGWAHO

Minister of Health

Cc: - **Acting DG of RBC**
- The Head of Malaria and Other Parasitic Diseases Division-RBC
KIGALI.

ANNEX 2: LOCAL PROCUREMENT

Description	Quantity / Number
IRS Transportation	
Rented Vehicles used in micro-planning and logistic assessments	13
Rented Vehicles used in IRS implementation	83
IRS Supervision vehicles(Country Office)	3
Rented vehicles that facilitated the Post IRS activities	29
Printed materials	
SOP Forms	27,215
Team Leader Forms	5,291
IRS Cards	178,000
Brochures	0
IEC Mobilizer Forms	793
IEC Implementer Form	17,523
Stock Cards	1,500
Delivery Note Books	0
Request Books	0
Goods Issued Note Books	271
Food Vendors	
Gisagara District	8
Nyagatare District	8
Bugesera District	6

ANNEX 3: SOP TRAINING PROGRAM

TIME	SUBJECT	FACILITATOR
	DAY 1	
08.30 am – 09.00 am	**Session 1: Opening Ceremony**	Sector Authorities
08.30 am - 08.45 am	Arrival and Registration	Sector Supervisor
08.45 am – 09.00 am	Introduction and Opening remarks	Sector Coordinator
09.15 am – 09.30 am	Objective of the training	Sector Coordinator
09.30 am – 10.00 am	Introduction to Indoor residual spraying	Trainer
10.00 am – 11.00 am	Parts of Compression Pumps handling, progressive rising and Pump maintenance	Trainer
11.30 am - 12.30 pm	Introduction to the spraying surface	Trainers
12.30 pm – 01.00 pm	Safety of population and Environment	Trainers
01.00 pm – 02.00 pm	**LUNCH**	
02.00 pm – 03.00 pm	Personal Protection & dressing rehearsal	Trainers
03.00 pm - 04.00 pm	Filling of daily collection data forms	
04.15 pm - 04.45 pm	Filling of Daily collection data forms	
04.45 pm - 05.00 pm	Filling day evaluation Chart	
	DAY 2	
	Session 3: Safety of IRS	
08.00 am - 09.00 am	Filling of daily collection data forms	Trainers
09.00 am – 10.00 am	Preparing Structures for IRS, Community mobilization	Trainers
10.00 am - 11.00 am	Basics in Management of adverse effects	Sector Coordinator
11.00 am - 01.00 am	Supervision and reporting of all IRS activities, Roles of Team leader) (Use of supervision checklists and Spray and team leader Pocket guides)	Sector Coordinator
1.00 pm – 2.00 pm	**Lunch**	
2.00 pm – 5.00 pm	Supervision and reporting of all IRS activities (Use of supervision checklists)	
	DAY 3 - 5	
	Quality Control	
08.00 am – 10.00 am 10.00 am – 01.00 pm 02.00 pm – 04.00 pm	**Wall spraying techniques (Theory & demonstration)** **Spraying Walls techniques practices** • Maintaining 45cm distance from Walls • Maintaining 75cm Swath and 5cm overlap • Spray rhythm (Speed top – down) Spraying walls techniques - practice	Trainers Trainers, Storekeeper

ANNEX 4: STOCK UPDATE

Category	Item	Initial Stock	New Procurement	Used	Equipment Damaged/ Needing Repair)	Usable Stock Remaining
PPE						
	Coveralls	5485	0	3,363	2,493	5,485
	Boots	1,829	0	1,784	462	1,367
	Helmets	3,052	0	1,384	26	3,026
	Gloves	7,938	0	2,960	2,960	4,978
	Dust masks	46,842	0	35,156	0	11,686
Spray pumps						
	Spray pumps	1,772	0	1,515	80	1772
	Repair kits	39		10	0	29
	Nozzle gaskets	231		99	0	132
	Nozzle tips	73	0	73	0	0
	Strainers	800	0	238	0	562
	Extension Assembly	46	0	23	0	23
	Pressure Gauge	26	0	9	0	17
	Pump Hose	70	0	70	0	0
	Measuring cylinder	25	0	25	0	25
Insecticides						
					0	
Empty Sachets						
	Carmabate	25,687	135,837	145,295	0	16229

ANNEX 5: WASTE DISPOSAL CERTIFICATES

REPUBLIQUE DU RWANDA
DISTRICT DE BUGESERA
HOPITAL NYAMATA
BP: 7112 Kigali
Tél: 0788150100
E-mail: hop.nyamata@rwanda1.com

CERTIFICATE OF INCINERATION

THIS IS TO CERTIFY THAT 575 Kg of IRS contaminated wastes were received on October, 8th 2014 from ABt Associates Inc, Bugesera Office, and incinerated on 10th October 2014.

Kind Regards

DR. Alfred RUTAGENGWA
ADEPR Nyamata Hospital Director

Kibilizi DH

FOCUS ON THE FUTURE

CERTIFICATE OF INCINERATION

Kibilizi District Hospital is conforming that :

has fully incinerated 1058kgs 0f infectious waste from IRS activities in Gisagara District according to the Rwandan environmental law .

UWIZEYE Protogene
Environmental Health Officer

Dr NDAGIJIMANA Sylvestre
Med. Director of Kibilizi DH

REPUBLIC OF RWANDA

EASTERN PROVINCE
NYAGATARE DISTRICT
NYAGATARE HOSPITAL
B.P.43 NYAGATARE
24th October 2014

CERTIFICATE OF INCINERATION

THIS IS TO CERTIFY THAT **792** KG OF IRS CONTAMINATED WASTES WERE RECEIVED ON OCTOBER 17, 2014 FROM ABT ASSOCIATES INC, NYAGATARE OFFICE, AND INCINERATED ON 24th OCTOBER 2014.

Kind Regards

Dr RUHIRWA Rudoviko
Director

ANNEX 6: HUMAN BITING RATES (BITES/PERSON/NIGHT)

	Gisagara		Nyagatare		Bugesera	
	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor
Sep-13	38.17	55.33	44.67	35.92	12	14.58
Oct-13	12.08	9.67	14.17	7.33	1.58	0.83
Nov-13	11.08	18.92	15.17	26.67	0.25	1.25
Dec-13	5.17	4.92	12.58	13.08	0.33	0.67
Jan-14	2.5	3.25	4.5	5	5.92	3.08
Feb-14	3	3.8	12.2	14.3	4.5	7
Mar-14	6	9.5	15.4	23.1	0.5	0
Apr-14	9.25	20.24	26.74	37.25	0.67	0.84
May-14	1.92	3.08	4.49	7.9	0.08	0.12
Jun-14	0.92	1.33	1.95	4.8	2.82	1.43
Jul-14	1.33	2.22	9.35	5.34	3.75	2.84
Aug-14	9.9	20.8	55.17	47.42	13.24	18.65
Sep-14	12.9	34.4	50.38	67.5	2.65	3.85

ANNEX 7: PYRETHRUM SPRAY CATCH RESULTS

			UNFED	FED	HALF GRAVID	GRAVID	Total	Density (An. gambiae s.l./house)
Sep-13	Gisagara	Muganza	49	32	8	23	112	7.47
		Mamba	8	8	0	1	17	1.13
	Nyagatare	Mimuli	78	38	15	16	147	9.80
		Rukomo	34	26	6	9	75	5.00
	Bugesera	Mareba	13	14	4	4	35	2.33
		Musenyi	4	8	2	0	14	0.93
Oct-13	Gisagara	Muganza	17	15	7	1	40	2.67
		Gishubi	13	7	10	6	36	2.40
	Bugesera	Nyarugenge	31	11	26	22	90	6.00
		Musenyi	7	5	6	6	24	1.60
	Nyagatare	Rukomo	8	1	0	0	9	0.60
		Nyagatare	2	0	1	0	3	0.20
Nov-13	Gisagara	Muganza	97	22	19	20	158	10.53
		Gishubi	52	11	14	5	82	5.47
	Bugesera	Nyarugenge	1	0	1	1	3	0.20
		Musenyi	6	2	0	0	8	0.53
	Nyagatare	Nyagatare	0	0	0	0	0	0.00
		Rukomo	5	2	0	0	7	0.47
Dec-13	Gisagara	Muganza	22	21	16	18	77	5.13
		Gishubi	23	16	22	16	77	5.13
	Bugesera	Nyarugenge	13	14	6	4	37	2.47
		Musenyi	0	1	0	0	1	0.07

	Nyagatare	Nyagatare	0	1	0	0	1	0.07
		Rukomo	0	0	0	0	0	0.00
Jan-14	Gisagara	Muganza	46	135	37	5	223	14.87
		Gishubi	17	9	18	11	55	3.67
	Bugesera	Nyarugenge	17	29	11	8	65	4.33
		Musenyi	0	0	0	0	0	0.00
	Nyagatare	Nyagatare	4	4	2	3	13	0.87
		Rukomo	5	5	3	0	13	0.87
Feb - 14	Gisagara	Muganza	5	0	0	0	5	0.33
		Gishubi	4	0	0	0	4	0.27
	Bugesera	Nyarugenge	3	0	0	0	3	0.20
		Musenyi	1	1	0	0	2	0.13
	Nyagatare	Nyagatare	2	0	0	0	2	0.13
		Rukomo	2	6	0	1	9	0.60
Mar-14	Gisagara	Muganza	17	12	3	1	16	1.07
		Gishubi	11	7	2	0	9	0.60
	Bugesera	Musenyi	0	0	0	0	0	0.00
		Nyarugenge	0	0	0	0	0	0.00
	Nyagatare	Nyagatare	0	7	1	0	8	0.53
		Rukomo	3	3	1	0	4	0.27
Apr 14	Nyagatare	Nyagatare	2	1	1	0	2	0.13
		Rukomo	9	11	1	2	14	0.93
	Bugesera	Nyarugenge	1	1	0	0	1	0.07
		Musenyi	0	0	1	0	1	0.07
	Gisagara	Muganza	0	6	1	2	9	0.60
		Gishubi	1	0	4	1	5	0.33
May 14	Bugesera	Musenyi	3	2	0	0	2	0.13
		Nyarugenge	0	3	1	0	4	0.27
	Gisagara	Muganza	1	3	0	1	4	0.27
		Gishubi	2	3	1	0	4	0.27
	Nyagatare	Nyagatare	3	7	1	0	8	0.53
		Rukomo	7	12	3	0	15	1.00
Jun-14	Gisagara	Muganza	0	2	1	1	4	0.27
		Gishubi	1	0	2	2	4	0.27
	Nyagatare	Nyagatare	0	0	2	0	2	0.13
		Rukomo	0	0	0	2	2	0.13
	Bugesera	Musenyi	5	4	1	0	5	0.33
		Nyarugenge	2	3	0	2	5	0.33
Jul-14	Gisagara	Muganza	5	4	5	3	12	0.80
		Gishubi	2	2	2	1	5	0.33
		Nyagatare	0	3	0	0	3	0.20
		Rukomo	3	5	1	1	7	0.47
	Bugesera	Musenyi	1	1	0	0	1	0.07
		Nyarugenge	5	5	1	0	6	0.40
Aug-14	Gisagara	Muganza	19	25	7	5	37	2.47
		Gishubi	13	18	6	4	28	1.87
	Nyagatare	Nyagatare	7	11	2	2	15	1.00
		Rukomo	10	14	1	2	17	1.13

	Bugesera	Musenyi	4	9	1	1	11	0.73
		Nyarugenge	34	48	13	9	70	4.67
Sept 14	Nyagatare	Nyagatare	12	19	3	1	23	1.53
		Rukomo	8	11	2	3	16	1.07
	Gisagara	Muganza	6	19	3	5	27	1.80
		Gishubi	8	18	7	4	29	1.93
	Bugesera	Musenyi	0	0	0	0	0	0.00
		Nyarugenge	1	3	0	0	3	0.20

ANNEX 8: PARITY RATES (PERCENTAGE)[7]

District	Gisagara		Nyagatare		Bugesera	
Site/ Date	Muganza	Gishubi	Nyagatare	Rukomo	Nyarugenge	Musenyi
Sep-13	23.5 (149)	15.6 (90)	28.5 (130)	25.2 (127)	27.7 (83)	19.4 (60)
Oct-13	21.4 (70)	35.9 (39)	35.9 (39)	28.8 (66)	27.3 (18)	18.2 (11)
Nov-13	26.6 (79)	12.9 (31)	25.8 (31)	30.1 (83)	0 (1)	41.2 (17)
Dec-13	35.1 (57)	60 (20)	28.1 (64)	38.4 (86)	12.5 (8)	25 (4)
Jan-14	40.7 (27)	52.4 (21)	26.3 (38)	27.1 (76)	22.2 (54)	0 (1)
Feb-04	33.9 (56)	32.8 (58)	29.2 (72)	28.7 (115)	27.7 (112)	33.3 (6)
Mar-14	24.1 (116)	20.5(39)	13.3 (105)	5.5 (11))	16.7 (12)	0 (0)
Apr-14	31.9(94)	27.8(36)	28.7(187)	30(60)	20(5)	0(11)
May-14	18.2 (33)	33.3(3)	6.5(46)	15.7(121)	0(0)	0(2)
Jun-14	33.3(12)	33.3(3)	22.6(31)	0(12)	30.8(13)	45.2(31)
Jul-14	12.5(16)	0(3)	30.4(23)	23.1(39)	24(25)	7.7(13)
Aug-14	6.9(72)	6.9(29)	27.5(69)	34.1(88)	38.3(47)	27.2(18)
Sep-14	5.3%(75)	22.5 (40)	11.2(116)	3.1(65)	36(25)	0(0)

[7] The values in brackets represent the total number of *An. gambiae s.l.* dissected

ANNEX 9: ENTOMOLOGY LAB EQUIPMENT

	ITEM DESCRIPTION	# of units
1	Rack 96 Reverse Asst 5 PK	5
2	ES-8_300 8 Channel Pipette	1
3	Wall Heater	2
4	Venta Airwasher humidifier	3
5	Indoor humidty monitor (3) Humidty/temp/clock	2
6	Dual Wavelength UV Transilluminator	1
7	Chairs	57
8	Electrophoresis Power supply	1
9	Buffer puffer recirculating	1
10	Vortex Orbital Shaker	1
11	Centrifuge	1
12	Multi-Block HET	1
13	Eppendorf Tubes	5
14	12 Channel variable volume Pippette	1
15	Stirring HotPlate	1
16	Multichannel pipette(30-300)	1
17	Magnetic Stirring Bar	1
18	TissueLyser II	1
19	TissueLyser Adapter Set	1
20	GelDoc-it TS Imaging system	1
21	Conventional PCR Kit. hotstarTaq Plus Master Mix Kit(100):	1
22	Realtime PCR Kit. Quantitect Probe PCR Kit(200):	1
23	DNA extraction kit.	1
24	Gelpilot DNA Loading Dye,	1
25	Plastic sample racks for 96	1
26	Microamp optical 96-well reaction plate	16
27	Gelpilot 100 bp ladder	3

ANNEX 10: SUMMARY OF MID-SPRAY ENVIRONMENTAL INSPECTIONS- STORAGE FACILITY AND SOAK PITS

Operation Site	Date Inspection Performed	Are the store keepers, SOs and wash persons wearing appropriate PPE?	Do spray teams have clean PPE at the start of each work day?	Are overalls washed daily, and dried over the soak pit?	During transport, are all spray operator comfortably seated with pumps well placed between their legs in the transport vehicle?	Are spray operators fed before start of spray? (before wearing of PPE	Is the store well arranged? (height of arranged items, allowing for free movement, proper stacking of items, allowing for ventilation)	Are warning signs correctly displayed? (danger sign, insecticide safety notice)	Is there firefighting equipment (not expired)?	Are the surroundings of the store and soak pit clear of IRS solid wastes (empty sachets, masks, gloves)?	Are contents of drums 1, 3, 5 and 7 emptied into spray pumps before spray operators depart for field?
Musenyi	9/18/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ngeruka	9/18/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shyara	10/1/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nyarugenge	9/17/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ruhuha	9/30/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mareba	9/16/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kamabuye	9/18/14	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Mamba	9/24/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gikonko	9/22/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mukindo	9/17/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Muganza	9/18/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mugombwa	9/25/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gishubi	10/9/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Operation Site	Date Inspection Performed	Are the store keepers, SOs and wash persons wearing appropriate PPE?	Do spray teams have clean PPE at the start of each work day?	Are overalls washed daily, and dried over the soak pit?	During transport, are all spray operator comfortably seated with pumps well placed between their legs in the transport vehicle?	Are spray operators fed before start of spray? (before wearing of PPE	Is the store well arranged? (height of arranged items, allowing for free movement, proper stacking of items, allowing for ventilation)	Are warning signs correctly displayed? (danger sign, insecticide safety notice)	Is there firefighting equipment (not expired)?	Are the surroundings of the store and soak pit clear of IRS solid wastes (empty sachets, masks, gloves)?	Are contents of drums 1, 3, 5 and 7 emptied into spray pumps before spray operators depart for field?
Save	9/24/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kansi	9/16/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ndora	9/24/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Musha	9/23/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nyanza	9/24/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kigembe	9/16/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
kibirizi	9/18/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Karama	9/30/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mukama	9/25/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mimuli	10/2/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gatunda	9/24/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nyagatare	9/23/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Katabagemu	9/18/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tabagwe	9/19/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rukomo	9/9/14	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

ANNEX 11. SUMMARY OF MID-SPRAY ENVIRONMENTAL INSPECTIONS- HOUSEHOLD PREPARATION BEFORE IRS

Operation Site	Have all personal belongings, animals, and sick persons been removed from the house?	Have all immovable items been moved to center of the house and properly covered with polythene sheet?	Are the residents instructed on what to do during and after spraying?
Musenyi	Yes	Yes	Yes
Ngeruka	Yes	Yes	Yes
Shyara	Yes	Yes	Yes
Nyarugenge	Yes	Yes	Yes
Ruhuha	Yes	Yes	Yes
Mareba	Yes	Yes	Yes
Kamabuye	Yes	Yes	Yes
Mamba	Yes	Yes	Yes
Gikonko	Yes	Yes	Yes
Mukindo	Yes	Yes	Yes
Muganza	Yes	Yes	Yes
Mugombwa	Yes	Yes	Yes
Gishubi	Yes	Yes	Yes
Save	Yes	Yes	Yes
Kansi	Yes	Yes	Yes
Ndora	Yes	Yes	Yes
Musha	Yes	Yes	Yes
Nyanza	Yes	Yes	Yes
Kigembe	Yes	Yes	Yes
Kibirizi	Yes	Yes	Yes
Karama	Yes	Yes	Yes
Mukama	Yes	Yes	Yes

Mimuri	Yes	Yes	Yes
Gatunda	Yes	Yes	Yes
Nyagatare	Yes	Yes	Yes
Katabagemu	Yes	Yes	Yes
Tabagwe	Yes	Yes	Yes
Rukomo	Yes	Yes	Yes

ANNEX 12. SUMMARY OF MID-SPRAY ENVIRONMENTAL INSPECTIONS- OBSERVATION OF SPRAY OPERATORS IN THE FIELD

Operation Site	Are SOs in full PPE? (helmet, overalls, boots, gloves, mask)	Is mixing of the insecticide witnessed by any household resident?	Are SOs spraying only the recommended surfaces?	Do SOs correctly record household details?	Is any SOs observed eating/drinking/smoking while at work?	Do SOs correctly follow the spraying techniques (standing 45cm from the wall, using vertical swaths, 5cm swath overlap, frequently shaking the can and constant observation of the pressure gauge)
Musenyi	Yes	Yes	yes	Yes	No	
Ngeruka	Yes	Yes	Yes	Yes	No	Yes
Shyara	Yes	Yes	Yes	Yes	No	Yes
Nyarugenge	Yes	Yes	Yes	Yes	No	Yes
Ruhuha	Yes	Yes	Yes	Yes	No	Yes
Mareba	Yes	Yes	Yes	Yes	No	Yes
kamabauye	Yes	Yes	Yes	Yes	No	Yes
Mamba	Yes	Yes	Yes	Yes	No	Yes
Gikonko	Yes	Yes	Yes	Yes	No	Yes
Mukindo	Yes	Yes	Yes	Yes	No	Yes
Muganza	Yes	Yes	Yes	Yes	No	Yes
Mugombwa	Yes	Yes	Yes	Yes	No	Yes

Gishubi	Yes	Yes	Yes	Yes	No	Yes
Save	Yes	Yes	Yes	Yes	No	Yes
Kansi	Yes	Yes	Yes	Yes	No	Yes
Ndora	Yes	Yes	Yes	Yes	No	Yes
Musha	Yes	Yes	Yes	Yes	No	Yes
Nyanza	Yes	Yes	Yes	Yes	No	Yes
Kigembe	Yes	Yes	Yes	Yes	No	Yes
Kibirizi	Yes	Yes	Yes	Yes	No	Yes
Karama	Yes	Yes	Yes	Yes	No	Yes
Mukama	Yes	Yes	Yes	Yes	No	Yes
Mimuri	Yes	Yes	Yes	Yes	No	Yes
Gatunda	Yes	Yes	Yes	Yes	No	Yes
Nyagatare	Yes	Yes	Yes	Yes	No	Yes
Katabagemu	Yes	Yes	Yes	Yes	No	Yes
Tabagwe	Yes	Yes	Yes	Yes	No	Yes
Rukomo	Yes	Yes	Yes	Yes	No	Yes

ANNEX 13. SUMMARY OF MID-SPRAY ENVIRONMENTAL INSPECTIONS- OBSERVATIONS OF SPRAY OPERATORS AT OPERATION SITES AFTER COMPLETING SPRAYING

Operation Site	At the end of the shift, are both full and empty sachets returned, counted and recorded in inventory?	Empty sachets and used masks are stored in separate designated and labeled containers in the store room?	Are 7 barrels placed and arranged on an impermeable ground or polythene sheet (for permeable grounds) along the wash bay?	Do barrels #2, 4, and 6 contain enough water for triple rinsing?	Do SOs correctly conduct triple rinsing whiles wearing PPE?	Are all IRS PPE and haversacks handed over to the store keeper at the end of the day's work?	Are washed pumps orderly arranged in the store?	Are SOs provided with soap to wash and bathe?	Do spray teams bathe after the day's work?	Is the insecticide usage rate and average no. of houses sprayed per SO within acceptable limits?(At least 2.5 – 3 and 10 houses/SO/day)
Musenyi	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ngeruka	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shyara	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nayarugenge	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ruhuha	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mareba	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kamabuye	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mamba	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gikonko	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mukindo	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Muganza	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mugombwa	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gishubi	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Save	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kansi	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Operation Site	At the end of the shift, are both full and empty sachets returned, counted and recorded in inventory?	Empty sachets and used masks are stored in separate designated and labeled containers in the store room?	Are 7 barrels placed and arranged on an impermeable ground or polythene sheet (for permeable grounds) along the wash bay?	Do barrels #2, 4, and 6 contain enough water for triple rinsing?	Do SOs correctly conduct triple rinsing whiles wearing PPE?	Are all IRS PPE and haversacks handed over to the store keeper at the end of the day's work?	Are washed pumps orderly arranged in the store?	Are SOs provided with soap to wash and bathe?	Do spray teams bathe after the day's work?	Is the insecticide usage rate and average no. of houses sprayed per SO within acceptable limits?(At least 2.5 – 3 and 10 houses/SO/day)
Ndora	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Musha	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nyanza	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kigembe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kibirizi	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Karama	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Mukama	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gatunda	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nyagatare	Yes	Yes	Yes	Yes	Yes	yes	Yes	Yes	Yes	Yes
Katabagemu	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tabagwe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rukomo	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

ANNEX 14: SUMMARY OF POST-SPRAY ENVIRONMENTAL INSPECTIONS- INSPECTION OF STORE AFTER COLLECTION OF LOGISTICS TO THE DISTRICT STORES

Operation Site	Date Inspection Conducted	Are all the IRS items, insecticides and wastes taken back to the district store?	Does the addition of used insecticides and unused insecticides equal the beginning inventory?	Is the store cleaned before being handed over to the owners?	Is the soak pit covered and the gate closed and locked?	Are the soak pit and its surroundings left clean?	Was the working relationship between the IRS team and owners of the store good?
Musenyi	10/21/14	Yes	Yes	Yes	Yes	Yes	Yes
Ngeruka	10/21/14	Yes	Yes	Yes	Yes	Yes	Yes
Shyara	10/21/14	Yes	Yes	Yes	Yes	Yes	Yes
Nyarugenge	10/21/14	Yes	Yes	Yes	Yes	Yes	Yes
Ruhuha	10/21/14	Yes	Yes	Yes	Yes	Yes	Yes
Mareba	10/21/14	Yes	Yes	Yes	Yes	Yes	Yes
Kamabuye	10/21/14	Yes	Yes	Yes	Yes	Yes	Yes
Mamba	10/13/14	Yes	Yes	Yes	Yes	Yes	Yes
Gikonko	10/13/14	Yes	Yes	Yes	Yes	Yes	Yes
Mukindo	10/14/14	Yes	Yes	Yes	Yes	Yes	Yes
Muganza	10/15/14	Yes	Yes	Yes	Yes	Yes	Yes
Mugombwa	10/14/14	Yes	Yes	Yes	Yes	Yes	Yes
Gishubi	10/13/14	Yes	Yes	Yes	Yes	Yes	Yes
Save	10/13/14	Yes	Yes	Yes	Yes	Yes	Yes
Kansi	10/14/14	Yes	Yes	Yes	Yes	Yes	Yes
Ndora	10/13/14	Yes	Yes	Yes	Yes	Yes	Yes
Musha	10/13/14	Yes	Yes	Yes	Yes	Yes	Yes
Nyanza	10/14/14	Yes	Yes	Yes	Yes	Yes	Yes
Kigembe	10/14/14	Yes	Yes	Yes	Yes	Yes	Yes
Kibirizi	10/13/14	Yes	Yes	Yes	Yes	Yes	Yes
Karama	10/16/14	Yes	Yes	Yes	Yes	Yes	Yes
Mukama	10/16/14	Yes	Yes	Yes	Yes	Yes	Yes

Gatunda	10/16/14	Yes	Yes	Yes	Yes	Yes	Yes
Nyagatare	10/16/14	Yes	Yes	Yes	Yes	Yes	Yes
Katabagemu	10/16/14	Yes	Yes	Yes	Yes	Yes	Yes
Tabagwe	10/16/14	Yes	Yes	Yes	Yes	Yes	Yes
Mimuli	10/16/14	yes	yes	yes	yes	yes	yes
Rukomo	10/16/14	Yes	Yes	Yes	Yes	Yes	Yes

ANNEX 15. SUCCESS STORY

Entomology Lab for Malaria Control

New Entomological Research Lab in Rwanda to Help Government Make Evidence-Based Decisions around Vector-Control Interventions

Photo: The PMI AIRS Project/Rwanda

The PMI AIRS Project leads indoor residual spraying and entomological research and surveillance in 15 African countries where malaria is endemic.

www.pmi.gov

www.africairs.net

Progress in malaria control requires a deep understanding and knowledge of the mosquitoes carrying the disease. The PMI AIRS Project in collaboration with MOPDD conducts complex entomological surveillance and research to understand vector behavior, composition, and density. PMI AIRS also tests mosquito resistance to, and the residual life of, insecticides throughout the malaria-transmission period.

To help build the capacity of malaria-endemic countries to make evidence-based decisions around the implementation of malaria interventions, the PMI AIRS Project, in partnership with Rwanda's Malaria and Other Parasitic Diseases Division of the Ministry of Health, established Rwanda's first modern-day entomological laboratory to identify malaria-carrying mosquitoes and monitor the efficacy of vector-control interventions.

The new laboratory, located in Kigali, will focus on:

- Morphological and molecular identification of malaria vectors including Polymerase Chain reaction (PCR) for identification of sibling species of *Anopheles gambiae* complex and identification of Knock Down Resistance (KDR) Mechanisms
- Measuring insecticide susceptibility profiles and LLINs quality control
- Rearing of *Anopheles gambiae* s.s., susceptible strain for use in bioassays
- Training of internship students, medical and environmental in advanced entomological techniques.

Rwanda's Director of Vector Control Emmnauel Hakizimana noted that the entomology laboratory would go a long way in cutting down on the cost and time for conducting specific analysis on the vector species. "In the past, we had to send samples to the Center for Disease Control in Atlanta, the Kenya Medical Research Institute and the International Centre of Insect Physiology and Ecology in Kenya, for analysis at a huge cost in terms of funds and time," he said. "The lab will provide almost real-time data for making fast intervention decisions." The lab was officially inaugurated by Rwanda's Minister of Health and US Mission Deputy Chief of Mission on September 16, 2014, and attended by 12 National Malaria Control Program Managers representing countries of the Eastern Africa Roll Back Malaria Regional Network (EARN).

ANNEX 16: MONITORING AND EVALUATION PLAN MATRIX – SEPTEMBER 2014 CAMPAIGN RESULTS

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Targets	Results	Targets	Results	Targets	Results
Component 1: Establish cost-effective supply chain mechanisms including procurement, distribution and storage of IRS-related commodities and execute all aspects of logistical plans for IRS-related activities.											
1.1 Procurement											
1.1.1 Number and percentage of international insecticide procurement orders delivered in country, at port of entry, at least 30 days prior to the start of spray operations	[*Numerator:* Number of international insecticide procurement orders delivered in country, at port of entry, at least 30 days prior to the start of spray operations] [*Denominator:* Total number of international insecticide procurement orders] *Calculation:* [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	*Data source*: Logistics and Procurement Inventory Reports *Reporting frequency*: Each spray season	By Spray Campaign	AIRS	N.A.; 80%	1; 100%	Round 1[8]: 1; 100% Round 2: 1; 100%	Round 1: N.A.[9] Round 2: 1; 100%	Round 1: 1; 100% Round 2: 1; 100%	Round 1: 1; 100% Round 2: 1; 100%
1.1.2 Number and percentage of international pocurement orders for	[*Numerator:* Number of international procurements for equipment, including PPE, received at port of entry, 30 days prior to start of spray	Y1, Y2, Y3	*Data source:* Logistics and Procurement Inventory Reports	By Spray Campaign	AIRS	N.A.; 85%	1; 100%	Round 1: 1; 100% Round 2:	Round 1: 1; 100% Round 2:	Round 1: 1; 100% Round 2:	Round 1: 1; 100% Round 2[10]:

[8] Round 1 occurs in February; round 2 in August/September.

[9] No international insecticide was procured for Round 1 in Year 2.

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Targets	Results	Targets	Results	Targets	Results
equipment, including PPE, received at port of entry, 30 days prior to start of spray operations.	operations] [*Denominator*: Total number of international procurements for equipment, including PPE.] *Calculation:* [Numerator ÷ Denominator] x 100		*Reporting frequency*: Each spray season					1; 100%	1; 100%	NA	NA
1.1.3 Number and percentage of local PPE procurement orders that are delivered to the main warehouse, 14 days before the start of spray operations	[*Numerator:* Number of local PPE procurement orders delivered to the main warehouse 14 days before the start of spray operations] [*Denominator*: Total number of local PPE procurement orders] *Calculation:* [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	*Data source:* Logistics and Procurement Inventory Reports *Reporting frequency*: Each spray season	By Spray Campaign	AIRS	N.A.; 80%	1; 100%	Round 1: 1; 100% Round 2: NA	Round 1: 1; 100% Round 2: NA	Round 1: N.A Round 2: N.A	Round 1: N.A. Round 2: N.A
1.1.4 Successfully Complete spray operations without an insecticide stock-out	Milestone: (Achived/Not achieved)	Y1, Y2, Y3	*Data source:* Logistics Inventory Report *Reporting frequency*: Each spray season	By Spray Campaign	AIRS	Acheived	Acheived	Round 1: Achieved Round 2: Achieved	Round 1: Achieved Round 2: Achieved	Round 1: Achieved Round 2: Achieved	Round 1: Achieved Round 2: Achieved
1.2 In-country Logistics, Warehousing, and Training											

[10] No international procurement done since we had enough PPE's.

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Targets	Results	Targets	Results	Targets	Results
1.2.1 Number and percentage of logistics and warehouse managers trained in IRS supply chain management	*[Numerator:* Total number of logistics and warehouse managers trained in IRS supply chain management using AIRS Project resources.] *[Denominator:* Total number of AIRS logistics and warehouse managers.] *Calculation*: [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	*Data source*: Routine training records *Reporting frequency*: Each spray season	By Spray Campaign By Gender	AIRS	8; 100% 3 males, 5 females	8; 100% 3 males, 5 females	Round 1: 8; 100% 3 males, 5 females Round 2: 8; 100% 3 males, 5 females	Round 1: 7; 100% 3 males, 4 females Round 2: 8; 100% 7 males, 1 female	Round 1: [11] 29: 100% 16 males; 13 females Round 2: 35: 100% 19 males; 16 females	Round 1: 29: 100% 16 males; 13 females Round 2: 35: 100% 20 males; 15 females
1.2.2 Number and percentage of base stores where physical inventories are verified with up-to-date stock records	*[Numerator:* Number of base stores where physical inventories are verified by up-to-date stock records] [*Denominator*: Total number of base stores audited.] *Calculation:* [Numerator ÷ Denominator] x 100 *(See PIRS for details on sample size for operational audits)*	Y2, Y3	*Data source:* Logistics and Environmental compliance reports *Reporting frequency*: Each spray season	By Spray Campaign	AIRS	N.A.	N.A.	Round 1: 4; 100% Round 2: 4; 100%	Round 1: 4; 100% Round 2: 4; 100%	Round 1: 4; 100% Round 2: 4; 100%	Round 1: 4; 100% Round 2: 4; 100%
1.2.3 Submit up-to-date inventory records to AIRS Home Office 30 days after the end of each spray campaign	Milestone: (Complete/Not Complete)	Y2, Y3	*Data source:* Post-Spray Logistics Inventory Report *Reporting frequency*: Each spray season	By Spray Campaign	AIRS	N.A.	N.A.	Round 1: Complete Round 2: Complete	Round 1: Complete Round 2: Complete	Round 1: Complete Round 2: Complete	Round 1: Complete Round 2: Complete

[11] Warehouse managers were introduced at sector stores, and contributed to the increase of trainees in IRS supply chain management for this spray round.

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Targets	Results	Targets	Results	Targets	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 IRS country work plan developed and submitted on time	Milestone: (Complete/Not Complete)	Y1, Y2, Y3	*Data source:* Project records *Reporting frequency*: Annually		AIRS	Complete	Complete	Round 1: Complete Round 2: Complete	Round 1: Complete Round 2: Complete	Round 1: Complete Round 2: Complete	Round 1: Complete Round 2: Complete
2.2 Support of Safety and Health Best Practices and Compliance with USAID and Host Country Environmental Regulations											
2.2.1 SEA/letter report submitted on time[12]	Milestone: (Complete/Not Complete)	Y1, Y2, Y3	*Data source:* Project records – submitted SEAs/ letter reports *Reporting frequency:* Each spray campaign	By Spray Campaign	AIRS	Complete	Complete	Round 1: Complete Round 2: Complete	Round 1: Complete Round 2: Complete	Round 1: Complete Round 2: Complete	Round 1: Complete Round 2: Complete
2.2.2 Number and percentage of soak pits and storerooms inspected and approved prior to spraying	*[*Numerator: Number and percentage of soak pits and warehouses/storerooms inspected and certified by an environmental officer/AIRS Environmental Compliance Officer prior to each	Y1, Y2, Y3	*Data source*: Pre, Mid and Post Inspection Reports submitted by environmental officers	By Spray Campaign By Soak Pit By	AIRS	N.A.; 100%	84; 100%	Round 1: 46; 100%	Round 1: 46; 100% 23 soak pits, 23 storerooms	Round 1: 41; 100% 21 soak pits, 20 storerooms	Round 1: 41; 100% 21 soak pits, 20 storerooms

[12] In Year 1, SEAs were due 30 days prior to the commencement of spraying and letter reports were to be submitted 14 days prior to the commencement of spraying. In Year 2 and Year 3, due dates agreed upon with Washington-PMI will be noted in each country-specific Monitoring and Evaluation Plan to assess indicator 2.2.1.

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Targets	Results	Targets	Results	Targets	Results
	spray campaign supported by the AIRS Project] *[*Denominator: Total number of project soak pits and/or storerooms] Calculation*: [Numerator ÷ Denominator] x 100*		*Reporting frequency:* Each spray season	Warehouse/ Storeroom				Round 2: 78; 100% 39 soak pits, 39 storerooms	Round 2: 78; 100% 39 soak pits, 39 storerooms	Round 2: 57; 100% 29 soak pits, 28 storerooms	Round 2: 57; 100% 29 soak pits, 28 storerooms
2.2.3 Number of government environmental and health officers trained in IRS environmental compliance	Total number of government environmental and health officers trained in IRS environmental compliance using AIRS Project resources	Y1, Y2, Y3	*Data source:* Training reports from Environmental Compliance Officer *Reporting frequency:* Semi-annually	By Spray Campaign By Gender	AIRS	3	0	Round 1: 3; 3 males Round 2: 9; 100% 6 males, 3 females	Round 1: 3 2 males; 1 female Round 2: 8; 88.9%, 5 males, 3 females	Round 1: 7 5 males; 2 females Round 2: 7; 100% 5 males; 2 females	Round 1: 4 3 males; 1 female Round 2: 6; 85.7% 5 males; 1 female.
2.2.4 Number of spray personnel trained in environmental compliance and personal safety standards in IRS implementation	Total number of spray personnel who attend a training in environmental compliance and personal safety standards in IRS implementation using AIRS Project resources, includes all staff who received environmental compliance training - spray operators, team leaders, washpersons, storekeepers, etc.	Y1, Y2, Y3	*Data source:* Project records – Training reports *Reporting frequency:* Each spray season	By Spray Campaign By Gender	AIRS	N.A.	2,305; 1,227 males, 1,078 females	Round 1: 1,659; 834 males, 825 females Round 2: 1,867; 939 males, 928 females	Round 1: 1,854; 946 males, 908 females Round 2: 1,888; 853 males; 1,035 females	Round 1: 3,852; 2,808 males, 1,044 females Round 2: 4,314; 3,145 males 1,169 females	Round 1: 3,376; 2,463 males, 913 females Round 2: 4,381; 3,131 males, 1250 females
2.2.5 Number of health workers receiving insecticide poisoning case management training	Total number of clinical personnel trained in insecticide poisoning case management using AIRS Project resources	Y2, Y3	*Data source:* Project records – Training reports *Reporting*	By Spray Campaign By Gender	AIRS	N.A.	98; 60 males, 38 females	Round 1: 52; 32 males, 20 females	Round 1: 70; 49 males, 21 females	Round 1: 57; 32 males, 25 females	Round 1: 57; 32 males, 25 females

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Targets	Results	Targets	Results	Targets	Results
			frequency: Each spray season					Round 2: 99; 67 males, 32 females	Round 2: 99; 67 males, 32 females	Round 2: 76; 43 males, 33 females	Round2: 76 43 males, 33 females
2.2.6 Number of adverse reactions to pesticide exposure documented	Total number of incidents of pesticide exposure reported that resulted in a referral for medical care	Y1, Y2, Y3	*Data source:* Incident report forms that are required for each incidence of pesticide exposure *Reporting frequency:* Each spray season	By Spray Campaign By residential/occupational exposure	AIRS	0	24	Round 1: 0 Round 2: 0	Round 1: 18 Round 2: 14	Round 1: 0 Round 2: 0	Round 1: 5 Round 2: 1
2.2.7. Number of vehicular accidents reported	Total number of vehicular accidents reported	Y1, Y2, Y3	*Data source*: Vehicular incident report forms that are required for each accident *Reporting frequency:* Each spray season	By Spray Campaign	AIRS	0	0	Round 1: 0 Round 2: 0	Round 1: 1 Round 2: 0	Round 1: 0 Round2: 0	Round 1: 1 Round2: 2
2.3 Support Entomological Monitoring Activities and Insecticide Resistance Strategies											
2.3.1 Number of sentinel sites supported by the AIRS project	Total number of entomological sentinel sites supported by the AIRS project	Y1, Y2, Y3	*Data source:* Entomological reports *Reporting frequency:* Annually	By Spray Campaign	AIRS	6	6 (partial support)	Round 1: 6 (partial support) Round 2: 6 (partial support)	Round 1: 6 Round 2: 6(partial support)	Round 1: 6 (partial support) Round 2: 2 (partial support)	Round 1: 6 (partial support) Round 2: 2 (partial support)
2.3.2 Number and	*[Numerator:* Number of	Y1, Y2,	*Data source:*	By Spray	AIRS	6; 100%	6; 100%	Round 1:	Round 1:	Round 1:	Round 1:

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Targets	Results	Targets	Results	Targets	Results
percentage of entomological monitoring sentinel sites measuring all five primary PMI entomological indicators	entomological monitoring sites measuring all five primary PMI entomological indicators] *[Denominator:* Number of entomological monitoring sentinel sites] *Calculation:* [Numerator ÷ Denominator] x 100	Y3	Entomological reports *Reporting frequency:* Annually	Campaign				6; 100% Round 2: 6; 100%	6; 100% Round 2: 6; 100%	6; 100% Round 2: 6; 100%	6; 100% Round 2: 6; 100%
2.3.3 Number and percentage of entomological moniotring sites measuring at least one secondary PMI indicator	*[Numerator:* Number of entomological monitoring sites measuring at least one secondary PMI indicator] *[Denominator:* Number of entomological monitoring sites] *Calculation:* [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	*Data source:* Entomological reports *Reporting frequency:* Annually	By Spray Campaign	AIRS	6; 100%	6; 100%	Round 1: 6; 100% Round 2: 6; 100%	Round 1: 6;100% Round 2: 6; 100%	Round 1: 6; 100% Round 2: 6; 100%	Round 1: 6; 100% Round 2: 6; 100%
2.3.4 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	*[Numerator:* Number of insecticide resistance testing sites that tested at least one insecticide from each of the four classes of insecticides recommended for malaria vector control.] *[Denominator:* Number of insecticide resistance testing sites] *Calculation:* [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	*Data source:* Entomological reports *Reporting frequency:* Annually	By Spray Campaign By Type of Insecticide	AIRS	12; 100%	12; 100% All four classes of insecticide are being tested at each of the 12 sites	Round 1: 12; 100% All four classes of insecticide to be tested at each of the 12 sites Round 2: 12; 100% All four classes of insecticide to be tested	Round 1: All four classes of insecticide habe been tested at each of the 12 sites Round 2: 5; 41.7% All four classes of insecticide were tested	Round 1: N.A. Round 2: 12; 100% All four classes of insecticide to be tested	Round 1: N.A. Round 2: 12; 100% All four classes of insecticide were tested

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Targets	Results	Targets	Results	Targets	Results
								at each of the 12 sites	at 5 sites.	at each of the 12 sites	at each of the 12 sites
2.3.5 Number of wall bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS	Total number of wall bioassay studies conducted in established sentinel sites to evaluate quality of IRS spraying activities	Y1, Y2, Y3	*Data source:* Entomological reports *Reporting frequency:* Per spray campaign	By Spray Campaign	PMI	1 (36 houses)	1 (36 houses)	Round 1: 1 (36 houses) Round 2: 1 (36 houses)	Round 1: 48 houses Round 2: 1 (36 houses)	Round 1: 1 (36 houses) Round 2: 1 (36 houses)	Round 1: 1 (36 houses) Round 2: 1 (36 houses)
2.3.6 Number of wall bioassays conducted after the completion of spraying at monthly intervals to evaluate insecticide decay	Total number of wall bioassay studies conducted at monthly intervals in established sentinel sites to evaluate the rate of insecticide decay on sprayed surfaces	Y1, Y2, Y3	*Data source:* Entomological reports *Reporting frequency:* Per spray campaign	By Spray Campaign	PMI	5 (36 houses)	5 (36 houses)	Round 1: 5 (36 houses) Round 2: 5 (36 houses)	Round 1: 36 houses Round 2: 5 (36 houses)	Round 1: 5 (36 houses Round 1: 3 (36 houses)	Round 1: 2 (36 houses) Round 1: 1 (36 houses)
2.3.7 Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites	Total number of vector susceptibility tests conducted to gauge the effectiveness of individual insecticides proposed for use in spray operations	Y1, Y2, Y3	*Data source:* Entomological reports *Reporting frequency:* Per spray	By Spray Campaign By Type of Insecticide	PMI	4 replicates per 6 insecticides[13]	4 replicates per 6 insecticides[14]	Round 1: 4 replicates per 6 insecticides Round 2: 4 replicates	Round 1: 4 replicates per 6 insecticides Round 2: 4 replicates	Round 1: 4 replicates per 6 insecticides Round 2: 4 replicates	Round 1: Ongoing Round 2: Ongoing

[13] DDT, Fenitrothion, Bendiocarb, Deltamethrin, Lambdacyhalothrin, Etofenprox

[14] DDT, Fenitrothion, Bendiocarb, Deltamethrin, Lambdacyhalothrin, Etofenprox

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Targets	Results	Targets	Results	Targets	Results
			campaign					per 6 insecticides	per 6 insecticides	per 6 insecticides	
2.4 Conduct Communications Activities and Community Mobilization											
2.4.1 Number of radio spots and talk shows aired[15]	Total number of radio spots and talk shows aired in target spray districts to stress the safety and benefits of IRS, ensure successful spray coverage, timely vacating of premises and adherence to IRS safety precautions by community members	Y1, Y2, Y3	*Data source:* Project records *Reporting frequency*: Semi-annually	By Spray Campaign	AIRS	N.A.	134	Round 1: 134 Round 2: 134	Round 1: 42 Round 2: 150	Round 1: 96 Round 2: 90	Round 1: 96 Round 2: 90
2.4.2 Number of IRS print materials disseminated	Total number of IRS educational materials developed, printed and distributed to community members in target spray districts using AIRS Project resources	Y1, Y2, Y3	*Data source:* Project records *Reporting frequency:* Semi-annually	By Spray Campaign By Type of printed material and message(s)	AIRS	270,000	227,767	Round 1: 139,167 Round 2: 241,408	Round 1: 117,518 brochures Round 2: 219.810	Round 1: 136,413 Round2: 66,378	Round 1: 83,811 Round2: 65,332
2.4.3 Number of people reached with IRS messages via door-to-door mobilization	Total number of adults reached with IRS message during pre-spray community, door-to-door mobilizaiton	Y1, Y2, Y3	*Data source:* Moblilization Data Collection Forms *Reporting*	By Spray Campaign By Gender	AIRS	N.A.	1,063,869; 508,345 males, 555,524 females	Round 1: 554,098; 264,763 males, 289,335	Round 1: 496,315; 237,533 males, 258,782	Round 1: 279,485; 125,649 males, 153,836	Round1: 261,896; 116,777 males, 145,119

[15] The February spray round follows shortly after the fall campaign. Thus, fewer radio spots are necessary as communities are still privy to IRS sensitization messages.

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Targets	Results	Targets	Results	Targets	Results
			frequency: Daily per moblization conducted					females Round 2: 511,463; 230,123 males; 281,340 females	females Round 2: 511,463; 230,123 males; 281,340 females	females Round 2: 391,279; 175,909 males, 215,370 females	females Round 2: 378,454; 168,763 males, 209,691 females
2.5 Spray Targeted Structures According to Technical Specifications											
2.5.1 Number of structures targeted for spraying[16]	Total number of structures found in targeted spray districts by Spray Operators	Y1, Y2, Y3	*Data source:* Daily Spray Operator Forms *Reporting frequency:* Daily per spray campaign	By Spray Campaign	PMI	240,000	242,589	Round 1: 125,000 Round 2: 219,462	Round 1: 121,697 Round 2: 229,039	Round 1: 124,012 Round 2: 169,904	Round 1: 125,629 Round 2: 174,411
2.5.2 Number of structures sprayed with IRS[17]	Total number of structures sprayed in targeted districts	Y1, Y2, Y3	*Data source:* Daily Spray Operator Forms *Reporting frequency*: Daily per spray campaign	By Spray Campaign	PMI	204,000	236,610	Round 1: 106,250 Round 2: 186,543	Round 1: 121,154 Round 2: 224,708	Round 1: 105,410 Round 2: 144,418	Round 1: 123,919 Round 2: 173,086
2.5.3 Percentage of	*[*Numerator: Total number of	Y1, Y2,	*Data source*: Daily	By Spray	PMI	85%	97.5%	Round 1:	Round 1:	Round 1:	Round 1:

[16] The annual target is from the applicable work plan; the annual result is the number of structures found by spray operators during the campaign.

[17] The annual target is based on 85% spray coverage of indicator 2.5.1.

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Targets	Results	Targets	Results	Targets	Results
total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	structures sprayed in targeted districts] *[*Denominator: Total number of structures in targeted areas found by spray operators] Calculation: [Numerator ÷ Denominator] x 100	Y3	Spray Operator Forms *Reporting frequency*: Daily per spray campaign	Campaign				85% Round 2: 85%	99.6% Round 2: 98.1%	85% Round 2: 85%	98.6% Round2: 99.2%
2.5.4 Number of people residing in structures sprayed (Number of people protected by IRS)	Total number of people residing in structures sprayed (Actual numbers are collected during spray operations; population estimates are not used.)	Y1, Y2, Y3	*Data source*: Daily Spray Operator Forms *Reporting frequency:* Daily per spray campaign	By Spray Campaign By Number of pregnant women By Number of children <5 years old	PMI	N.A.	1,025,181; 17,157, pregnant women; 160,399, children <5 years	Round 1: 533,948; 8,936 pregnant women; 83,541 children <5 years Round 2: 1,025,181; 17,157 pregnant women; 160,399 children <5 years	Round 1: 522,315; 8,935 pregnant women; 81,433 children <5 years Round 2: 957,027; 16,023 pregnant women; 147,531 children <5 years	Round 1: 507,653; 8,461 pregnant women, 74,994 children < 5 years Round 2: 677,072; 11,285 pregnant women, 100,022 children < 5 years	Round 1: 512,789; 8,547 pregnant women, 75,753 children <5 years Round 2: 705,048; 11,119 pregnant women, 103,408 children < 5 years
Component 3: Provide onngoing monitoring and evaluation and quality control measures											
3.1 Submit Monitoring and Evaluation Plan (MEP) to PMI-Rwanda	*Milestone:* (Complete/Not Complete)	Y1, Y2, Y3	*Data source*: Project records *Reporting frequency:* Semi-		AIRS	Complete	Complete	Round 1: Complete Round 2: Complete	Round 1: Complete Round 2: Complete	Round 1: Complete Round 2: Complete	Round 1: Complete Round 2: Complete

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Targets	Results	Targets	Results	Targets	Results
			annual								
3.2 Submit a post-spray data quality audit report to the M&E Specialist in the AIRS Home Office within 60-180 days of completion of spray operations	*Milestone*: (Complete/Not Complete)	Y1, Y2, Y3	*Data source*: PSDQA Summary Report *Reporting frequency*: Per spray campaign	By Spray Campaign	AIRS	N.A.	N.A.	Round 1: N.A. Round 2: Complete	Round 1: N.A. Round 2: Complete	Round 1: Complete Round 2: N.A.	Round 1: Complete Round 2: N.A.
3.3 Submit a country-specific Eligible Structure Definition Document to local PMI and NMCP	*Milestone:* (Complete/Not Complete)	Y1	*Data source:* Project records *Reporting frequency:* Semi-annually		AIRS	Complete	Complete	N.A.	N.A.	N.A.	N.A.
3.4 Supply chain review conducted by RTT	Milestone: (Complete/Not Complete)	Y1, Y2	*Data source*: RTT supply chain review reports *Reporting frequency*: Semi-annually	By Spray Campaign	AIRS	Complete	Complete	N.A.	N.A.	N.A.	N.A.
Component 4: Contribute to Global IRS Policy-Setting and Country-Level Policy Development of Evidence-Based IRS; Disseminate Experiences and Best Practices											
4.1 Number of guidelines/checklists/tools related to IRS	Total number of implementation guidelines, process checklists and program tools related to IRS	Y1, Y2, Y3	*Data source:* Project records – Activity reports	By Guideline/checklist/tool	AIRS	8	8	Both spray rounds: 27	Both spray rounds: 27;	N.A.[18]	N.A.

[18] We used the same guidelines/checklists/tools developed in September 2013.

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Targets	Results	Targets	Results	Targets	Results
operations developed or refined with project support	operations developed or refined using the technical and/or financial resources of the AIRS Project		*Reporting frequency*: Semi-annually					Type: 20 supervisory checklists, 7 training manuals	20 super-visory checklists, 7 training manuals (IEC, M&E, operations, database, environment, finance, logistics)		
4.2 Number of articles/best practices documents published	Total number of articles or other best-practice documents that have been published in relevant journals or through PMI/USAID communications vehicles	Y2, Y3	*Data source*: EOSR *Reporting frequency:* Semi-annually	By Spray Campaign By IRS Technical Area	AIRS	N.A.	N.A	Round 1: N.A. Round 2: 1(Mobile environmental compliancet a collection)	Round 1: N.A. Round 2: 1 (Mobile environmental compliancet a collection)	N.A.	N.A.
4.3 Number of best practice presentations given at national/ regional/international workshops and conferences	Total number of project-related oral and poster presentations delivered in national, regional and/or international meetings related to IRS.	Y2, Y3	*Data source:* Project records – Activity reports *Reporting frequency*: Semi-annually	By IRS Technical Area	AIRS	N.A.	1 Technical area: IRS mobilization /implementation	Both spray rounds: 1 Technical area: IRS mobilization /implementation	Both spray rounds: 1[19] Technical area: IRS mobilization /implementation	N.A.	N.A.

[19] Presented at the National IRS Evaluation Meeting.

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Targets	Results	Targets	Results	Targets	Results
Component 5 (Cross-cutting): Capacity Building, Knowledge Transfer, Gender Inclusion											
5.1 Capacity Building (Gender Inclusion)											
5.1.1 Number of people trained in IRS implementation[20]	Total number of personnel trained in IRS implementation using AIRS Project resources. This figure only spray personnel (i.e. spray operators, team leaders, supervisors, clinicians.)	Y1, Y2, Y3	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign By Gender Percentage of Women Trained	PMI	N.A.	1,986; 998 males, 988 females 49.7% women	Round 1: 1,659; 834 males, 825 females 49.7% women Round 2: 1,847; 877 males, 970 females, 52.5% of women	Round 1: 1,605; 762 males, 843 females 52.5% women trained Round 2: 1,875; 890 males, 985 females, 52.5% of women trained	Round 1: 1,180; 525 males, 655 females; 55.5% women trained Round 2: 1,507; 670 males, 837 females, 55.5% of women trained	Round 1: 1,180; 525 males, 655 females; 55.5% women trained Round 2: 1,501; 667 males, 834 females, 55.6% of women trained
5.1.2 Number of people trained to deliver or support IRS in target districts	Total number of people trained using AIRS Project resources to implement/support elements of IRS in target districts. This figure includes all cadre that serve a role in IRS.	Y1, Y2, Y3	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign By Gender By Role (e.g., spray operator, storekeeper) Percentage of	AIRS	N.A.	6,065; 4,509 males, 1556 females 25.6% women	Round 1: 3,700; 2,751 males, 949 females 25.6% women Round 2: 6,065;	Round 1: 3,793; 2,624 males, 1,169 females; 30.8% women trained Round 2: 5,765;	Round 1: 3,401; 2,476 males, 925 females; 27.2% women Round 2: 4,758;	Round 1: 3,398; 2,474 males; 924 females; 27.2% women trained Round 2: 4,403;

[20] *This indicator is also referred to as "Number of people trained with U.S. Government funds to deliver IRS".*

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Targets	Results	Targets	Results	Targets	Results
				women trained				4,509 males, 1,556 females 25.6% women	4,196 males, 1,569 females, 27.2 of women trained	3,464 males, 1294 females; 27.2 women trained	3,142 males, 1,261 females; 28.6% women trained
5.1.3 Number of personnel trained as IRS implementation trainers	Total number of personnel trained in Training of Trainers (TOT) for IRS delivery	Y1, Y2, Y3	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign By Gender Percentage of women trained	AIRS	178	178; 77 males, 101 females 56.7% women	Round 1: 120; 52 males, 68 females 56.7% women Round 2: 166; 72 males, 94 females 56.6% women	Round 1: 118; 60 males, 58 females 49.1% women trained Round 2: 171; 85 males, 86 females, 50.3% of women trained	Round 1: 81; 41 males, 40 females, 49.4% women Round 2: 113; 57 males, 56 females; 49.6% women trained	Round 1: 81; 41 males, 40 females, 49.4% women trained Round 2: 125; 52 males, 73 females; 58.4% women trained
5.1.4 Number of government environmental and/or health officials trained in IRS oversight	Total number of national and sub-national/district government environmental and/or health officials who are trained in oversight of IRS implementation using AIRS Project resources	Y1, Y2, Y3	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign By Gender Percentage of Women Trained Type of government official (e.g. environmental /health)	AIRS	N.A.	3; 3 males 0% women Type: Environmental health officers	Round 1: 3; 3 males 0% women Type: Environmental health officers Round 2: 9; 100% 6 males,	Round 1: 3; 2 males; 1 female 33.3% women Type: Environmental health officers Round 2: 8; 88.9%, 5 males,	Round 1: 7 5 males 2 females, 28.6 % women trained Type: Environmental health officers Round 2: 7; 5 males,	Round 1: 4 3 males; 1 female; 25.0% women trained Type: Environmental health officers

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Targets	Results	Targets	Results	Targets	Results
								3 females Type: Environmental health officers	3 females, 37.5 % of women trained Type: Environmental health officers	2 females; 28.6% women trained Type: Environmental health officers	Round 2: 6; 5 males, 1 females; 16.7% women trained Type: Environmental health officers
5.1.5 AIRS conducted a capacity assessment	AIRS Rwandaprogram conducted an assessment of IRS capacity among national and sub-national/district government health officials	Y1, Y2	Data source: Project records – Capacity assessment reports Reporting frequency: Semi-annually		AIRS	Complete	In process	Complete	Complete	N.A.[21]	N.A.
5.1.6 Number of capacity-building MOUs signed by AIRS, NMCP and partners/ institutions	Total number of Memoranda of Understanding (MOU) on provision of local capacity building finalized and signed between AIRS, the Malaria and Other Parasitic Diseases Division (MOPPD), and other local partners and institutions	Y1, Y2, Y3	Data source: Project records – MOUs Reporting frequency: Semi-annually	By Spray Campaign	AIRS	1	1	N.A.	N.A.	N.A.	N.A.

[21] This has been completed during September 2013 spray round