



PRESIDENT'S MALARIA INITIATIVE



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

**RWANDA END OF SPRAY
REPORT**
SPRAY CAMPAIGN: FEB 11-MARCH 5, 2013

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ACRONYMS

AIRS	Africa Indoor Residual Spraying
BCC	Behavior Change Communication
CBHI	Community Based Health Insurance
CHW	Community Health Worker
COP	Chief of Party
CTC	Client Technology Center
EPEDR	Entreprise pour la Protection de l'Environnement et Development Rural
HLC	Human Landing Catch
IEC	Information, Communication and Education
IRS	Indoor Residual Spraying
ITNs	Insecticide Treated Nets
IVM	Integrated Vector Management
M&E	Monitoring & Evaluation
MBR	Man Biting Rate
MOH	Ministry of Health
MOP	Malaria Operational Plan
MOPDD	Malaria and Other Parasitic Diseases Division
NMCP	National Malaria Control Program
PERSUAP	Pesticide Evaluation Report and Safer Use Action Plan
PMI	President's Malaria Initiative
PPE	Personal Protective Wear
PSC	Pyrethrum Spray Catch
PSI	Population Services International
RBC	Rwanda Biomedical Center
RDB	Rwanda Development Authority
REMA	Rwanda Environmental Management Authority
RHCC	Rwanda Health Communication Center
RTI	Research Triangle Institute
SEA	Supplemental Environmental Assessment
SOP	Spray Operator
TL	Team Leader
ToT	Training of Trainers
USAID	United States Agency for International Development
WG	Wettable Granules

EXECUTIVE SUMMARY

Abt Associates supports the implementation of indoor residual spraying in Rwanda on a three-year Africa-wide IRS project funded by USAID under the President's Malaria Initiative (PMI). The objective of the project is to limit exposure to malaria and reduce the incidence and prevalence of malaria. During the August 2012 spray round a total of 236,610 structures were sprayed resulting in 97.5% spray coverage and protected 1,025,181 residents in Bugesera, Gisagara, and Nyagatare districts. The February 2013 spray round targeted 126,515 structures in 20 sectors of the 42 sectors that were sprayed in August 2012. A pyrethroid was also used and the spray campaign took 20 days to complete.

The following bullets are project achievements and key highlights of the 2013 February spray campaign, which lasted 20 days:

- A total of 121,154 structures were sprayed out of 121,697 structures found by spray operators in the targeted districts, accounting for a coverage rate of 99.6%. In total, 522,315 residents were protected, of which 81,433 (15.6 %) were children under five years old and 8,935 (1.7 %) were pregnant women.
- A total of 119,418 structures were mobilized and 117,518 brochures were distributed during the mobilization exercise.
- A total of 3,793 individuals were trained using PMI funds to facilitate IRS activities in the three districts. Of these, 1,417 were spray operators (653 males and 764 females); 1,873 were mobilizers, of which 235 (12.5%) were female. Overall, 30.8% (n= 1,169) of all IRS personnel in 2013 were female.
- A total of 93,026 sachets of Deltamethrin WG 250 insecticide were used to spray 121,154 structures, with a utilization ratio of approximately 1:1.3 (sachet-tostructure sprayed).
- A total of 17 boarding schools and 2 prisons were sprayed protecting 5,347 residents. A total of 220 sachets of Deltamethrin WG 250 were used.
- All IRS primary wastes, including empty sachets and used masks, were incinerated at the Gahini Hospital incineration plant in Kayonza. Other solid wastes, including worn-out boots, used gloves, damaged barrels & other plastic items were disposed and recycled at the Entreprise pour la Protection de l'Environnement et Development Rural (EPEDR) Recycling plant. The non-contaminated wastes such as empty boxes and papers were disposed of at the Nduba dumping site.
- WHO cone bioassays were conducted in collaboration with MOPPD to determine the insecticide decay rates following the 2012 spray showed an average 82% mortality four months post IRS. Cone bioassays conducted within one week of spraying in February 2013 to assess the quality of spraying in the target districts, recorded mosquito mortalities ranging from 96.7 and 99.3%. Vector studies conducted after the 2012 IRS spray campaign IRS to assess the vectors species, density and behavior in the three IRS districts using Human Landing Collections (HLC) and Pyrethrum Spray Catches (PSC) revealed predominance of *Anopheles gambiae* s.l. with varying levels of

endophilic/exophilic behavioral tendencies and biting rates.

AIRS RWANDA 2013: ROUND I AT A GLANCE

Number of provinces/districts covered by PMI-supported IRS	3 districts (Bugesera, Gisagara, and Nyagatare)
Insecticide	Pyrethroids
Number of structures covered by PMI-supported IRS	121,154
Number of structures targeted by PMI-supported IRS	121,697
Spray coverage	99.6%
Population protected by PMI-supported IRS	522,315
Dates of PMI-supported IRS campaign	Feb 11-March 5, 2013
Length of campaign	20 days
Number of people trained with USG funds to deliver IRS	1,605

I. COUNTRY BACKGROUND

Rwanda covers an area of approximately 26,338 square kilometers with a population of approximately 11 million people. The entire population is at risk of malaria, including an estimated 1.8 million children under five and 450,000 pregnant women/year.¹ 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 is comparatively stable year round.² 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 south-east parts of the country). Given the significant decline in the burden of malaria in Rwanda and the accompanying high coverage of malaria control interventions nationwide, the National Malaria Control Program (NMCP) intends to target interventions based on the changing malaria epidemiology.³

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 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 expansion to cover entire districts depended on the availability of resources. Much of the IRS in Rwanda has been funded by PMI. Up to, and including the year 2012 Rwanda implemented eight IRS rounds. In August 2011, Abt Associates Inc. was mandated by PMI to implement IRS in Rwanda along with 13 other African countries. PMI and the Rwanda Ministry of Health (MOH) through the Malaria and Other Parasitic Diseases Division (MOPDD) identified 3 high burden malaria districts in which to implement IRS in 2012. The three IRS districts were Bugesera, Gisagara and Nyagatare, with a total of 242,461 structures. A total of 236,610 structures were sprayed in 2012. Considering that malaria transmission takes place year round and peaks during the periods October-December and March-May a second spray round was conducted in February 2013 to supplement the August-September spray round to ensure protection for the population during the two major transmission seasons. Twenty (20) sectors were selected for the February 2013 IRS campaign in the three IRS districts. The sectors' selection was based on their high malaria prevalence as was evidenced from malaria cases reported in 2012 from the health facilities serving the sectors. Working in collaboration with the MOH/MOPDD and other stakeholders, Abt was tasked to achieve at least 85 percent spray coverage in the IRS target districts.

In addition, the project provided technical support in the following activities:

¹ 2002 Census, 2010 projection

² Trends in malaria cases, hospital admissions and deaths following scale-up of antimalarial interventions, 2000-2010, Rwanda, (Karema *et al*, 2012)

³ National Malaria Strategic Plan 2012 – 2017.

- Training, capacity building, and advocacy at the national, regional, and district levels as a means of achieving IRS sustainability. This included building the capacity of government officials and partners to undertake high-quality IRS.
- Regular monitoring and evaluation (M&E) of the IRS program.
- 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 of IRS, and to encourage ownership.
- Promote cost-efficiency through due diligence and efficiency of operations.

2. PRE-SPRAY ACTIVITIES

2.1 SELECTION OF IRS DISTRICTS AND SECTORS

In preparation for the August/September 2012 IRS campaign, the MOH, through the MOPDD worked with PMI in the selection of the IRS target districts. The IRS districts were selected based on malaria epidemiological data and three districts, Gisagara, Nyagatare and Bugesera, with the highest malaria burden were selected (see Figure 1). A total of 242,461 structures were targeted for spraying in the 42 sectors of the three target districts. During the February 2013 IRS campaign a total of 20 sectors were selected in the three IRS districts. During the selection, precedence was given to sectors with the highest malaria caseloads based on malaria cases reported in 2012 from the health facilities.

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

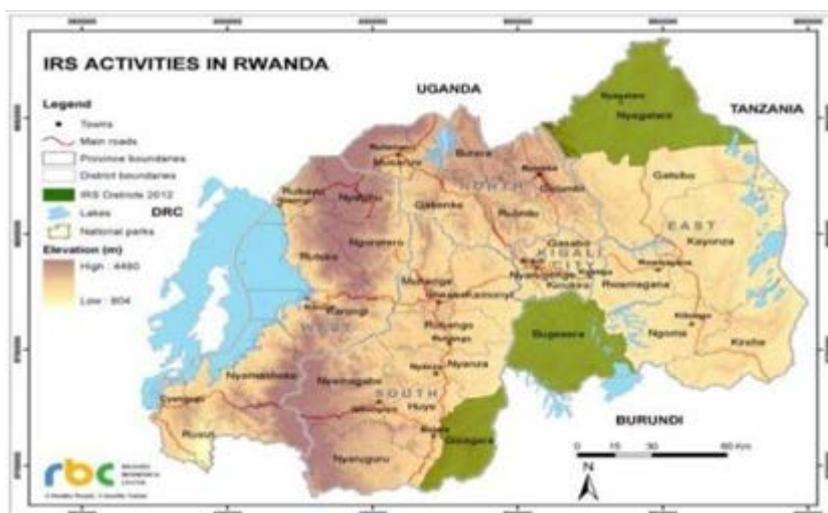


Table 1 below shows a summary of the target structures in the 20 sectors.

TABLE 1: TARGET STRUCTURES FOR IRS ROUND 9

District	No. of Sectors	Target Structures	Target Population	
			Females	Males
Bugesera	6	31,215	65,439	60,171
Gisagara	5	30,445	66,587	58,698
Nyagatare	9	64,855	141,001	133,870

2.2 DISTRICT PLANNING MEETINGS

Following the choice of the target sectors in the three IRS districts, collaboration and coordination between the stakeholders was initiated. Micro planning meetings with district and sector authorities in the 3 districts and 20 sectors were conducted in January 2013. 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 Spray Operators (SOPs)
- Community mobilization plan for IRS
- Role of districts/sectors in the provision of IRS operational site offices and stores
- Role of local leaders in supervision of IRS activities during the IRS operations
- Participation at weekly meetings at the sector level

2.3 INSECTICIDE SELECTION

A pyrethroid, Deltamethrin 250 WG, was used during the February 2013 IRS campaign. The selection was based on data obtained from insecticide susceptibility assays that were carried out in 2011. 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 (Annex 1). Within the pyrethroid class, the local vector species in the sites in the IRS target districts showed between 97%-100% mortalities. Based on these results, a pyrethroid was recommended and the Deltamethrin WG 250 insecticide that had remained from the 2012 stock was used.

2.4 ENVIRONMENTAL ASSESSMENT

During the period 28 January to 2 February the Rwanda AIRS team conducted pre-spray environmental assessments in the 3 IRS districts at the operation sites at sector level. The assessments involved identifying storage facilities and the appropriateness of soak-pits that were used in the previous IRS round. Some operation sites (two in Nyagatare and one in Gisagara) each of which had been used as one were split up into two sites. This was necessitated by the vastness of the sectors to be served by these operation sites and the large numbers of spray operators who would operate from the operation sites. In total, 8 storage facilities were rented while 15 were to be provided by the sector authorities at the sector office premises. A total of 18 soak-pits were refurbished and 5 new soak-pits were constructed. The refurbishments

generally comprised of clearing bushes in and around the soak-pits, addition of compacted murrum, fixing a polythene sheet to the murrum, and fixing poles to further stabilize the fence. Table 2 below shows the details of the refurbishments that were done at the operation sites.

The 2011 Supplemental Environmental Assessment (SEA) that was amended in 2012 in preparation for the August/September 2012 IRS campaign was used during the February 2013 IRS campaign. The SEA served to document the collaborative efforts and discussions that led to the strategy and tactics for the IRS campaign. Among the measures which were recommended in the amended SEA were:

- The identification, elimination/movement, and close monitoring of beehives which were located close to structures where spraying will occur, due to the toxic nature of pyrethroids to bees.
- IEC efforts would include providing information to beneficiaries about the toxicity of the pesticide to be sprayed to bees, and recommending that hives be moved away from areas to be sprayed.
- Soak pits near beekeeping areas should be covered with a tarp to prevent bees from visiting the soak pits to obtain water.
- Intensify supervision during washing of PPE and cleaning of pumps to ensure that all IRS equipment is washed daily and that the wash areas are used appropriately during spray operations.

TABLE 2: CONSTRUCTION AND REFURBISHMENTS AT IRS OPERATION SITES

District/Province	No. of Operation Sites	Site Refurbished (soak pit, storeroom, fence, etc.)
Bugesera/ Eastern Province	6	4 soak pits refurbished 2 new soak pits constructed 1 office and storage facility provided by sector authorities 5 office and storage facilities rented
Nyagatare/ Eastern province	11	9 soak pits refurbished 2 new soak-pits constructed 8 storerooms provided by sector authorities 3 stores were rented
Gisagara/ Southern Province	6	5 soak pits refurbished 1 new soak pit constructed 6 storerooms provided at the sector offices

2.5 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 the target districts. Besides reference to the inventory records from the previous IRS campaign, logistics needs assessment was conducted in December 2012. 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 the eighth round of spraying
- Mobilization and distribution of equipment, materials, and supplies (see Annex 2).

International Procurement

The International procured commodities included 41,160 masks; 25 graduated measuring cylinders; 100 pump hoses without valve bodies; 1000 nozzle tips; 100 pressure gauges for pumps and 100 pump extension assemblies. Table 3 below shows the items 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
Sprayer repair kits	15	0	15	12	0	3
USAID stickers	1,944	0	1,944	708	0	1247
Respiratory masks	4,824	44,160	48,984	29,203	0	19,781
First aid kits	145	0	145	108	0	37
Latex nitrile gloves	6,950	0	6,950	2734	0	4216
Face shields	1,484	0	1,464	1,363	0	1,484
Suspension for hard hats (Inner part)	3,087	0	3,087	1480	831	763
Head gears (Hard hat adapters)	2,405	0	2,405	1459	144	303
Insecticide sachets (Deltamethrin WG 250)	195,985	0	195,985	93,026	0	102,959
Measuring cylinder	0	25	25	23	0	25
Pump hose	26	100	126	26	0	100
Pressure Gauge	2	100	102	74	0	28
Steel Nozzle tip	972	1,000	1,972	473	0	1799
Extension Assembly (Lance)	70	100	172	90	0	82

Local Procurement

Local procurement involved an open competitive tendering process in which a solicitation for quotes for the services or items was performed. The selection was done by the Abt Associates Rwanda procurement committee based on the best value according to the criteria given in the solicitation for the quotations. The services/ items procured locally included; (Annex 2)

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

Material Distribution to the Districts and Operation Sites

Following the August/September 2012 IRS campaign, IRS materials such as coveralls, boots, helmets and pumps were retained in the district storage facilities. Other items; respiratory masks, gloves and insecticide were distributed from the central warehouse to the district stores in January. 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 (Table 4).

TABLE 4: IRS COMMODITY DISTRIBUTION

Site	Coveralls	Boots	Helmets	Gloves	Respiratory Masks	Deltamethrin WG 250	Pumps
Bugesera	767	369	361	792	7,086	21,812	421
Nyagatare	1,563	818	690	1,150	15,040	47,463	544
Gisagara	775	423	333	844	6,970	23,829	321

2.6 HUMAN RESOURCE REQUIREMENTS

The project deployed a total of 3,578 seasonal staff that provided support during the IRS operations across the three districts. The seasonal staff comprised of 3 district coordinators, 3 district IEC assistants, 12 data clerks, 4 storekeepers, 4 logistics assistants, 3 finance assistants, 23 sector coordinators, 90 sector supervisors, 23 sector IEC assistants, 119 IEC cell supervisors, 1754 IEC village mobilizers, 70 nurses (side effect managers), 93 washers, 3 cleaners, 3 pump technicians, 52 security guards, 1,054 SOPs and 266 team leaders (TLs). The spray operators, team leaders, washers, cell & village IEC mobilizers and security guards were 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. Table 5 enumerates the IRS support staff per district.

TABLE 5: SEASONAL IRS STAFF BY DISTRICT

Districts	Bugesera	Gisagara	Nyagatare	Total
Spray Operators	259	254	541	1054
Team Leaders	67	64	135	266
District Coordinators	1	1	1	3
District IEC Assistants	1	1	1	3
Data Clerks	3	3	6	12
Storekeepers	2	1	1	4
Logistics Assistants	1	1	1	3
Finance Assistants	1	1	1	3
Washers	23	22	48	93
Cleaners	1	1	1	3
Pump Technicians	1	1	1	3
Sector Coordinators	6	6	11	23
Sector Supervisors	22	22	46	90
Sectors IEC Assistants	6	6	11	23
Adverse effect Managers	17	17	36	70
Cell IEC Supervisors	29	23	67	119
Village IEC Mobilizers	502	424	828	1,754
Security Guards	18	12	22	52

Total	960	860	1,758	3,578
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2.7 IRS TRAININGS

Prior to the commencement of the 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:

- IRS planning and logistics management
- Spray techniques and processes
- Environmental compliance and personal safety
- Advocacy and social mobilization
- IRS monitoring and evaluation
- Supervision of IRS activities
- Malaria 101, including information on basic prevention and methods of transmission

Training of Trainers

A refresher training of trainers (ToT) was organized and conducted in collaboration with MOPDD from Jan 21–23, 2013. Since the participants had gone through the ToT during the 2012 IRS preparations, the ToT was aimed at refreshing the participants' skills and knowledge in IRS. During the training, they received instructions on methods to conduct IRS training and supervision to the IRS implementers. The training comprised of both theory and practical sessions through group discussions, demonstrations, lectures and question and answer methods. The participants included 23 IRS sector coordinators, 92 IRS Sector Supervisors and 3 district coordinators. After the ToT, the participants were allocated 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 numbers of the trainers are shown in Table 6 below.

TABLE 6: NUMBERS OF TOT PARTICIPANTS, BY GENDER

IRS Role	Number of Participants		Total
	Male	Female	
Sector Coordinators	14	9	23
Sector Supervisors	43	49	92
District Coordinators	3	0	3
Total	60	58	118

FIGURE 2: IRS PRACTICAL TRAINING SESSION



Spray Operator and Team Leader Training

The SOP and TL training was organized and conducted in close collaboration with district and sector authorities for 4 days during February 5-8, 2013 in designated training sites provided by sector authorities. Of the total number of SOPs and TLs trained (n= 1,417), 86% had previous IRS experience. The major objective of the training was to equip the SOPs and TLs with 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 female SOPs and TLs were screened for pregnancy. In addition, the SOPs and TLs had to fully meet the selection criteria to be eligible for training and the IRS operations. The criteria were that one is;

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

The SOPs and TLs were taken through intensive 4-day theory and practical sessions (see Annex 3) which covered content in:

- 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
- Understanding the basics of IEC for IRS

A total of 1,417 spray operators were trained as detailed in Table 7 below. A total of 136 facilitators (TOTs) conducted the training.

TABLE 7: NUMBER OF SPRAY OPERATORS TRAINED TO IMPLEMENT IRS, BY GENDER AND FACILITATORS

District	Training Sites	Spray Operators		Facilitators/ TOTs	
		Male	Female	Male	Female
Nyagatare	9	276	434	38	30

Gisagara	3	222	143	14	18
Bugesera	5	155	187	23	13
Total	17	653	764	75	61
			1,417		136

Data Collection Training

In January 2013, the AIRS Rwanda team, led by the M&E and Database Manager 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 clerk trainings. 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 supervisory forms;
- 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
- Data Quality Assurance and Control

Logistics Training

All the staff who would be involved in logistics and storekeeping during the implementation of IRS were trained. Sector coordinators, sector supervisors and IEC assistants were given basic skills in logistics and stores management during the ToT sessions. A comprehensive, two-day training was conducted for 3 logistics assistants and 4 storekeepers at the Abt Associates office in Kigali. Participants were taken through the following topics:

- Individual roles and responsibilities in logistics
- Warehouse and commodity management
- IRS transport management
- Management of food vendors
- IRS water management
- Soak pit management
- Environmental compliance
- Understanding and preparing for post IRS activities

Washer Training

A total of 93 washers were given a one day refresher training/ orientation at 23 operational sites in the three IRS districts before the commencement of IRS operations. Sector Coordinators and Sector Supervisors were responsible for this refresher training at their respective sectors. The washers were taken through the use

of PPEs, soak pit maintenance, effluent waste disposal and insecticide effects to humans and the environment. They were also advised on how to respond to insecticide adverse effects that they might experience.

Fire and Transport Security Training

Fifty two (52) security guards were given an orientation on fire security and general security protocol for the IRS stores. Ninety four (94) IRS drivers were taken through an orientation on safety procedures while transporting insecticides and use of first aid kits. They were also taken through what measures to take:

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

Table 8 shows the number staff in all roles trained to deliver IRS.

TABLE 8: 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		Coveralls Washing		Fire Security			Transport Security	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		M	F
District Coordinators	3	0									3	0											6
Sector Coordinators	14	9									14	9											46
Sector Supervisors	43	49																					92
Spray Operators			653	764																			1,417
Data Entry Clerks					8	6																	14
Logisticians							1	2															3
Store Keepers							2	2															4
Pump Technicians									3	0													3
District IEC Assistants											1	2											3
Sector IEC Assistants											14	9											23
Cell & Village IEC Mobilizers													1,638	235									1,873
Adverse Effects Clinicians															49	21							70
Washers																	32	61					93
Security Guards																			52	0			52
Drivers																					94	0	94
TOTAL M/F	60	58	653	764	8	6	3	4	3	0	32	20	1,638	235	49	21	32	61	52	0	94	0	
TOTAL/Training	118		1,417		14		7		3		52		1,873		70		93		52		94		3,793

2.8 M&E SYSTEM DEVELOPMENT

A Microsoft Access database developed by Abt's Client Technology Center (CTC) was used for data entry and management during the 9th spraying round in Rwanda. The database served as a tool for implementation and management by tracking key performance and output indicators. This enhanced system helped M&E and technical staff to provide quick feedback and minimize errors in data collection through regular data quality assurance and data quality control, data entry and validation.

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 ensured progressively 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 and the data entry process through comprehensive trainings and supervision at all levels.
- Carried out recruitment of data clerks during the period, followed by training in data entry and data management.
- Facilitated training of the M&E team on the database.
- Facilitated the trainings of district coordinators, sector coordinators, sector supervisors, and special teams in IRS data collection tools.

During the 9th spray campaign, spray coverage was calculated 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-level.

3. INFORMATION, EDUCATION AND COMMUNICATION

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

3.1 TRAINING

Training of Trainers

A two-day training of trainers on mobilization was conducted in Kigali from January 24-25, 2013 by Abt in collaboration with MOPDD. The trainees included the District Coordinators, District IEC Assistants, Sector IEC Assistants and Sector coordinators. They were taught to train the IEC mobilizers at the cell and village level, and to be in charge of coordinating and supervising all IEC/IRS activities. A total of 52 candidates (32 males and 20 females) participated in this training including 3 district coordinators, 3 district IECs, 23 sector IEC assistants and 23 sector coordinators.

The main objective of the training was to strengthen AIRS staff knowledge and capacity to train and disseminate IEC/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.

Training of IEC Community Mobilizers

The training of IEC mobilizers was conducted from January 28-30, 2013 in designated training sites in the sectors in the 3 IRS districts. The trainees were village and cell leaders who were recruited based on the criteria that; one had to be a cell or village leader and/or in charge of security at the village level, of good conduct, respectable, able to read and write, and known by the community. The trainings, which were held at sector level, were facilitated by the sector IEC Assistants together with Sector Coordinators with help from District Coordinators, District IEC Assistants and local leaders at the sector and cell levels. Overall coordination was done by AIRs staff. The IEC mobilizers were trained on how to:

- Identify eligible structures for IRS in the three targeted districts
- Promote understanding and acceptance of the IRS by educating the community about the purpose of the IRS campaign
- Inform beneficiaries about the benefits of IRS
- Address common myths and misconceptions about IRS
- Discuss with structure owners their role before, during and after spray operations to ensure a safe and successful IRS campaign
- Create a more long-term or sustainable awareness of the program by involving and engaging key community stakeholders.

A total of 1,873 mobilizers (235 females and 1,638 males) were trained. Each sector and cell team also developed an individual community mobilization implementation plan. Table 9 below shows the number of mobilizers that received training by district.

TABLE 9: NUMBER OF IEC MOBILIZERS TRAINED TO IMPLEMENT IRS

District	No. of IEC Mobilizers Trained		TOTAL
	Male	Female	
BUGESERA	497	34	531
GISAGARA	339	108	447
NYAGATARE	802	93	895
TOTAL	1,638	235	1,873

3.2 DOOR-TO-DOOR MOBILIZATION

The door to door mobilization exercise of structures was conducted for 2-4 days in each village during the period 9th February to 5th March 2013. During this exercise, village mobilizers reached eligible structures with IRS messages, distributed IRS structure cards and brochures to each of the identified eligible structures, filled in the data collection tools (the IEC data card) and communicated the dates of spraying to the structure owners. A total of 119,418 structures were mobilized with a high IRS acceptance rate of 99.7% recorded. Some 117,518 brochures were distributed. Table 10 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 structure cards and brochures issued to the structures to ensure accuracy and completeness of the data collected.

TABLE 10: RESULTS OF IRS MOBILIZATION ACTIVITY

District	Structures Sensitized	Adults Reached with IRS Messages		Structures Accepting IRS	% Structures Accepting IRS	Brochures Distributed
		Male	Female			
Bugesera	30,573	60,020	65,526	30,351	99.3%	30,297
Gisagara	27,346	53,274	60,693	27,292	99.8%	27,037
Nyagatare	61,499	124,239	132,563	61,364	99.8%	60,184
TOTAL	119,418	237,533	258,782	119,007	99.7%	117,518

3.3 IEC COORDINATION

During the entire period of spraying, local leaders at all levels readily provided support. Sector social affairs officers were very instrumental in linking spray operations teams to the 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 to supervise the district IEC activities. Sector IEC staff worked closely with sector social affairs and sector coordinators to supervise the sector IEC activities. They ensured that the cell and village mobilizers mobilized all eligible structures and that all structure owners were informed of the date of spraying at least a day earlier. IEC teams worked according to the updated IRS schedule each day.

On the actual spraying date, the IEC mobilizers would direct the spray operators 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

Community Mobilization Meetings by Local Leaders

Local leaders participated in mobilization activities; the vice mayors in charge of social affairs in Gisagara and Nyagatare presided over the IRS launch in the two districts respectively. The sector executive secretaries and social affairs officers

supervised the IRS activities and occasionally led the IRS teams to mobilize the community especially in cases where the communities tended to resist.

Monthly Community Work (Umuganda)

In a bid to promote community cohesion, Rwanda has set aside the last Saturday (8am to 11am) 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 the 'Umuganda' the community conducts communal activities and also takes time to discuss ways of promoting development activities in the society. During the month of February 'Umuganda' was conducted on February 23, which was during the IRS operations period. Abt Associates had earlier collaborated with the local leaders and agreed 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 were the IEC mobilizers for IRS. The main message was to encourage the community members to prioritize the spraying of their houses since the spraying season coincided with the season in which they prepare their farms for planting. The Vice Mayors and Sector Executive secretaries helped with this and sent the IRS message to the population in the IRS districts.

Mass Media Communication

Two live radio talk shows were aired simultaneously on Radio Rwanda, Radio Salus and Radio Nyagatare. During the radio talk shows, community members called in to ask for clarifications on matters of IRS; IRS myths and fears were discussed during these sessions. A third radio talk show was aired only on Radio Nyagatare and hosted by the Nyagatare Hospital Director on February 21, 2013.

Radio spots were aired two times daily from February 4-25, 2013. 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 funding agency. Table 11 shows details of the mass media communication activities done during the IRS operations.

TABLE 11: MASS MEDIA COMMUNICATION ACTIVITIES CONDUCTED DURING THE IRS CAMPAIGN

Dates	Type of IEC Activity/Material	Frequency/Number Produced
11 February 2013	Radio Talk show	1 Radio Talk Show on Radio Rwanda/Salus/Nyagatare
14 February 2013	Radio Talk show	1 Radio Talk Show on Radio Rwanda/Salus/Nyagatare
21 February 2013	Radio Talk show	1 Radio Talk Show on Radio Nyagatare
04-25 February 2013	Radio Spot	42 times on 3 radio stations aired 2 times per day

4. Implementation of IRS Activities

The 9th round of IRS implementation was carried out over a 20-day period from February 11 to March 5.

4.1 IRS SUPERVISION

During the IRS campaign, supervision was provided by a team from Abt Associates, MOH/MOPDD, PMI, Hospitals, Health Centers and local authorities at both the district and sector levels. Supervision checklists for different cadre of supervisors (see Annex 4) were used to ensure consistency and follow up on the proposed recommendations. To further enhance supervision, Abt Associates appointed an Abt staff member to be in-charge of each district to coordinate routine daily supervision by working closely with the district staff. Supervision of the spray operations was arranged such that:

- Each team consisted of four spray operators, supervised by a team leader.
- A sector supervisor was responsible for supervising three such teams. Supervisors reported directly to the sector coordinator, who in turn reported to the district coordinator.
- Supervisor checklists were used as tools to assess the daily performance of spray operators and team leaders.
- Sector social affairs officers 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 the operations

MOPDD/RBC participated in the IRS launch in Mamba Sector, Gisagara District

PMI conducted a field visit with the US Deputy Chief of Mission, the MOH permanent Secretary, District authorities in Ruhuha Sector; Bugesera District went to the field to supervise the IRS activities. Table 12 below summarizes the institutions/stakeholders which participated in supervision.

TABLE 102: INSTITUTIONS/ STAKEHOLDERS WHICH PARTICIPATED IN IRS SUPERVISION

Level	Institution	Responsibilities
National Level	MOH/MOPDD/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 Sector Social Affairs	Close supervision in districts and environmental protection

As part of supervision, the district coordinators convened at the Abt Kigali office every Saturday during the IRS operations period for a feedback meeting that brought together the Abt Kigali team and the MOPDD to review the progress of IRS activities. Each district coordinator made a presentation of the period's progress

and outlined challenges including ways in which the challenges were overcome. During these interactions, MOPDD representatives, and the Abt Kigali team discussed the issues at hand and provided guidance to the district coordinators.

4.2 LOGISTICS

4.2.1 IRS STORAGE AND INSECTICIDE STOCK MANAGEMENT

District-level storage facilities in each district served as distribution centers for IRS materials, equipment, and supplies which were used during the IRS operations. The district storage facilities were manned by a logistics assistant and a storekeeper who also ensured distribution and close supervision of supplies and materials at the operation sites storage facilities. There were 23 storage facilities in the three districts, 15 of them were provided at the sector offices at no cost as the district/sector authority contribution to the IRS campaign. The other 8 facilities were rented at premises near the sector offices. Each of the sector coordinators was in charge of storage management at the sector level with oversight from the district logistic assistant and storekeeper.

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

IRS Vehicles

A total of 94 vehicles were contracted for the support of the IRS operations in the three districts. Table 13 below shows the number of vehicles assigned to each district.

TABLE 13: DISTRIBUTION OF VEHICLES IN THE DISTRICTS

District	Vehicles for SOPs	Vehicles for Supervision	Total
Bugesera	22	2	24
Gisagara	21	2	23
Nyagatare	44	3	47
Total	87	7	94

4.3 SAFETY AND ENVIRONMENTAL COMPLIANCE

During IRS operations, all players 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. PPE included coveralls, gloves, boots, helmets, face shields, and dust masks for use throughout the spray period.

Soak pits were monitored throughout the operations. The plastic sheeting which 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 to decontaminate themselves before retiring for the day.

The mid-spray environmental compliance inspections were carried out during the spraying operation 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. 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, and validity of 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.

4.4 MANAGEMENT OF INSECTICIDE ADVERSE EFFECTS

Each of the three IRS districts had a team which was in charge of adverse effects. The team comprised of a coordinator, a doctor who was based at the district hospital and 2 nurses based at each health center affiliated to 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. A total of 18 cases were reported in the three districts throughout the operations. The associated symptoms of the reported cases were mild, limited to localized irritations of eyes or dermal rashes and headaches. All the cases were attended to appropriately and the persons affected recovered within a few hours of attention. Table 14 below provides a summary of adverse effects that were reported in all districts and were attended to at either a health center or district hospital.

TABLE 14: NUMBER OF ADVERSE EFFECTS CASES

Districts	Number of cases	Symptoms
Bugesera	15	Itchy skin and rashes Eye irritation
Nyagatare	2	Headache Fever
Gisagara	1	Nausea

5. Post-Spray Activities

5.1 POST SPRAY REVIEW MEETINGS

IRS evaluation/review meetings were conducted at the district and national level (to be done 16th April) in order to:

- Review the overall IRS programmatic implementation process for the 2013 spray round, experiences and achievements of the IRS round

- Disseminate IRS results and findings of the Entomological studies conducted in collaboration with MOPDD-RBC
- Review IRS challenges in the 3 IRS target districts and come up with recommendations for the next spray cycle

Reach a consensus on the recommendations and way forward for next spray cycles. At the district level, 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 in charge
- MOH/MOPDD representatives
- Abt Associates staff
- CHW representatives

At the national level, a partner review meeting took place on April 16, 2013 to evaluate the achievements of the IRS operations. Participants were drawn from MOH (national and district levels), Abt Associates, and PMI Presentations at the review meeting covered the following topics:

- District malaria trends in the last 2 years
- IRS planning and implementation, coverage, achievements and challenges
- Training and capacity building
- Logistics management and commodity distribution
- Advocacy, communication and social mobilization campaign
- Best practices and environmental/ personal safety
- IRS supervision

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

TABLE 15: EVALUATION MEETINGS PARTICIPANTS

District/ National	Review Meeting Dates	Participants		Total
		Male	Female	
Bugesera	12 March 2013	26	9	35
Gisagara	13th March 2013	27	8	35
Nyagatare	14th March 2013	35	16	51
National	16th April 2013	14	4	18
Total		102	37	139

Summary of recommendations from review meetings were:

- Districts should strive to include IRS in their annual plans of action
- Mobilizers should be very specific when delivering IEC messages, emphasis to the community on IRS benefits and on keeping the IRS card safely.
- Ensure the mass campaigns are organized in the community before IRS launch to show the impact of malaria prevention strategies in general.
- Respect of MOH criteria during recruitment of SOP's especially age
- Conduct IRS training for Local Leaders/Sectors
- Recruit SOPs only from the pool of existing CHWs and conduct a special recruitment meeting with sector authorities on recruitment procedures and provide them with lists of SOPs with previous IRS experience for consideration
- Include IRS in all community mobilization campaigns
- Conduct a mobilization meeting at cell levels at the start of the campaign
- IEC mobilizers and SOPs who do not fully commit their time to IRS activities by engaging in other tasks leading to absenteeism should be reported immediately to sector authorities and serious measures should be taken against them
- Share and discuss the challenges and recommendation of the previous IRS operation during the IEC and SOP's training
- Local leaders should have frequent meetings with IRS staff during IRS preparations, supervision to address the key issues of mobilization and IRS operations in general.
- Consider sectors with high malaria transmission cases (Gishubi, Nyarugenge sectors) in next round
- Conduct a mobilization meeting at cell levels at the start of the campaign

5.2 POST SPRAY ENVIRONMENTAL ASSESSMENT

The post-spray environmental assessment was conducted in the 3 districts. 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. Soak-pits which had been constructed on rented space were pulled down and pit areas restored to previous conditions by filling in and leveling with soil. For soak-pits which were constructed at sector premises, Abt Associates agreed with the district and sector authorities that the sectors would provide security to the soak pits and wash areas to ensure that they are not vandalized during the non-spraying season. Stores were cleaned/ decontaminated before handing them over to the owners.

5.3 IRS WASTE DISPOSAL

IRS wastes were disposed at 3 different sites according to the type generated during the IRS operations. Contaminated wastes, such as insecticide empty sachets and used masks, were incinerated at the Gahini Hospital incineration plant whose combustion temperature is 1100° Celsius. A total of 654 Kg of wastes was incinerated which comprised of 93,026 empty insecticides sachets and 29,203 used masks. Other wastes, including 113 pairs of worn-out boots, 2,734 used gloves, and assorted plastics items (28 damaged barrels, 37 jerry cans and 99 basins) were disposed of at the Entreprise pour la Protection de l'Environnement et Development

Rural (EPEDR) Recycling plant. Uncontaminated wastes, such as cardboard boxes and paper, were disposed of at the Nduba Dumping site where they will decompose with time. After disposal, a certificate of disposal was issued, please see Annex 5.

5.4 INVENTORY

Following completion of the IRS operations, all the commodities at the sector stores were transported to the district stores. The sector coordinators 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 below shows a summary of the remaining stock. See Annex 6 for detailed inventory.

TABLE 16: STOCK OF IRS COMMODITIES

Item	Quantity Before the Campaign	Unit	Quantity Used	Remaining Stock after the Campaign
Coveralls	5,018	Piece	3,105	5,015
Boots	2,154	Pair	1,630	2009
Helmets	2,212	Piece	1,384	2,176
Head gear	2,405	Piece	1,459	303
Inner part for helmets	3,087	Piece	1,480	763
Face shields	1,484	Piece	1,363	1,484
First Aid kits	145	Piece	108	37
Latex Nitrile Gloves	6950	Pair	2,734	4,216
Respiratory masks	48,984	Piece	29,203	19,781
Spray Pumps	1,772	Piece	1,217	1,772
Sprayer Repair Kits	15	Kit	12	3
Nozzle Tips 8002E	972	Piece	466	1499
Pump Hoses	26	Piece	26	100
Pressure Gauges	2	Piece	74	28
Extension Assembly	70	Piece	47	82
Deltamethrin sachets	195,985	Sachet	93,026	102,959

6. Monitoring and Evaluation

Monitoring and Evaluation for the February 2013 IRS campaign closely followed the processes outlined in the 2012 AIRS Rwanda Work Plan and the 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

The AIRS Rwanda team used the same data collection tools and the Microsoft Access database, developed by Abt's Client Technology Center from the August 2012 spray campaign. Any AIRS M&E protocol updates 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. This enhanced system helped M&E and technical staff produce "real-time" reports for quick feedback and to minimize errors in data collection and entry through regular data quality assurance and quality control 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, data clerks transmitted data to the Database and M&E Managers for review. For quality control purposes and the timely generation of weekly client spray progress reports, all data were entered within 48 hours of spraying. Daily Spray Operator 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.

6.3 DATA QUALITY ASSURANCE AND CONTROL

Data quality assurance was carried out daily during the IRS campaign by a variety of AIRS staff (i.e. team leaders, supervisors, district coordinators, M&E Manager, Database Manager, etc.) Specific activities conducted to ensure data quality included:

- Physical checks for verification of data collected by spray operators;
- Daily database assessment to verify data entered by Database and M&E Managers.
- Random Spot Checks.

Physical Data Verification

Physical data verification was performed at three different levels:

- Spray Operator Level: 100% of spray data collected on spray operator 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

Forms from team leaders and checked the accuracy of the spray data. Spray forms were then transmitted to the data centers each evening.

- Data Entry Level: Data clerks reviewed each form for typos and transcription errors and verified the arithmetic before entering the data into the database.

Database Quality Control

During the spray campaign, the M&E Manager and the Database Manager performed daily data verification activities of the Access database to guarantee the quality of the data. They scanned the database and run spray progress reports to identify anomalies and data entry errors. They also retrieved paper spray forms and randomly crosschecked these data with the data that had been entered into the database. In the rare event that 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, and corrected the data wherever the error occurred. At the end of every week, the M&E and Database Managers provided feedback, based on issues that surfaced, to the data clerks to improve data entry and, ultimately, data quality.

Additionally, the Access database was developed to incorporate a series of logic checks (i.e. user locks and display error messages) that reduced the number of data entry errors. Data clerks also 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 the End of Spray Report and all other client-submitted reports were generated.

During a thorough cleaning process, discrepancies between spray *totals* and *details* data were investigated and reconciled by the M&E and Database Managers before finalizing and reporting campaign results. Corrections were made to the paper spray forms and the database, where necessary.

Random Spot Checks

The M&E and Database Managers regularly conducted spot checks of the data collection forms at all the three data centers and compared the data recorded on the forms with data entered into the database. In addition, the M&E team conducted random field checks with other AIRS Rwanda supervisory staff by visiting random structures found by spray operators (based on spray form records) and interviewed the residents to collect spray campaign information. The M&E Manager 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.

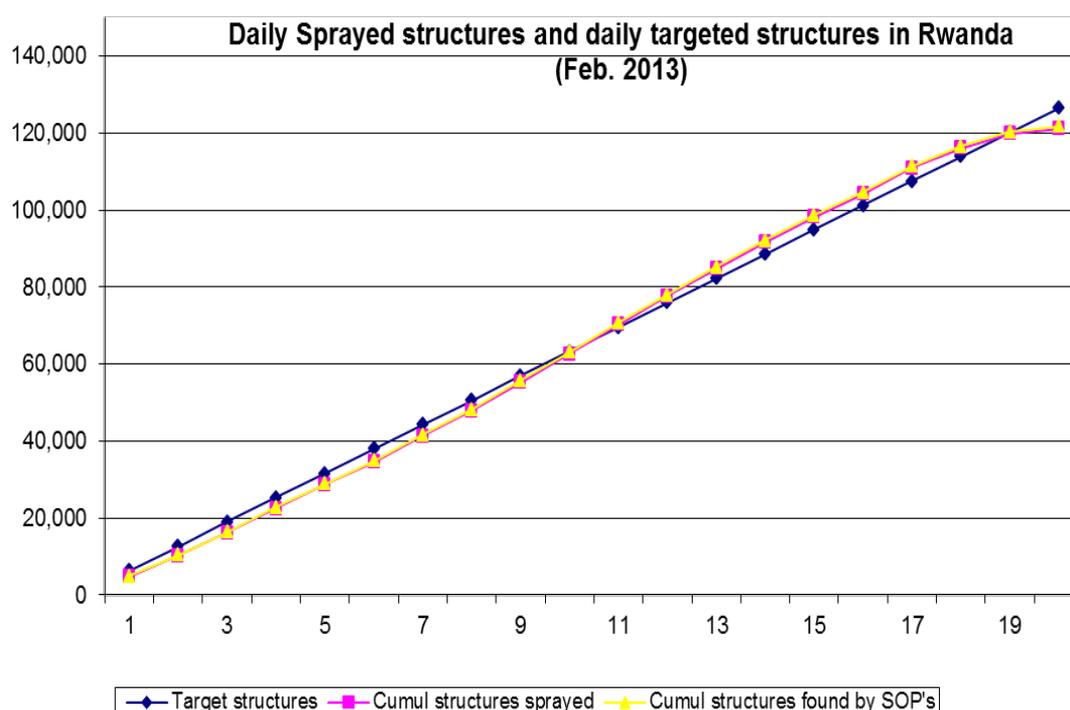
6.4 IRS RESULTS

During the spray campaign, we sprayed 121,154 structures of the 121,697 structures found, resulting in a 99.6% spray coverage. A total of 522,315 people were protected, including 8,935 pregnant women and 81,433 children under five years (Table 17). In total, 93,026 sachets of insecticide were used during the spray campaign, where we sprayed an average of 1.3 structures sprayed per sachet.

TABLE 17: SUMMARY OF AIRS RWANDA RESULTS IN 2013⁴

District	Total Structures Found	Total Structures Sprayed	Spray Coverage (%)	Total Population Protected			
				Male	Female	Pregnant Women	Children <5 Years
Bugesera	29,832	29,456	98.7	59,427	64,877	2,047	19,960
Gisagara	29,740	29,725	99.9	59,203	67,151	1,978	20,472
Nyagatare	62,125	61,973	99.8	131,675	139,982	4,910	41,001
Total	121,697	121,154	99.6	250,305	272,010	8,935	81,433

FIGURE 3: IRS DAILY TRACKER



Mosquito Nets

The total number of mosquito nets reportedly available in the households that were targeted for spray is 241,355. Among the 8,935 pregnant women protected by IRS, 8,154 (91%) reported they slept under a mosquito net the previous night. Of the 81,433 children under five years protected by IRS, 74,880 (92%) were reported to have slept under a mosquito net the previous night (Table 18).

⁴ Spray coverage was calculated by dividing the number of structures sprayed (numerator) by the number of structures found by SOPs (denominator). We used 126,515 structures found during the 2012 IRS campaign as a target for tracking spray progress and performance at both the sector and district level (Figure 3).

TABLE 18: MOSQUITO NETS REPORTED AVAILABLE IN TARGETED STRUCTURES

District	Bed Nets Available	Pregnant Women Sleeping Under a Net	Pregnant Women Protected by IRS	Children <5 Sleeping Under a Net	Children <5 Protected by IRS
Bugesera	50,823	1,898	2,047	18,512	19,960
Gisagara	58,222	1,892	1,978	19,077	20,472
Nyagatare	132,310	4,364	4,910	37,291	41,001
Total	241,355	8,154	8,935	74,880	81,433

Insecticide Usage

The total number of sachets used during the February 2013 campaign was 93,026. There were no sachets lost or damaged. On average, one sachet sprayed 1.3 structures (Table 19) and the average size of a structure is 190 m². The average number of sachets used by a spray operator per day was 4.4, and each operator, on average, sprayed six structures per day.

TABLE 19: INSECTICIDE USAGE

District	Total Structures Sprayed	Total Sachets Used	Total Sachets Unused	Average # Sachets per Sprayed Structure	Average # Sachets per SOP/ Day
Bugesera	29,456	21,889	8,792	1.34	4.4
Gisagara	29,725	23,784	14,048	1.24	4.7
Nyagatare	61,973	47,353	27,9993	1.30	4.4
Total	121,154	93,026	50,833	1.30	4.4

IRS Results for Special Institutions

A total of 17 boarding schools and 2 prisons comprising 92 dormitories were sprayed in the 3 target districts and 5,347 people were protected. Two hundred and twenty (220) insecticide sachets were used to spray the schools and prisons (Table 20).

TABLE 20: IRS RESULTS FOR SCHOOLS AND PRISONS

District	# of Schools	# of Prisons	# of Dormitories	Population Protected		Found Rooms	Sprayed Rooms	Spray Coverage	Mosquito Nets Available
				Male	Female				
Bugesera	2	-	7	172	336	7	7	100.0%	326
Gisagara	4	-	22	474	692	22	22	100.0%	808
Nyagatare	11	2	63	1,836	1,837	197	197	100.0%	1,520
Total	17	2	92	2,482	2,865	226	226	100%	2,654

7. CAPACITY BUILDING OF THE MINISTRY OF HEALTH

The implementation of IRS was done in close collaboration with the Ministry of Health staff. Their involvement in the implementation enhanced their capacity and will thus 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 handy 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 district/sector staff (Vice-Mayor-social affairs, District Health Director, District Environmental Health Officer, and Sector Social affairs Officers). These staffs were all given orientations on IRS supervisory activities.

8. ENTOMOLOGY

Entomological monitoring is essential in any insecticide based vector control intervention such as IRS. It ensures 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 which were aimed at:

- 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;
- Assessing vector susceptibility to insecticides approved for IRS and mechanism of resistance;

8.1 VECTOR SPECIES COMPOSITION, DENSITIES, FEEDING TIME AND LOCATION

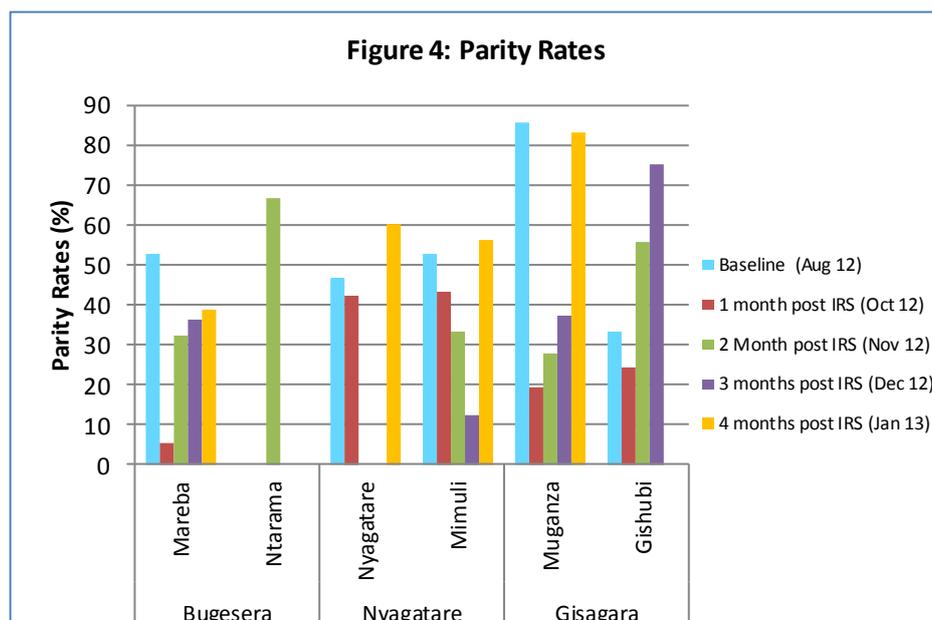
Vector collections were done to assess the vector species composition, density and behavior in the three IRS districts using human landing collections (HLC) and pyrethrum spray catches (PSC). The collections were done before the August-September 2012 IRS campaign for baseline data and then monthly thereafter. Ovary dissection of the Anophelines collected by HLC was done to determine the parity

rates. These collections are underway on a monthly basis post the February 2013 IRS campaign.

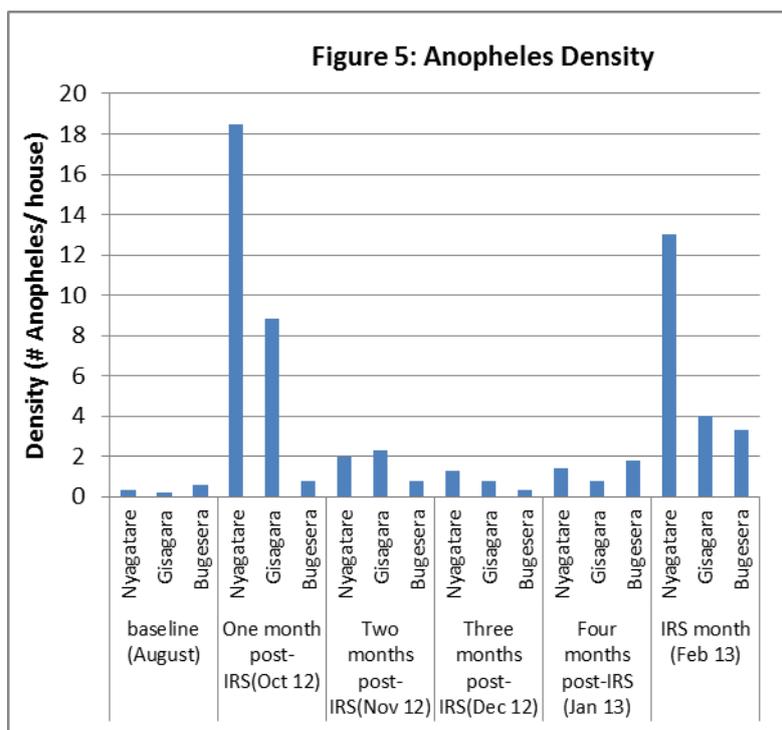
The malaria vectors collected throughout the study period were predominantly *Anopheles gambiae s.l.* and *Anopheles coustani* in a few sites. The anophelines showed varying levels of endophilic/exophilic behavior across the study sites and through the study period. Anophelines collected in Mimuli (Nyagatare) and Muganza (Gisagara) sites generally recorded over 50% tendency to bite indoors (Annex 7).

The man biting rates (MBR) also varied across the study sites with the highest being recorded in Mimuli site (70.2 bites/ person/ night) in October 2012 (Annex 7).

Parity rates, as determined from the ovary dissection did not show any definite trend across the study sites during the study period (Figure 4).



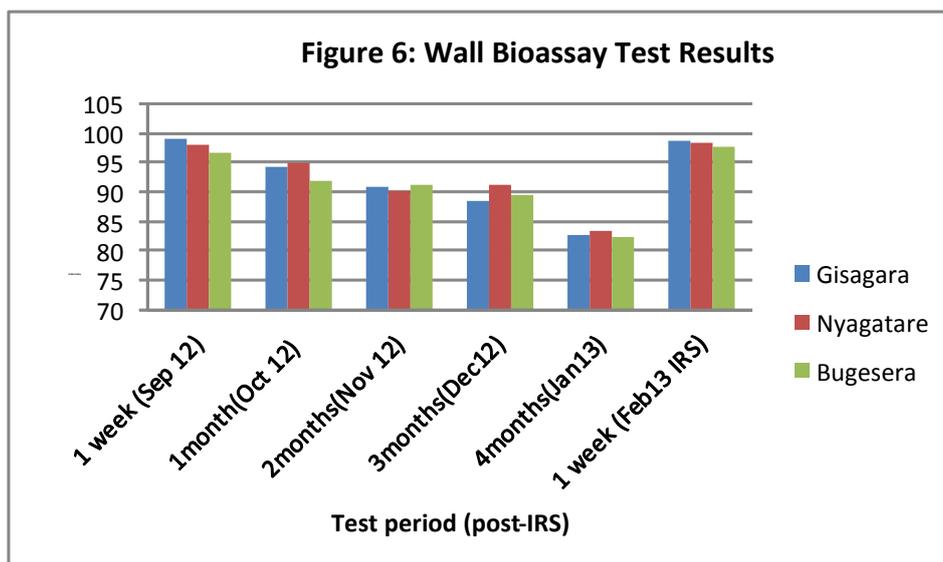
During the PSC baseline collections, the number of mosquitoes collected was lower than in the consecutive months after IRS and in these, the anopheles densities were highest during the first month after IRS in Nyagatare and Gisagara (Figure 5). This population build-up during the IRS period could be as a result of the proliferation of breeding sites following the onset of the rainy season. (Annex 8)



8.2 WALL BIOASSAYS

Wall bioassays were conducted using susceptible *Anopheles gambiae* (Kisumu strain) within one week of spraying during the two spray rounds to assess the quality of spraying in the three districts. Thereafter, further tests were conducted to assess the insecticide decay rate on a monthly basis for the August 2012 IRS campaign. Similar tests are ongoing once every month following the February 2013 IRS campaign. The assays for the 2012 IRS campaign (and those of the February 2013 post-IRS) were performed in 36 sprayed structures in the three districts. In each district, two different sectors were sampled and in each sector 6 structures were sampled. The structures sampled were of three different wall surfaces, namely: plastered and painted, plastered and not painted, and mud. For each of the three different wall surfaces, two structures were used for the tests. The quality assurance bioassay tests conducted during the February 2013 IRS campaign were performed in forty eight (48) sprayed structures in the three districts. In Nyagatare four sectors were selected in which six (6) structures were sampled in each sector; in each of the other two districts (Bugesera and Gisagara) two different sectors were sampled and in each sector six (6) structures were sampled.

During the August 2012 IRS campaign, the quality assurance tests showed mortality rates of between 96.7 and 99.3%. The monthly bioassay data collected showed 82% mortality rates of susceptible *Anopheles gambiae* four months post-spraying; an indication that the insecticide was still effective against the malaria vector. The February 2013 quality assurance wall bioassay tests showed mean mortality rates of between 95 -100% (Figure 6).



9. CHALLENGES, LESSONS LEARNED AND RECOMMENDATIONS

9.1 CHALLENGES

The main challenges experienced during the IRS campaigns included:

- Mobilizers who are community leaders did not take sufficient time to educate the community adequately on IRS messages and in most instances it was reported that they only distributed materials. This occurrence is attributed to the limited time they give to IRS mobilization as a result of their other competing community activities.
- Poor coordination between mobilizers and spray operator teams in some sectors resulted in delays in covering the targeted numbers of structures.
- Some SOPs were found pregnant during IRS while their medical checkups conducted just before the start of IRS results were negative.
- Loss of IRS cards by households and village mobilizers (approximately 21.5%) was reported and this led to re-printing hence increase in cost.
- Non- adherence to established recruitment guidelines for SOPs by sector officials led to attrition during the IRS operations hence affecting IRS operations. Approximately 35% of SOPs recruited were students and not CHWs.
- Sparse distribution of structures, rainfall in the first week and the inaccessibility of some villages by road due to bad terrain led to reduced daily output by some spray teams.

9.2 LESSONS LEARNED AND RECOMMENDATIONS

- Sector authorities to whom local leaders (mobilizers) report should also be trained on IRS and coordination of community mobilization so as to guide and supervise the mobilizers appropriately.
- Increase level of supervision for mobilization to ensure better community readiness and participation in IRS.
- Work with local authorities to include IRS messages in all community forums and campaigns.
- Take advantage of the community work day (Umuganda) for community mobilization of IRS.
- The need to abide by the recruitment criteria for IRS seasonal staff should be addressed by the MOPDD/ RBC at all planning and review meetings.
- Mobilize the community on IRS benefits and enhance messages about the source of support (funding) i.e. USAID and the American people.
- Conduct mobilization meetings at cell levels at the start of the campaign to be conducted by cell and village mobilizers.
- Share and discuss the challenges and recommendations of the previous IRS operation during the IEC and SOPs training for a smoother IRS operation.
- Engage the CHW Sector in-charges as sector IEC assistants in order to enhance coordination and acceptability of IRS.
- Incorporate IRS in district annual work plans for proper coordination of the activity

10. LIST OF ANNEXES

ANNEX I: SUMMARY OF 2011 INSECTICIDE SUSCEPTIBILITY TEST RESULTS (24HR POST-EXPOSURE % MORTALITY)

Site	Deltamethrin 0.05%	Lambda- cyhalothrin 0.05%	DDT 4%	Bendiocarb 0.1%	Permethrin 0.75%	Fenitrothion 1.0%
Bukora	88.3	98.7	80.4	90.8	83.5	100
Busoro	100	100	100	100	100	100
Karambi	98.7	100	96.5	98.8	90.9	100
Kicukiro	89.5	100	51.8	100	98.7	100
Kivumu	100	100	94.8	96.3	100	100
Mareba	98.9	100	98.8	100	98.9	100
Mashesha	100	95	90.9	100	90.4	99
Mbuga	97.4	100	100	98.8	95.2	98.7
Mimuli	97.6	100	76.4	93.9	86.2	100
Mubuga	98.8	100	95.5	97.8	96.6	100
Musanze	98.7	100	96.3	90.6	100	100
Nyamasheke	92.7	98.7	75	96.3	89.2	98.7
Rubaya	100	100	100	100	100	100
Rukara	94.2	100	*-	98.8	83.7	100

ANNEX 2: LOCAL PROCUREMENT

Description	Quantity / Number
IRS Transports	
Rented vehicles used in Micro-planning and logistic assessments	3
Rented Vehicles used in IRS implementation	91
Special Team Vehicles	0
IRS Supervision vehicles(Country Office)	3
Rented vehicles that facilitated the Post IRS activities	6
Printed materials	
SOP Forms	17622
Team Leader Forms	6,728
IRS cards	41,211
Brochures	74,672
IEC Mobilizer Forms	3,303
IEC Implementer Form	10,235
Stock Cards	0
Delivery Note Books	0
Request Books	100
Goods Issued Note Books	126
Food vendors	
Gisagara District	5
Nyagatare District	6
Bugesera District	4

ANNEX 3: SOP TRAINING PROGRAM 5TH – 8TH FEBRUARY 2013

TIME	SUBJECT	FACILITOR
Day 1		
08.00 - 09.00	Arrival and Registration	Supervisor
09.00 - 09.15	Opening remarks	Sector Executive/Social Affairs
09.15 - 09.30	Objective of the training	Sector Coordinator
09.30 - 10.00	Introduction to Indoor residual spraying	Trainer
10.00 - 10.15	BREAK	Sector Supervisor
10.15 - 11.15	Parts of Compression Pumps handling and Pump maintenance	Trainer
11.15 - 11.45	Pump Calibration	Trainer
11.45 - 12.15	Introduction to the spraying surface	Trainer
12.15 - 01.00	Safety of population and Environment	Trainer
01.00 - 02.00	LUNCH	Sector Supervisor
02.00 - 03.00	Personal Protection	Trainer
03.00 - 04.30	Filling daily data collection forms	Trainer
04.30	End on Day 1	
Day 2	Safety of IRS	
08.00 - 10.00	Filling of Daily collection data forms	Trainers
10.00 - 10.15	BREAK	Sector Supervisor
10.15 - 11.00	Preparing Structures for IRS, Community mobilization	Trainers
11.00 - 12.00	Management of adverse effects	Trainers
12.00 - 01.00	Supervision and reporting of all IRS activities (Use of supervision checklists)	Trainers
01.00 - 02.00	LUNCH	Sector Supervisor
02.00 – 04.00	Introduction to Spraying Wall Practice	Trainers
04.00	End on Day 2	
Day 3 - 4	Quality Control	
08.00 - 01.00	Spraying Walls practices Maintaining 45cm distance from Walls Maintaining 75cm Swath and 5cm overlap Spray rhythm (Speed top – down)	Trainers
01.00 - 02.00	LUNCH	Sector Supervisor
02.00 - 04.00	Spraying Walls practices Maintaining 45cm distance from Walls Maintaining 75cm Swath and 5cm overlap Spray rhythm (Speed top – down)	Trainers

ANNEX 4: DISTRICT COORDINATOR'S SUPERVISION FORM

Name of District

Coordinator.....

District: Sector

Cell:..... Village.....Date of

supervision:/...../.....

1. Human resources

Quality Names Found in the field

Yes No Comments

Sector Coordinator/

Supervisor/Sector IEC Assistant

Yes No If No, why?

• Presence form filled (SOP's and IEC's) /___/ /___/

2. Materials Resources (Store/Warehouse)

• Total number of working Pumps /___/ /___/

.....

• Total number of defective pumps /___/ /___/

.....

• Strainers in good condition (screen) /___/ /___/

.....

• Tools for repair pumps available /___/ /___/

.....

• Soap available /___/ /___/

.....

• Tarpaulins (Plastic sheets for covering property) /___/ /___/

.....

3. Insecticide (Store/Warehouse)

• Appropriate storage /___/ /___/

.....

• Security Ensured (Key and guard) /___/ /___/

.....

• Store card updated /___//___/

.....

• Empty sachets adequately stored /___//___/

.....

• Insecticide stock sufficient for one week and above /___/ /___/

.....

• Masks, Gloves, sufficient for one week and above /___/ /___/

.....

4. Management aspect

• Local authority informed on spray schedule /___/ /___/

.....

• IRS Weekly meeting minutes with local authorities available /___/ /___/

.....

• Data form available /___/ /___/

.....

5. Environment safety/Compliance

• Overalls washed over soak pits /___/ /___/

.....

- Dusty masks changed every day /___/ /___/

.....
- Insecticide effluent disposed into the soak pit /___/ /___/

.....
- Empty sachets and others solids wastes recorded and stored in safe store /___/ /___/

.....
- Washing equipment in place (Soak pit, buckets, basins...) /___/ /___/

.....
- Water and drums available /___/ /___/

.....
- Stores secured and guarded /___/ /___/

.....
- Is soak pit fence intact and cleanliness maintained? /___/ /___/

.....

6. Adverse/Side Effects in the sector

- Adverse effects reported (Human/Animal) /___/ /___/ Detail

.....
- Action Taken (Detail)

.....

.....

.....

7. Feedback from community about spraying (information is to be collected from the population and local authority)

.....

.....

8. General observations

Strengths	Area needed improvement
Problem identified	Measures taken

Name and signature of District Coordinator: _____.

ANNEX 5: WASTE DISPOSAL CERTIFICATE

	GAHINI HOSPITAL BIOMEDICAL WASTE INCINERATOR	
TO WHOM IT MAY CONCERN		DATE 27/03/2013
Ref: 001/G.H.B.I/2013		
RE: CERTIFICATE OF G.H.B.I SOLID WASTER INCINERATOR		
Client: Abt Associates, PoBox 5200 Kigali – Rwanda		
This is to certify that 654Kgs of solid waste for Abt Associates was collected on 18/03/2012, 19/03/2013 and 21/03/2013 and have been completely incinerated and destructed.		
Kind regards,		
Dr. MUVUNYI Alphonse		
Gahini Hospital Director		

ANNEX 6: STOCK UPDATE

Category	Item	Initial Stock	New Procurement	Used	Equipment Damaged/ Needing Repair)	Usable Stock Remaining
PPE						
	Coveralls	5035	0	3105	845	5035
	Boots	2165	0	1630	113	2052
	Helmets	2218	0	1384	42	2176
	Gloves	6969	0	2753	0	4216
	Dust masks	4765	44160	29144	0	19781
	Raincoats	0	0	0	0	0
Spray Equipment						
	Spray pumps	1772	0	1217	0	1772
	Repair kits	15	0	12	0	0
	Nozzle gaskets	0	0	0	0	0
	Nozzle O-rings	0	0	0	0	0
	Nozzle tips	485	1000	800	0	685
	Strainers	0	0	0	0	0
	Cover gaskets	0	0	0	0	0
	Extension Assembly	70	100	88	0	82
	Pressure Gauge	2	100	74	0	28
	Pump Hose	26	100	26	0	100(not used because sent incomplete part)
	Measuring cylinder	0	25	23	0	25
Insecticides						
Pyrethroid	Deltamethrin	195985	0	93026	0	102959
Empty Sachets						
	Pyrethroid	0	0	93026	0	0

ANNEX 7: ENDOPHILY⁵ AND MAN BITING RATES⁶

			Aug '12	Oct '12	Nov '12	Dec '12	Jan '12	Feb'13
Bugesera	Mareba	Endophily	44%	44%	36.6%	34%	18.2%	47.2%
			(66)	(43)	(101)	(47)	(132)	(402)
	Ntarama		0 (8)	0% (1)	33.3% (3)	50% (32)	0%	
	Musenyi						22% (41)	
	Mareba	Man Biting Rate	18.00	3.60	0.00	27.20	11.00	33.50
	Ntarama		0.03	0.08	0.23	0.23	0.25	
Musenyi							3.40	
Nyagatare	Nyagatare	Endophily	50%	40%	30.8%	35.3%	76.3%	
			(66)	(150)	(13)	(17)	(21)	
	Mimuli		82.1%	42%	50.7%	63.5%	49.7%	54.4%
		(28)	(842)	(298)	(301)	(175)	(469)	
	Rukomo						14.8% (17)	
	Nyagatare	Man Biting Rate	1.80	12.50	1.10	2.30	1.58	
Mimuli	0.78		70.20	25.50	26.90	14.58	39.10	
Rukomo							1.40	
Gisagara	Muganza	Endophily	91%	51.2%	21.3%	35.4%	59.5%	54.6%
			(11)	(498)	(122)	(48)	(42)	(194)
	Gishubi		58.3%	31.1%	11.1%	100%	100%	
		(13)	(225)	(27)	(1)	(1)		
	Mamba						36.8% (38)	
	Muganza	Man Biting Rate	0.30	41.50	10.20	4.90	3.50	16.20
Gishubi	0.10		18.80	2.38	2.00	0.08		
Mamba							3.20	

⁵ Endophily- the figure in brackets is the total anophelines collected

⁶Man Biting Rates are given as Bites/person/night

ANNEX 8: PYRETHRUM SPRAY CATCHES RESULTS

	Site	Total <i>An. gambiae</i> s.l.	Unfed	Fed	Half Gravid	Gravid	Other culicidae	Total Culicidae	Density (# anophelines /house)
Aug-12	Mimuli	8	3	2	2	1	20	28	0.53
	Nyagatare	1	1	0	0	0	1	2	0.07
	Gishubi	3	1	1	1	0	11	14	0.20
	Muganza	2	1	1	0	0	19	21	0.13
	Ntarama	3	2	1	0	0	5	8	0.20
	Mareba	14	6	2	2	4	0	14	0.93
Oct-12	Mimuli	517	150	171	141	77	0	539	34.47
	Nyagatare	37	10	7	10	8	8	43	2.47
	Gishubi	37	14	20	2	1	8	45	2.47
	Muganza	227	90	57	35	45	20	247	15.13
	Ntarama	0	0	0	0	0	16	16	0.00
	Mareba	23	7	14	2	0	36	59	1.53
Nov-12	Mimuli	60	12	15	16	14	0	57	4.00
	Nyagatare	0	0	0	0	0	12	12	0.00
	Gishubi	32	14	10	5	3	0	32	2.13
	Muganza	36	5	14	6	11	1	37	2.40
	Ntarama	0	1	1	1	1	0	4	0.00
	Mareba	23	7	14	2	0	36	59	1.53
Dec-12	Mimuli	31	14	12	4	1	0	31	2.07
	Nyagatare	7	1	3	0	3	0	7	0.47
	Gishubi	21	0	12	4	4	0	20	1.40
	Muganza	3	1	1	0	1	0	3	0.20
	Ntarama	0	0	0	0	0	0	0	0.00
	Mareba	10	1	3	3	3	0	10	0.67
Jan-13	Mimuli	37	18	8	8	3	3	40	2.47
	Nyagatare	5	2	1	0	2	2	7	0.33
	Gishubi	0	0	0	0	0	0	0	0.00
	Muganza	24	8	7	4	5	0	24	1.60
	Ntarama	5	1	4	0	2	0	7	0.33
	Mareba	48	20	17	5	6	0	48	3.20
Feb-13	Mimuli	385	221	73	76	15	14	399	25.67
	Rukomo	5	1	4	0	0	21	26	0.33
	Mamba	5	2	1	2	0	0	5	0.33
	Muganza	115	44	32	28	11	29	144	7.67
	Musenyi	16	5	5	3	3	16	32	1.07
	Mareba	83	37	34	6	6	25	108	5.53

ANNEX 9: 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?
Ngeruka	2/20/13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shyara	2/20/13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kamabuye	2/20/13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ruhuha	2/20/13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mareba	3/1/13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mamba Site 1	3/1/13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mamba Site 2	3/1/13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Muganza	2/15/13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mugombwa	2/12/13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kansi	2/12/13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mukindo	2/15/13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Karama	3/1/13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mukama	3/1/13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Karangazi	3/20/13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Site 1											
Mimuli	3/21/13	Yes									
Gatunda	3/1/13	Yes									
Nyagatare Site 1	2/27/13	Yes									
Rukomo	2/21/13	Yes									

ANNEX 10. 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?
Ngeruka	Yes	Yes	Yes
Shyara	Yes	Yes	Yes
Kamabuye	Yes	Yes	Yes
Ruhuha	Yes	Yes	Yes
Mareba	Yes	Yes	Yes
Mamba Site 1	Yes	Yes	Yes
Mamba Site 2	Yes	Yes	Yes
Muganza	Yes	Yes	Yes
Mugombwa	Yes	Yes	Yes
Kansi	Yes	Yes	Yes
Mukindo	Yes	Yes	Yes
Karama	Yes	Yes	Yes
Mukama	Yes	Yes	Yes
Karangazi Site 1	Yes	Yes	Yes
Mimuli	Yes	Yes	Yes
Gatunda	Yes	Yes	Yes
Nyagatare Site 1	Yes	Yes	Yes
Rukomo	Yes	Yes	Yes

ANNEX II. 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)
Ngeruka	Yes	Yes	Yes	Yes	No	Yes
Shyara	Yes	Yes	Yes	Yes	No	Yes
Kamabuye	Yes	Yes	Yes	Yes	No	Yes
Ruhuha	Yes	Yes	Yes	Yes	No	Yes
Mareba	Yes	Yes	Yes	Yes	No	Yes
Mamba Site 1	Yes	Yes	Yes	Yes	No	Yes
Mamba Site 2	Yes	Yes	Yes	Yes	No	Yes
Muganza	Yes	Yes	Yes	Yes	No	Yes
Mugombwa	Yes	Yes	Yes	Yes	No	Yes
Kansi	Yes	Yes	Yes	Yes	No	Yes
Mukindo	Yes	Yes	Yes	Yes	No	Yes
Karama	Yes	Yes	Yes	Yes	No	Yes
Mukama	Yes	Yes	Yes	Yes	No	Yes
Karangazi Site 1	Yes	Yes	Yes	Yes	No	Yes
Mimuli	Yes	Yes	Yes	Yes	No	Yes
Gatunda	Yes	Yes	Yes	Yes	No	Yes
Nyagatare Site 1	Yes	Yes	Yes	Yes	No	Yes

Rukomo	Yes	Yes	Yes	Yes	No	Yes
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ANNEX 12. 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 while 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)
Ngeruka	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shyara	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kamabuye	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
Mamba Site 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mamba Site 2	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
Kansi	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Yes
Mukindo	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Karama	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mukama	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Karangazi Site 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Mimuli	Yes									
Gatunda	Yes									
Nyagatare Site 1	Yes									
Rukomo	Yes									

ANNEX 13: 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?
Ngeruka	3/10/13	Yes	Yes	Yes	Yes	Yes	Yes
Shyara	3/10/13	Yes	Yes	Yes	Yes	Yes	Yes
Kamabuye	3/10/13	Yes	Yes	Yes	Yes	Yes	Yes
Ruhuha	3/10/13	Yes	Yes	Yes	Yes	Yes	Yes
Mareba	3/10/13	Yes	Yes	Yes	Yes	Yes	Yes
Musenyi	3/3/13	Yes	Yes	Yes	Yes	Yes	Yes
Mamba Site 1	3/10/13	Yes	Yes	Yes	Yes	Yes	Yes
Mamba Site 2	3/10/13	Yes	Yes	Yes	No, the soak pit was demolished, all materials taken to the district warehouse.	Yes	Yes
Muganza	3/10/13	Yes	Yes	Yes	Yes	Yes	Yes
Mugombwa	3/10/13	Yes	Yes	Yes	Yes	Yes	Yes
Kansi	3/10/13	Yes	Yes	Yes	Yes	Yes	Yes
Mukindo	3/10/13	Yes	Yes	Yes	Yes	Yes	Yes
Karama	3/11/13	Yes	Yes	Yes	Yes	Yes	Yes
Mukama	3/11/13	Yes	Yes	Yes	Yes	Yes	Yes
Karangazi Site 1	3/11/13	Yes	Yes	Yes	Yes	Yes	Yes

Karangazi Site 2	3/11/13	Yes	Yes	Yes	Yes	Yes	Yes
Mimuli	3/11/13	Yes	Yes	Yes	Yes	Yes	Yes
Gatunda	3/11/13	Yes	Yes	Yes	Yes	Yes	Yes
Nyagatare Site 1	3/11/13	Yes	Yes	Yes	Yes	Yes	Yes
Rukomo	3/11/13	Yes	Yes	Yes	Yes	Yes	Yes
Nyagatare Site 2	3/11/13	Yes	Yes	Yes	Yes	Yes	Yes
Katabagemu	3/11/13	Yes	Yes	Yes	Yes	Yes	Yes
Matimba	3/11/13	Yes	Yes	Yes	Yes	Yes	Yes

ANNEX 14. U.S. DEPUTY CHIEF OF MISSION AND BENEFICIARIES PRAISE INDOOR RESIDUAL SPRAYING IN RWANDA



On March 4, 2013, U.S. Deputy Chief of Mission in Rwanda Jessica Lapenn, President's Malaria Initiative Resident Advisor Francisco Saute, and leaders from the Rwanda Ministry of Health visited the Africa Indoor Residual Spraying project (AIRS) office and work sites in Bugesera District, Rwanda to learn about how the project is protecting approximately 1.5 million Rwandans from malaria in 2013.

While visiting the indoor residual spraying work site in Ruhuha Sector, the delegation observed a spray operator interact with a woman whose house was targeted for spraying. The spray operator informed the woman about the dangers of malaria and how IRS could protect her family. The woman needed little convincing. "In the last five years I have not had any malaria cases in my family including my children and this is due to the spraying done every year and the mosquito nets we get from the government. We are so happy to have this activity taking place in our home and we are grateful to the Government of Rwanda and the American people," the resident told Ms. Lapenn.

The Deputy Chief of Mission, USAID and Ministry of Health officials met with Ruhuha Sector health authorities and community members. The Vice Mayor thanked the deputy mission chief for the U.S. government support. He reported that malaria has significantly decreased from 40 percent to 14 percent in Bugesera district and it stands at only 10 percent in some sectors due to interventions such as IRS, mosquito nets, and promotion of household hygiene.

Ms. Lapenn emphasized that support from the government of Rwanda and the community is critical to the success of USAID health programs. She praised the government of Rwanda for embracing malaria elimination and reaffirmed the U.S. government's commitment to malaria control in the country. Dr. Uzziel Ndagijimana, permanent secretary at the Rwanda Ministry of Health, reiterated that malaria in Rwanda has been combated due to good government policies, different partners and the US government specifically. He specifically noted that USAID deserves to be

applauded by the community for their dedication to malaria prevention. Dr. Ndagijimana concluded by thanking spray operators, district and sector authorities, and the AIRS team for providing an excellent service to the communities.