



PMI | Africa IRS (AIRS) Project

Indoor Residual Spraying (IRS 2) Task Order Four

RWANDA END OF SPRAY REPORT

SPRAY CAMPAIGN: AUG 20-21 & SEP 17-OCT 18, 2012

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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 Developement 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

In August 2011, Abt Associates was awarded a three-year Africa-wide IRS project (AIRS), funded by USAID under the President's Malaria Initiative (PMI) and Rwanda is one of the countries to receive support to implement Indoor Residual Spraying (IRS). The key objective of the AIRS project in Rwanda is to reduce malaria associated morbidity and mortality through the implementation of IRS. The target for the 2012 IRS campaign was to spray roughly 240,000 structures located in Bugesera, Gisagara and Nyagatare districts. This End of Spray Report covers spraying conducted from August 20-21 and September 17- October 18, 2012.

The following bullets are project achievements and key highlights of the 2012 Rwanda spray campaign, which lasted 30 days:

- A total of 236,610 structures were sprayed out of 242,589 structures found by spray operators in the targeted districts, accounting for a coverage rate of 97.5%. In total, 1,025,181 residents were protected, of which 160,399 (15.6%) were children under five years old and 17,157 (1.6%) were pregnant women.
- A total of 260,977 households were mobilized and 227,767 brochures were distributed during the mobilization exercise.
- A total of 6,065 individuals were trained using PMI funds to facilitate IRS activities in the three target districts. Of these, 1,986 people were trained specifically to deliver IRS, which included 1,710 spray operators (50% female), 178 training of trainers (TOTs) (57% female) and 98 clinicians (39% female). Overall, 26% (n= 1,556) of all IRS personnel trained during the 2012 campaign were female.
- A total of 166,261 sachets of Deltamethrin WG 250 insecticide were used to spray 236,610 structures, with a utilization ratio of approximately 1:1.42 (sachets to structures sprayed).
- A total of 36 schools were sprayed protecting 12,714 residents. Spraying was conducted in prisons, police and military camps where 6,710 structures were sprayed with 33,979 residents protected.
- All IRS primary wastes, including empty sachets and used masks, were incinerated at the Kanombe Military Hospital incineration plant in Kigali. 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 within one week of spraying to assess the quality of spraying in the target districts, recording mosquito mortalities ranging from 95.8 – 99.3%. Baseline vector studies conducted prior to 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.

AIRS RWANDA 2012: AT A GLANCE

Number of provinces/districts covered by PMI-supported IRS in 2012	3 districts (Bugesera, Gisagara, and Nyagatare)
Insecticide	Pyrethroids
Number of structures covered by PMI-supported IRS in 2012	236,610
Number of structures targeted by PMI-supported IRS in 2012	242,589
2012 spray coverage	97.5%
Population protected by PMI-supported IRS in 2012	1,025,181
Dates of PMI-supported IRS campaign	August 21-22, 2012; September 17-October 18, 2012
Length of campaign	30 days
Number of people trained with USG funds to deliver IRS	1,986

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 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.⁴ Much of the IRS in Rwanda has been funded by PMI. Up to, and including the year 2011, Rwanda implemented seven 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. 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:

- 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).

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 MOP, 2012

⁴ MOP, 2011

- 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

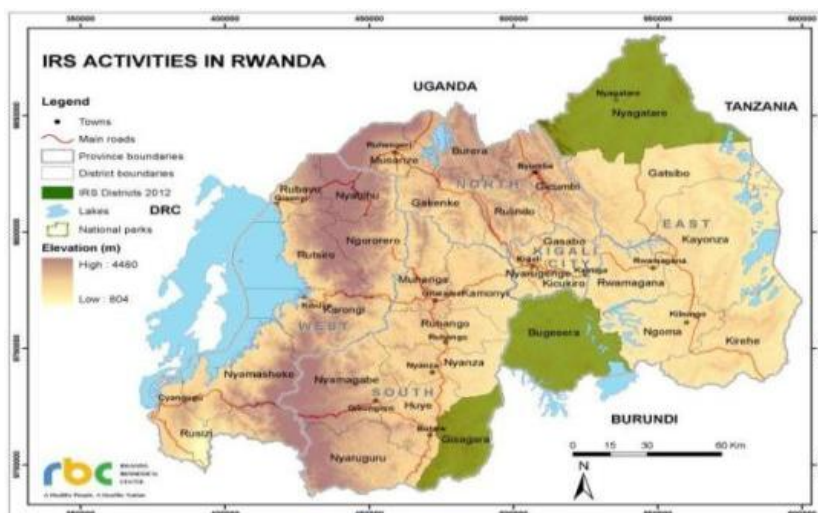
2.1 Selection of IRS Districts

In preparation for IRS Round 8, 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. 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. Table 1 below is a summary of the target structures.

Table 1: Target structures for IRS Round 8

District	No. of Sectors	No. of Target Structures	Target Population	
			Females	Males
Bugesera	15	76,053	163,582	152,161
Gisagara	13	75,362	151,778	130,264
Nyagatare	14	91,046	201,246	188,714

Figure 1: Map of Rwanda showing the three IRS target districts



2.2 District planning meetings

Following the choice of the target districts and number of target structures, MOPDD officially introduced Abt and the AIRS project to district administrative and health authorities in June 2012. Mechanisms for collaboration and coordination of IRS pre-spray activities were discussed and established. Micro planning meetings with district and sector authorities in all 3 districts and 42 sectors were conducted in June and July. In each of the three target districts a one day planning meeting was organized to discuss and develop an IRS operational plan with local leaders. Some of the topics 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

The selection of insecticide 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 sites within the IRS target districts showed between 97%-100% mortalities. Based on these results and the funds available, the insecticide selection committee selected a pyrethroid to be used for IRS round 8.

2.4 Environmental Assessment

During June 18-22, the Rwanda AIRS team, in collaboration with the District Environmental Officers, jointly conducted pre-spray environmental assessments in the 3 districts and at the IRS operation sites at the sector level. The assessments involved identifying storage facilities and the appropriateness of soak-pits that were used in previous IRS rounds. The teams found that 14 storage facilities had to be rented while 28 were to be provided by the sector authorities at the sector office premises. A total of 27 soak-pits needed to be refurbished while 15 new soak-pits would be constructed. The refurbishments generally comprised of clearing bushes in and around the soak-pits, the 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 Supplemental Environmental Assessment (SEA) that was written in 2011 was amended and approved by PMI. The amendments included the required measures to be taken, facilities, and equipment needed to conduct the 2012 IRS round in Rwanda. The SEA also served to document the collaborative efforts and discussions that led to the strategy and tactics for the proposed 2012 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	Number of Operation Sites	Site Refurbished (soak pit, storeroom, fence, etc.)
Bugesera/ Eastern Province	15	<ul style="list-style-type: none"> • 8 soak pits refurbished • 7 new soak pits constructed • 6 office and storage facilities provided by sector authorities • 9 office and storage facilities rented • Minor repairs done in 4 storerooms • 1 health center in each sector, nearby the operation sites
Nyagatare/ Eastern province	14	<ul style="list-style-type: none"> • 10 soak pits refurbished • 4 new soak-pits constructed • 11 storerooms provided by sector authorities • 3 stores • 1 health center in each sector, nearby the operation sites
Gisagara/ Southern Province	13	<ul style="list-style-type: none"> • 9 soak pits refurbished • 4 new soak pits constructed • 11 storerooms provided at the sector offices a • 2 stores were rented • 1 health center in each sector, nearby the operation sites

2.5 Logistics Needs and Procurement

A central AIRS warehouse was identified at the Kicukiro Small Scale Industrial area in Kigali. It served as the hub for storage of IRS commodities, including housing insecticides before distribution to the target districts. A logistics needs assessment was conducted in February and March 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.

The core IRS commodities listed in Table 3 below were purchased through an international competitive procurement process. A total of 274,050 sachets of Deltamethrin WG 250 were procured in time for the IRS campaign. Samples of the insecticide were independently tested for quality assurance at the South Africa Bureau of Standards and The Centre Wallon de Recherches Agronomiques, Belgium, both WHO accredited laboratories. The analysis in both labs confirmed that the insecticide conformed in content and appearance to WHO specifications 333/WG of May 2008 (Annex 2 and 3).

Table 3: International Purchases

Description	Quantity in Stock Before the Campaign	Quantity Received	Total Quantity	Quantity Used	Quantity Damaged	Quantity in Stock after the Campaign
Sprayer repair kits	8	20	28	13	0	15
USAID stickers	366	4,175	4,541	2,611	0	1,930
Respiratory masks	8,126	48,200	56,326	51,561	0	4,765
First aid kits	180	100	280	205	0	75
Latex nitrile gloves	10,850	210	11,060	4091	0	6,969
Face shields	2,266	200	2,466	1643	957	1509
Suspension for hard hats (Inner part)	3,615	444	4,059	1643	1,405	2,654
Head gears (Universal hard hat adapters)	2,407	204	2,611	1643	91	2,520
Insecticide sachets (Deltamethrin WG 250)	92,827	274,050	366,877	170,892	0	195,985

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 4):

- 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

As part of IRS preparations, IRS commodities were distributed in July 2012 to the 3 target districts. The quantities distributed to the districts were 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	1187	627	565	2615	17275	56096	507
Nyagatare	1502	861	756	2665	17535	66639	595
Gisagara	1264	655	637	2568	17300	59413	456
Police & Military Camps	102	51	51	66	630	6000	41

2.6 Human Resource Requirements

The project deployed 1,308 SOPs for 30 days in the 3 districts. These spray operators 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. Priority was given to Community Health Workers (CHWs) if they matched the selection criteria and passed a medical examination. Both males and females were eligible to apply.

Table 5: Seasonal IRS Staff by District

Districts	Bugesera	Gisagara	Nyagatare	Total
Spray Operators	407	406	495	1,308
Team Leaders	105	103	127	335
District Coordinators	1	1	1	3
District IEC Assistants	1	1	1	3
Data Clerks	5	5	6	16
Storekeepers	1	1	1	3
Logistics Assistants	1	1	1	3
Finance Assistants	1	1	1	3
Washers	36	32	45	113
Cleaners	1	1	1	3
Pump Technicians	1	1	1	3
Sector Coordinators	15	13	14	42
Sector Supervisors	37	34	40	111
Sectors IEC Assistants	15	13	14	42
Adverse effect Managers	1	1	1	3
Cell IEC Supervisors	72	59	107	238
Village IEC Mobilizers	1164	1048	1268	3480
Security Guards	36	28	28	92
Total	1900	1749	2152	5801

Seasonal staff selection was based on the following criteria:

- is a native of the district/sector
- is a CHW (is given priority)
- is able to read and write
- is medically fit as indicated by a medical test
- is below 40 years of age

An operational team of 335 team leaders supported, coordinated, and directly supervised the spray operators. In addition, 3 district coordinators, 3 district IEC assistants, 16 data clerks, 4 storekeepers, 4 logistics assistants, 3 financial assistants, 42 sector coordinators, 111 sector supervisors, 42 sector IEC assistants, 238 IEC cell supervisors, 3480 IEC village mobilizers, 3 side effect managers, 42 washers, 3 cleaners, 3 pump technicians and 92 security guards completed the operational team. Table 5 enumerates the IRS support staff by district.

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 manual 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

Training of Trainers

The training of trainers was organized and conducted in collaboration with MOPDD from 31st July to 3rd August 2012. The major objective of the ToT was to equip participants with skills and knowledge in IRS. In addition, trainees received instructions on methods to conduct IRS training to the IRS implementers. The training comprised of both theory and practical sessions through group discussions, demonstrations, lectures and question and answer methods. The trainees were selected candidates who had undergone and passed a written test. During the selection process, preference was given to those who had previous IRS experience. The participants included 47 IRS sector coordinators, 131 IRS sector supervisors and 3 IRS district coordinators.

Table 6: Numbers of ToTs by Gender

Position	Number of Participants		Total
	Male	Female	
Sector Coordinators	17	30	47
Sector Supervisors	60	71	131
Total	77	101	178

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 (TL). 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 ToTs are shown in Table 6 above.

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 over 5 days during the period 13th to 17th August 2012 in designated training sites provided by sector authorities. The major objective of the training was to have well-trained SOPs and TLs fully equipped to conduct quality IRS.

The SOPs and TLs were chosen by district and sector authorities, with guidelines from MOH/MOPDD. 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.

The SOPs and TLs were taken through intensive 2 day theory and practical sessions (see **Annex 5**) which covered content in:

- Spray techniques
- Handling and managing insecticides
- Handling and maintaining spray pumps
- Personal protection
- Leading a spraying team
- Filling out data collection forms
- Understanding basics of IEC for IRS

A total of 1,710 participants were trained as detailed in Table 7 below.

Table 7: Number of Participants Trained to Implement IRS

District	No. of Training Sites	No. of Participants		No. of Facilitators	
		Male	Female	Male	Female
Nyagatare	6	312	335	24	26
Gisagara	4	280	251	23	24
Bugesera	5	269	263	26	19
Total	15	861	849	73	69
		1,710		142	

Data Collection Training

In February 2012, the Abt M&E Manager attended a regional M&E Training in Ghana, Tamale which focused on the roles and responsibilities of the M&E Manager, provided a degree of standardization to the M&E systems in all AIRS countries, ensured consistent use of terminology, standardized reporting to facilitate clear communication and sharing of lessons learned and comprehension of AIRS M&E in terms of operational feedback and accountability.

In July and August 2012, the AIRS Rwanda team, led by the M&E Manager, organized, facilitated, and directed ToT sessions for sector coordinators, supervisors and sector IEC assistants, district-level orientations, community-based personnel trainings for SOPs and mobilizers and data entry clerk trainings. Please see Table 8 below for the number and type of staff trained. The trainings focused on the following key topics:

- Familiarity with data collection forms (spray operator and team leader forms, IEC village and cell mobilizer forms) and supervision forms;
- Understanding of key 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

Logistics Training

Logistics orientation was performed in the 3 IRS target districts during micro-planning meetings with local authorities in June and July 2012. All of the staff who would be involved in logistics and storekeeping during the implementation of IRS were trained. Sector coordinators, sector supervisors, logistics assistants, storekeepers and IEC assistants were given basic skills in logistics and stores management during the ToT sessions. A comprehensive two days training for 4 logistics assistants and 4 storekeepers was conducted at the Kigali Abt Associates office. 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 117 washers were given a one day training/ orientation at each of the operation sites in their respective districts before the commencement of IRS operations. They were taken through the use of PPEs, soak pit maintenance, effluent waste disposal, insecticide adverse effects and how to respond to such effects.

Fire and Transport Security Training

Drivers (99) and store management staff (8), including sector coordinators (47), were trained/ oriented on the use of the fire extinguishers and first aid kits. They were also taken through what measures to take:

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

Table 8: People Trained/ oriented to deliver IRS

Categories of Persons Trained	Training on IRS Delivery										Other Trainings												
	Training of Trainers		Spraying Operations		Data Capture		Logistics Training		Technical Maintenance		Structure Enumeration/ IEC ToT		Structure Enumeration/ IEC Training		Clinicians		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	
Sector Coordinators	17	30																					
Supervisors	60	71																					
Spray operators			861	849																			
Data clerks					19	10																	
Logisticians							2	2															
Storekeepers							1	3															
Pump Technicians									3	0													
District & Sector IEC Assistants											30	21											
Cell & Village Mobilizers													3233	447									
Adverse Effects Teams (Clinicians)															60	38							
Washers																	34	83					
Security Guards																			90	2			
Drivers																					99	0	
TOTAL M/F	77	101	861	849	19	10	3	5	3	0	30	21	3233	447	60	38	34	83	90	2	99	0	

Categories of Persons Trained	Training on IRS Delivery										Other Trainings											
	Training of Trainers		Spraying Operations		Data Capture		Logistics Training		Technical Maintenance		Structure Enumeration/ IEC ToT		Structure Enumeration/ IEC Training		Clinicians		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
TOTAL/ Training	178		1710		29		8		3		51		3680		98		117		92		99	

2.8 IEC and Structure Enumeration Activities

Following the review of the M&E system, IEC mobilizers performed door-to-door mobilization and structure enumeration (structure enumeration was a new activity this year). This exercise was conducted from 23 - 28 July and consisted of identifying eligible structures with a unique serialized IRS structure card. Information about each of the structures identified was also collected and later entered in a database by data clerks. Enumerators/mobilizers were recruited and trained on eligible structure identification, door-to-door mobilization and data collection. In total, 3,680 mobilizers (3,233 females and 447 males) were recruited (see Table 8). The criteria for the selection of mobilizers was that one had to be a cell or village leader and in charge of security at the village level, possess knowledge of the area, be of good conduct, respectable, be able to read and write, and be known by the community.

2.9 M&E System Development

A web based Microsoft Access database developed by the Client Technology Center (CTC) located in the Abt Bethesda office was used for data entry and management during the 8th spraying round in Rwanda. The database served as a tool for implementation and management by tracking key performance and output indicators. This new 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:

- Reviewed M&E tools and data collection tools for AIRS Rwanda 8th spraying campaign.
- Harmonized data collection tools with the database to appropriately report PMI indicators—such forms include the daily spray form, daily team leader form, IEC mobilizer form, IEC supervisor form, supervision checklists, as well as the monitoring tools for local authorities.
- 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.
- Reviewed Rwanda caveats on the definition of structure and conducted regularly data quality assurance and control for both enumeration and spray data.

During the 8th spraying campaign, spray coverage was calculated based on the total number of structures sprayed against structures found by spray operators (denominator). Data collected during enumeration served as targets for tracking spray progress and performance at sectors and districts.

3. INFORMATION, EDUCATION AND COMMUNICATION

To ensure effective community mobilization, Abt Associates worked in close collaboration with 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 enumeration and mobilization was conducted in Kigali by Abt Associates in collaboration with MOPDD. The trainees were trained to be IEC implementers/ mobilizers at the cell and village level, in addition to being in charge of coordinating and supervising all IEC/IRS activities at the sector level as IEC assistants. They comprised of selected and qualified candidates who had applied and passed a pre-selection test administered by AIRS Rwanda. Further consideration was given to candidates who had past IRS IEC implementation experience. A total of 51 candidates (30 males and 21 females) participated in this training. The trainees were further segregated as follows: 3 district IECs, 42 sector IEC assistants and 6 reserve candidates.

The main objective of the training was to strengthen the knowledge and capacity of IEC IRS support staff to train and disseminate IEC/BCC messages to IEC community mobilizers and to also effectively coordinate IEC IRS activities. The training had 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 create a community mobilization plan.

Training of Enumerators/IEC Community Mobilizers

The training of IEC mobilizers was conducted from 19th to 20th July 2012 in designated training sites in the 3 IRS districts. These trainings were facilitated by the sector IEC assistants who had been trained at the ToT in Kigali. They worked closely with sector and cell social affairs officers. The mobilizers were trained on how to:

- Identify and enumerate 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 rumors and misconceptions about IRS
- Discuss with beneficiaries 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.

Each sector and cell team also created their community mobilization/enumeration implementation plan. Table 9 below shows the numbers of mobilizers who received training in the three districts.

Table 9: Number of IEC Mobilizers Trained to Implement IRS

District	No. of IEC Mobilizers Trained		TOTAL
	Male	Female	
BUGESERA	1,121	113	1,234
GISAGARA	900	207	1,107
NYAGATARE	1,212	127	1,339
TOTAL	3,233	447	3,680

3.2 Door-to-Door Mobilization /Enumeration of Structures

The door to door mobilization exercise along with the enumeration of structures was conducted during the period 25- 30 July 2012. During this exercise, village mobilizers reached eligible structures with IRS messages, distributed IRS structure cards to each of the identified eligible structures and filled in the data collection tools. They also reviewed the data collected and IRS structure cards issued to the structures to ensure accuracy and completeness of the data collected. The sector IEC assistants, with support from the sector and cell social affairs officers, oversaw the implementation of this activity. During spraying the IEC mobilizers reached households in their villages and cells to inform and prepare them for the IRS activity.

Since one of the recommendations that came up from the PMI audit was that beneficiaries of IRS remain unaware of the US government's role in supporting IRS in Rwanda, the AIRS team will emphasize this during all IEC/BCC communications. This messaging will include "from the American people" translated in Kinyarwanda and included as one of the key messages given to the householders during pre-spray mobilizations.

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 and supervised the sector IEC staff. Sector IEC staff worked closely with sector social affairs and supervised the cell and village mobilizers to ensure that all structures were informed of the date of spraying the day before. IEC teams were worked according to the updated IRS schedule each day.

The cell and village leaders who also worked as the IEC mobilizers mobilized the structures a day before the actual spray date. On the actual spray date, the mobilizers would then work with the spray operators to direct them to the structures mobilized. Once the spray operators finished spraying the structures, they issued a brochure to the structure owners. A total of 227,767⁵ brochures were distributed in the 3 districts.

3.4. Other IEC Activities

⁵ **87530** brochures in Nyagatare District, **67519** in Bugesera District and **72718** in Gisagara District

Community Mobilization Meetings

Several sensitization and mobilization meetings were held with district/sector authorities and opinion leaders at the community level. Please see the table below for more details (Table 10).

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 September 'Umuganda' was conducted on September 29, 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 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 Executives helped with this and sent the IRS message to the population in the IRS districts.

Table 10: Summary of Meetings Held with Leaders

District	Date	Type of District Meeting	Attended by	Participants	
				Male	Female
GISAGARA	20.9.2012	District Meeting on Malaria Prevention	V/Mayor and Sector Social Affairs	12	13
	27.9.2012	District Health Coordination Meeting	V/Mayor / all Sector Social Affairs and all Health Facilities	24	31
NYAGATARE	08.10.2012	District Meeting on Community Based Health Insurance (CBHI)	V/Mayor / all Sector Social Affairs and all Health Facilities	12	13
	25.9.2012	District Community Health Meeting	V/Mayor / all Sector Social Affairs and all in Charge of CHWs at Health Centers	17	14
	12.10.2012	Radio Talk Show on Radio Nyagatare	V/Mayor ,District Health Director and District Coordinator /IEC Coordinator	2	2
BUGESERA	24.9.2012	Cell Leaders Management Meeting.	V/Mayor ,all Executive Secretaries and all Cell leaders	46	37

	10.10.2012	Nyamata Cell and Village Leaders Management Meeting	Executive Secretary and all cell and Village Leaders	12	16
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Mass Media Communication

Abt Associates worked with PSI to reach the community through mass media communication. Two 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 and IRS myths and fears were discussed during these sessions. A third radio talk show was aired only on Radio Nyagatare and hosted by the District Vice mayor on 11th October 2012.

Radio spots were aired on three times a day from 15th August up to 8th October 2012. Key messages relayed during the messages were: informing people of the importance of IRS in the fight against malaria, the start date of IRS campaign and their role in IRS activities (before, during and after spraying).

A total of 84,000 posters were distributed in the three IRS districts. A total of 70 banners were put up at the Health Centers and Sector Offices which were affiliated with the IRS operation sites (Figure 3). Drama shows were performed in all 42 sectors of IRS and 29,994 people were sensitized on IRS amongst them 13,626 males and 16,368 females (Table 11). Table 12 provides the details of the mass media communication activities done during the IRS operations.

Table 11: Drama Shows Presented during the IRS Campaign

Area/District	Target Group		Total
	Males	Females	
Gisagara : All 13 sectors	2,355	2,951	5,306
Bugesera: All 15 Sectors	3,766	4,701	8,467
Nyagatare: All 14 sectors	7,505	8,716	16,221
Total	13,626	16,368	29,994

Table 12: Mass Media Communication Activities Conducted during the IRS Campaign

Dates	Type of IEC Activity/Material	Frequency /Number Produced
19th August 2012	Radio Talk Show	1 Radio Talk Show on Radio Rwanda/ Salus/ Nyagatare
19th September 2012	Radio Talk Show	1 Radio Talk Show on Radio

		Rwanda/ Salus/ Nyagatare
10th October 2012	Radio Talk Show	1 Radio Talk Show on Radio Nyagatare
15 August up to 10 October 2012	Radio Spot	162 times on 3 radio stations aired 3 times per day
15 August up to 10 October 2012	Posters	70,000 posters per district
17th August up 18th October 2012	Banners	70 Banners produced
15th August up to 18th October 2012	Drama Show	One week of IRS and 29,994 people mobilized on IRS

Figure 3: IRS Banner at Kibirizi Health Centre, Gisagara District



Translation

<i>Birakureba</i>	It concerns you
<i>Rinda umuryango wawe malariya</i>	Protect your family against malaria
<i>Itabire gahunda yo gutera mu nzu umuti wica umubu ukwirakwiza malaria</i>	Participate in IRS activities to fight against malaria
<i>Ryama buri ijoro mu nzitiramubu ikoranye umuti</i>	Always sleep under insecticide-treated mosquito nets

Collaboration with Health Facilities in IEC

Kiyombe Sector in Nyagatare District was sprayed for the first time and achieved an exemplary coverage of 99.6%. To achieve this coverage, extensive IEC was conducted and this assured that very few refusals were experienced. Through IEC, misconceptions and misunderstandings regarding IRS were cleared. One of the most effective communication channels used was holding brief meetings in the mornings at the Health Centers with all of the out-patients. The meetings were conducted by nurses before attending to their patients. “When we pass the information to the patients, they listen because they respect and trust us,” said the Kiyombe Health Centre Nurse. “In fact, we use them to

pass important messages to the community; they are an excellent channel of communication and mobilization to their families and neighbors.”

Enumeration of Eligible Structures

The AIRS Rwanda team conducted enumeration/mobilization in all three targeted districts, from July 25-30, 2012 to ensure a thorough preparation for the spray campaign that began on August 21, 2012. The main objective of enumeration and mobilization was to enumerate all structures to be sprayed during the 2012 spray campaign, also promote acceptance of the IRS program by informing the community about the purpose of the program and what is expected of them in terms of participation. Table 13 below shows the enumeration results.

Table 13: Results of the IRS Enumeration Activity

District	No. HHs Sensitized	No. Adults Reached with IRS Messages			No. HHs Accepting IRS	% HHs Accepting IRS	No. IEC Materials Distributed	No. Structures Enumerated
		Males	Female	Total				
Bugesera	80,932	160,399	172,717	333,116	80,388	99.3%	67,519	76,053
Gisagara	84,233	148,129	171,501	319,630	83,731	99.4%	72,718	75,362
Nyagatare	95,812	199,817	211,306	411,123	95,573	99.8%	87,530	91,046
Total	260,977	508,345	555,524	1,063,869	259,692	99.5%	227,767	242,461

4. IMPLEMENTATION OF IRS ACTIVITIES

The 8th round of IRS implementation was carried out over a 30-day period. The exercise commenced on August 21 and was temporarily halted on August 23 for a period of three weeks after which it was resumed on September 17 and ended on October 18.

4.1 IRS Supervision

During the IRS campaign, supervision was provided by a team from Abt Associates, MOH/MOPDD, PMI, PSI, Hospitals, Health Centers and local authorities at both the district and sector levels. Supervision checklists for different cadre of supervisors (see Annex 6) were used to ensure consistency and follow up on the proposed recommendations. To further enhance supervision, Abt Associates appointed an Abt staff member in each district to be responsible for routine daily supervision and closely work with the district staff. Supervision during spray operations was such that:

- Each team consisted of four spray operators, 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.
- Supervisor checklists were used as tools to assess the daily performance of spray operators and team leaders.
- Joint supervision from the national-level partners (MOPDD, Abt Associates and PMI) was intensified.
- Sector social affairs officers and district environmental officers dedicated two days each week to IRS supervision.

Table 14 below summarizes the institutions/stakeholders which participated in supervision.

Table 14: Institutions Involved in IRS Operations Supervision

Level	Institution	Responsibilities
National Level	MOH/MOPDD/RBC, USAID/PMI PSI 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 once every two weeks 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 that were shared among fellow district coordinators. 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

IRS Storage and Insecticide Stock Management

District-level storage facilities were established in each district to serve as a distribution center for IRS materials, equipment, and supplies sent to respective sectors in the districts. The district storage facilities were manned by a logistics assistant and a storekeeper who also ensured close supervision of supplies and materials at the sector-level storage facilities. In each of the 42 sectors there was an operation site with a storage facility. Out of the 42 storage facilities in the three districts, 31 of them were provided at the sector offices at no cost as the district/sector authority contribution to the IRS campaign. The other 11 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 sector 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 102 vehicles were contracted for the support of the IRS operations in the three districts. Table 15 below shows the number of vehicles assigned to each district.

Table 15: Distribution of Vehicles by Districts

District	Vehicles for SOPs	Vehicles for Supervision	Total
Bugesera	28	3	31
Gisagara	27	3	30
Nyagatare	31	3	34
Special Team	6	1	7
Total	92	10	102

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 operations and the plastic sheeting was replaced where and when there was need. The progressive 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 mid-spray environmental compliance inspections were carried out during the spraying operation in the three IRS districts to ensure 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 spray and washing activities, stores status and arrangement, transportation of SOPs, and warning signs and fire extinguishers in storerooms were inspected. Preparations of households before the spraying commenced 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 with each 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. A total of 24 cases were reported. 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 16 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 16: Number of Adverse Effects Cases

Districts	Number of cases	Symptoms
Bugesera	8	<ul style="list-style-type: none"> • Itchy skin and rashes • Eye irritation • Headache • Fever • Nausea • Difficulty in breathing
Nyagatare	7	
Gisagara	9	

4.5 IRS Adverse Incident

During the 8th round of the IRS campaign an adverse incident involving the death of a spray operator was reported. A spray operator by the name Etienne Ndayishimiye, aged 38 years, died in Karangazi Sector in Nyagatare district. The incident happened on 21st August at around 12:30pm as he was preparing to spray a 4th structure. Following the incident IRS activities were suspended immediately following consultation between USAID Rwanda and the MOH to pave way for investigations into the cause of death.

The following actions were undertaken:

- Examination of the deceased by medical experts and police was undertaken at Nyagatare district hospital.
- A technical team was set up by the Malaria Division of the Ministry of Health to investigate the cause of death.
- Analysis of insecticides procured for IRS was undertaken at 2 WHO accredited laboratories, the South African Bureau of Standards and the Centre Wallon de recherches Agronomiques, Belgium.
- Insecticide sample within the deceased's spray pump was sent to CDC Atlanta for analysis.
- Regular briefing meetings with the USAID mission and Abt home office and information sharing was conducted.

The results of the investigations conducted showed that the deceased SOP was sick given the fact that witnesses stated that he was shivering, sweating and showing excess fatigue the day before and the day of his death. IRS operations were resumed in the 3 target districts on the 17th September 2012 following concurrence by both the MOH and the USAID mission. Annex 7 provides summary of findings of the technical committee into the cause of death of the deceased. The results of the insecticide quality assurance analysis can be found in Annexes 2 and 3.

The AIRS Rwanda team learned the following lessons from this incident and put in place the following measures to ensure an incident like this does not occur again:

- Proper documentation and keeping of IRS records, including training attendance, temperature readings in insecticide stores, SOP medical examination results is critical.
- Ensure the SEA/ letter report is appropriately approved before commencement of IRS and adhere to mitigation measures spelled out in the EMMP.

- Ensure diligence in handling personal and environmental safety, including daily report on SOP health status by Team Leaders.
- Ensure SOPs have an appropriate accident and death insurance policy.
- Enhance SOP screening at recruitment, training and medical examination.
- Ensure that quality assurance analysis of insecticides is done before IRS commences.

Measures put in place following the incident:

- Daily report on the health status of the every SOP done daily through a checklist by team leaders.
- Ensure that each SOP is medically examined and fit to undertake IRS through supervision.
- If an SOP is identified as being unwell or unfit for spraying, he/she will be asked to sit out until they feel well again.

5. POST-SPRAY ACTIVITIES

5.1 Post Spray Review Meetings

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

- Review the overall IRS programmatic implementation process for the 2012 spray round experiences and achievements of the IRS spray 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 make recommendations for the next spray cycle
- Reach a consensus on the recommendations and way forward for next spray cycles

At the district level, 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. The sectors were awarded certificates in appreciation of their participation in the IRS activities. 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 November 21, 2012 to evaluate the achievements of the IRS operations. Participants were drawn from MOH (national and district levels), district administration (mayors' offices), district hospitals, media agencies, Abt Associates, PMI, REMA, RHCC, WHO, RDB and PSI.

Presentations at the review meeting covered the following topics:

- District malaria trends in the last 5 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
- Residual efficacy studies

The number of participants at the district meetings is described in Table 17 below.

Table 17: District and National Evaluation Meetings Participants

District/ National	Review Meeting Dates	Participants		Total
		Male	Female	
Bugesera	23 rd Oct 2012	47	23	70
Gisagara	24 th Oct 2012	48	23	71
Nyagatare	25 th Oct 2012	52	19	71
National	21 st Nov 2012	35	15	50
Total		182	80	262

Summary of recommendations coming from the district and national review meetings were:

- Reduce the period between structure enumeration and IRS operations
- Communicate the spray operation plan to the district/ local authorities at least 2 months before IRS operation
- Payment of IRS seasonal staff i.e.; (SOPs, Washers, Guards and IEC mobilizers) should be done within the specified period of two weeks and avoid delays
- SOPs should be retained for IRS operations for IRS quality and continuity
- Allocate days for mobilization depending on the geographical size of the village and number of structures to be covered to ensure that every house to be sprayed is reached
- Assign IRS operation sites based on the geographical size of the sector
- District authorities in IRS target districts should initiate discussion with counterparts in neighboring countries on cross border malaria control initiatives including IRS so as to reduce cross border malaria transmission.

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 insecticides and IRS wastes were taken to district storage facilities. Soak pits and their surroundings were well cleaned, covered and the doors securely locked. Abt Associates also 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 on October 26, 2012 at the Kanombe Military Hospital incineration plant whose combustion temperature is 1100 degrees Celsius. A total of 1,807.7 Kg of wastes was incinerated which comprised of 170,892 insecticides empty sachets and 51,556 used masks. Other wastes, including 360 pairs of worn-out boots, 4,091 used gloves, 24 damaged barrels and other plastic items were disposed of on November 1, 2012 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 on October 30, 2012 where they will decompose with time. After disposal, a certificate of disposal was issued (Annex 8).

5.4 Inventory

Following the completion of IRS operations, all of 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 18 below shows a summary of the remaining stock. See annex 9 for detailed inventory.

Table 18: Stock of IRS commodities

Item	Quantity Before the Campaign	Unit	Quantity Used	Remaining Stock after the Campaign
Coveralls	5,035	Piece	4,062	5,035
Boots	2,525	Pair	2,201	2,165
Helmets	2,444	Piece	2,009	2,218
Head gear	3,282	Piece	2,879	2,520
Inner part for helmets	4,727	Piece	3,852	2,654
Face shields	2,935	Piece	2,314	1,509
First Aid kits	280	Piece	135	145
Latex Nitrile Gloves	11,060	Pair	4,091	6,969
Respiratory masks	56,321	Piece	51,556	4,765
Spray Pumps	1,772	Piece	1,599	1,772
Sprayer Repair Kits	28	Kit	13	15
Nozzle Tips 8002E	1,364	Piece	875	489
Pump Hoses	15	Piece	10	5
Pressure Gauges	100	Piece	90	10
Extension Assembly	70	Piece	60	10
Deltamethrin sachets	366,877	Sachet	170,892	195,985

6. Monitoring and Evaluation

Monitoring and Evaluation for the 2012 IRS campaign closely followed the processes outlined in the 2012 AIRS Rwanda Work Plan and the M&E Concept Paper developed by the AIRS Core team. M&E activities, under the supervision of the COP, were led by the AIRS Rwanda M&E Manager and the Database Manager. Twenty nine data clerks were staffed across the three target districts to receive, verify, and enter enumeration and spray data within the project's required timeline. Data clerks were supervised by the M&E and Database Managers.

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 made revisions to the data collection tools to accommodate the few updates to the AIRS M&E system for the 2012 spray campaigns. A comprehensive Access database was developed by Abt's Client Technology Center for the Rwanda 2012 spray round and all M&E system updates were incorporated to ensure accuracy and consistency of data entry and reporting. The database served as a tool for implementation and management by tracking key performance and output indicators. This new and enhanced system helped M&E and technical staffs provide 'real-time' reporting, quick feedback and minimize errors in data collection through regular data quality assurance and data quality control, data entry and validation.

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 the forms before entering the data into the Access database. At the end of each day, data clerks transmitted data to the Database and M&E Managers. For quality control purposes and the timely generation of weekly client spray progress reports, all data were entered within 48 hours of spray. Daily Spray Operator (paper) Forms were filed and archived at the data centers. A daily electronic back-up of data was saved to the AIRS Rwanda server and to an external hard drive for data safety.

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. spray operators, team leaders, district coordinators, M&E Manager, Database Manager, etc.) Specific activities conducted to ensure data quality included:

Physical Data Verification:

- Spray Operator Level: 100% of spray data collected on spray operator forms were reviewed, arithmetically verified, and signed off by the team leader and the supervisor.

- District Level: Sector and district coordinators collected the Daily Spray Operator Forms from supervisors and checked the accuracy of the spray data. Afterward, the forms were transmitted to the data centers each evening.
- Data Entry Level: Data clerks reviewed each form for typos and transcription error and verified the arithmetic calculations on the spray forms before entering the data into the database.

Database Quality Control:

The Access database was developed to contain a series of rules (i.e. user locks and display error messages) that minimized the number of data entry errors. Data clerks also performed double-data entry, whereby they entered the totals line of each spray operator form for “real-time” or immediate reporting of spray progress and spray coverage. Thereafter, data clerks entered detailed data from the spray operator forms line-by-line (i.e. by structure), from which the End of Spray Report and all other official 2012 campaign reports were generated. Discrepancies between totals and detailed data were investigated and reconciled by the M&E or Database Manager whenever errors were found. If discrepancies were found that could not be addressed by the M&E and Database Managers, the district coordinator was contacted to examine the data collection issue. Thereafter, the corrections were made to the paper form and updated in the database.

Random Spot Checks

The M&E and Database Managers regularly conducted spot checks of paper forms at all three data centers and compared the forms with data entered into the database to assess data clerk performance. Additionally, the M&E team completed random field checks with other AIRS Rwanda supervisory staff, whereby random structures found by spray operators (per data collection forms filed at the data center) were visited and households interviewed about the spray campaign. The M&E Manager compared the data collected from the field visits with data collected by spray operators on the paper forms and addressed any discrepancies and rectified any issues with the appropriate AIRS staff.

6.4 IRS Results

During the 2012 spraying campaign, spray coverage was calculated based on the total number of structures sprayed (numerator) against structures found by spray operators (denominator). Data collected during enumeration served as targets for tracking spray progress and performance at both the sector and district level (figure 5).

During the spray campaign, spray operators found 242,589 structures, of which 236,610 (97.5% spray coverage) were sprayed. A total of 1,025, 181 people were protected, including 17,157 pregnant women and 160,399 children less than 5 years of age (Table 19). In total, 166,261 sachets of insecticide were used for the spray campaign where an average of 1.42 structures was sprayed per insecticide sachet.

Table 19: Summary of AIRS Rwanda Results in 2012

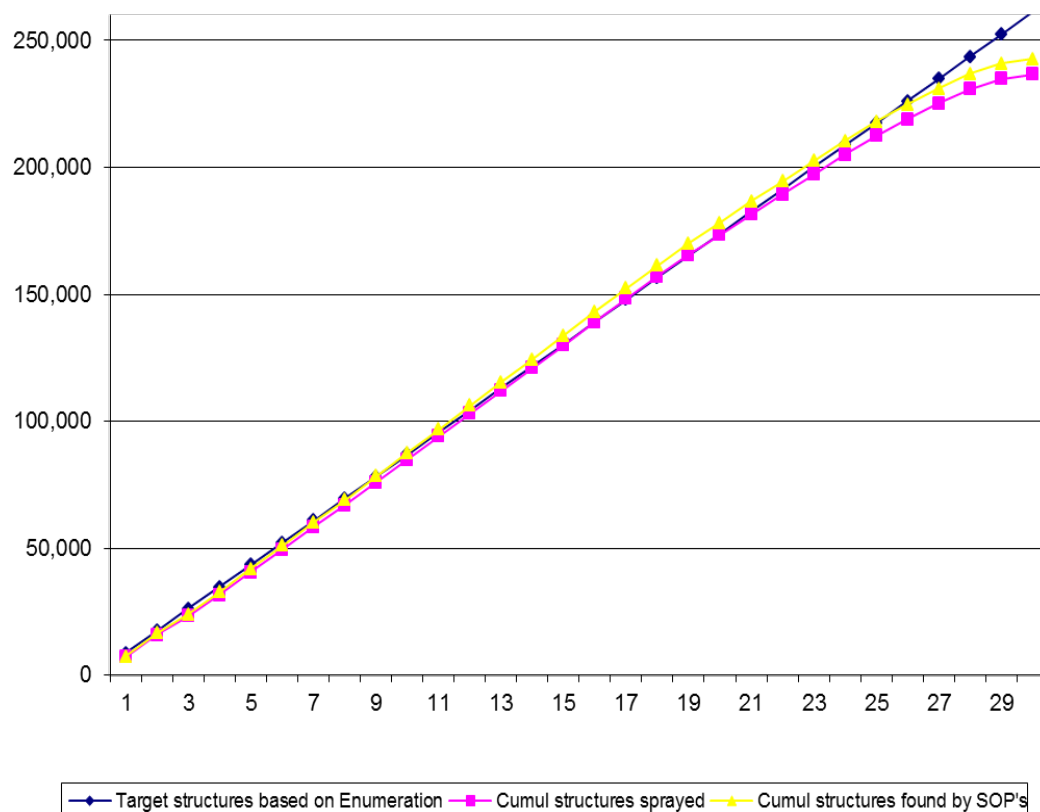
District	Total	Total	Spray	Total Population Protected	Insecticide	Average
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	Structures Found	Structures Sprayed	Coverage	Male	Female	Pregnant Women	Children <5 years	Sachets Used	Structures Sprayed per Sachet
Bugesera	77,687	73,575	94.7%	151,045	160,669	5,245	50,347	50,159	1.47
Gisagara	72,395	71,206	98.4%	139,114	158,226	4,351	47,553	51,858	1.37
Nyagatare	92,507	91,829	99.3%	203,241	212,886	7,561	62,499	64,244	1.43
Total	242,589	236,610	97.5%	493,400	531,781	17,157	160,399	166,261	1.42

IRS Daily Spray Progress Tracker

Figure 5 presents AIRS Rwanda daily spray progress over the 30-day campaign.

Figure 4: IRS Daily Tracker over 30 Operational Days



Insecticide-Treated Bed nets

The total number of insecticide-treated bed nets (ITNs) reportedly available in the households that were targeted for spray is 381,743 (Table 20). Among the 17,157 pregnant women protected by IRS, 14,470 (84%) reported they slept under an ITN the previous night when asked about their bed net use. And of the 160,399 children under five years of age protected, 128,722 (80%) were reported to have slept under an ITN the previous night.

Table 20: Insecticide treated bed nets Availability in Sprayed structures

District	ITN's Available	Reported ITN Use by Pregnant Women	Pregnant Women Protected by IRS	Reported ITN Use by Children <5	Children <5 Protected by IRS
Bugesera	109,836	4,427	5,245	40,142	50,347
Gisagara	118,708	3,775	4,351	38,978	47,553
Nyagatare	153,199	6,268	7,561	49,602	62,499
Total	381,743	14,470	17,157	128,722	160,399

Insecticide Usage

The total number of sachets used during Rwanda's 2012 campaign was 19,365. There were no sachets lost or damaged. On average, one sachet covered 1.42 structures (Table 21). The average number of sachets used by a spray operator per day was 5.2, and each operator sprayed on average 9.9 structures a day.

Table 21: Insecticide usage in the IRS spray round

District	No. Structures Sprayed	Total Sachets Used	Total Sachets Unused	Average No. Sachets per sprayed structure	Avg # sachets per SO per day
Bugesera	73,575	50,159	24,015	1.46	4.1
Gisagara	71,206	51,858	29,748	1.37	4.2
Nyagatare	91,829	64,244	33,624	1.43	4.3
Total	236,610	166,261	87,387	1.42	4.2

IRS Results for Special Institutions:

Police and Military Camps

In addition to the AIRS targeted structures mentioned above, AIRS Rwanda also sprayed prisons, and police and military camps located in 6 districts. All of the 6,710 structures which were found were sprayed. A total of 33,979 people were protected, including 132 were pregnant women and 273 were children under 5 years of age. In total, 5,796 sachets of insecticide were used for the spray campaign where an average of 1.16 structures was sprayed per sachet (Table 22).

Table 22: IRS Results for prisons and military camps

District	Structures Found	Structures Sprayed	Spray Coverage	Population Protected				Insecticide's Sachets Used	Average Structure Per Sachet
				Male	Female	Pregnant Women	Children Under 5		
Bugesera	440	440	100%	2039	66	22	44	445	0.99
Gasabo	2334	2334	100%	10785	369	20	4	1440	1.62
Kicukiro	2152	2152	100%	9099	872	74	212	2139	1.01
Kirehe	378	378	100%	1580	32	2	2	361	1.05

Nyarugenge	531	531	100%	3675	732	3	4	530	1.00
Rwamagana	875	875	100%	4308	422	11	7	881	0.99
Total	6,710	6,710	100%	31,486	2,493	132	273	5,796	1.16

Schools

A total of 36 school dormitories were sprayed in the 3 target districts and 12,714 people were protected. A total of 563 insecticide sachets were used to spray the schools (Table 23)

Table 23: IRS Results for School Dormitories

District	No. of Schools	Population Protected		Found Rooms	Sprayed Rooms	Mosquito Nets Available	Spray Coverage (by rooms sprayed)	Insecticide Sachets Used
		Male	Female					
Bugesera	10	4712	1768	1579	1578	1423	99.9%	221
Gisagara	20	2408	2830	140	137	5101	97.9%	311
Nyagatare	6	927	69	54	54	651	100.0%	31
Total	36	8,047	4,667	1,773	1,769	7,175	99.8%	563

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). This staffs were all given orientations on IRS supervisory activities.

The entomology surveillance site technicians received one week training. The technicians were trained on mosquito dissection techniques, determination of parity, data recording and reporting. An entomology planning meeting was also conducted to plan for the entomological activities. The entomological planning meeting convened sentinel site technicians, heads of the health centers which host the sentinel sites, staff from MOPDD and the Rwanda AIRS Technical Manager.

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 included training, wall bioassays, insecticide susceptibility, vector density and vector behavior assessments.

8.1 Entomology Training

As part of capacity building, a refresher training session was conducted to improve the skills of the entomology sentinel site technicians on anopheles morphological identification, ovary dissection and data reporting. The training was held at the Mashasha Health Centre in Rusizi district from 23-28 July 2012. The facilitators were drawn from MOPDD, Abt Associates and the RTI/IVM project. In collaboration with MOPDD, a national entomology planning meeting was held on 1-2 August, 2012. The aim of this meeting was to discuss the achievements made in entomological monitoring and deliberate on the way forward in consideration of the resources and opportunities at hand. The meeting convened sentinel site technicians, heads of the health centers which host the sentinel sites, staff from MOPDD and the Rwanda AIRS Technical Manager.

8.2 Wall Bioassays

Wall bioassays were conducted within one week of spraying to assess the quality of spraying in the three districts. Thereafter, further tests were conducted to assess the insecticide decay rate one month post-spray. The assays 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 average mortality rates ranged between 96.7% and 99.3% (1 week post-spray) and 91.7% and 95.8% (1 month post spray (Table 24).

Table 24: Wall Bioassay Results: One week & one month post spraying

District	Wall type	Total number of mosquitoes tested		Average % mortality ⁶		Average % control mortality	
		1 week post-spray	1 month post-spray	1 week post-spray	1 month post-spray	1 week post-spray	1 month post-spray
Gisagara	PP	120	120	98.3	91.7	0	3
	PNP	118	120	99.3	94.2	2	5
	Mud	120	120	99.3	93.3	2	3
Nyagatare	PP	120	120	99.0	95.8	2	3
	PNP	120	120	97.5	93.3	2	5
	Mud	120	120	99.0	91.2	0	0
	PP	120	119	95.8	90	2	3

⁶Abbot corrected mortality

Bugesera	PNP	120	120	96.7	94.2	2	2
	Mud	120	120	97.6	91.7	5	0

PP-Plastered & Painted; PNP- Plastered Not Painted

8.3 Vector density and Behavior

Vector collections were done prior to IRS to assess the vectors species, density and behavior in the three IRS districts using Human Landing Collections (HLC) and Pyrethrum Spray Catches (PSC). The collections were done before IRS (baseline) and one month later. The vectors collected were predominantly *Anopheles gambiae s.l.* and they showed varying levels of endophilic/exophilic behavior. The man biting rates (MBR) also varied across the sites, (Table 25).

Table 25: Baseline HLC and PSC results

District	Site	HLC						PSC	
		% Endophily		% Exophily		MBR (bites/person/night)		Average proportion of Anopheles per room	
		Baseline	1 month post-spray	Baseline	1 month post spray	Baseline	1 month post spray	baseline	1 month post spray
Bugesera	Mareba	44	44	56	56	5.4	3.6	0.47	0.39
	Ntarama	0	0	100	100	33.5	0.08	0.1	0
Nyagatare	Nyagatare	50	40	50	60	19.6	12.5	0.03	0.82
	Mimuli	17.9	42	82.1	58	14.0	70.2	0.27	1
Gisagara	Muganza	91	51.2	9	48.8	14.5	41.5	0.07	0.92
	Gishubi	58.3	31.1	41.7	68.9	29.1	18.8	0.1	0.84

9. CHALLENGES, LESSONS LEARNED AND RECOMMENDATIONS

9.1 Challenges

The main challenges experienced during the IRS campaigns included:

- Delays in determining the target districts caused a delay in the implementation of pre-spray activities. IRS activities require adequate lead times.
- The allocation of only one operation site per sector without taking into consideration the geographical area led to some spray teams to cover long distances hence reducing the daily spray output.
- The large number of mobilizer trainees versus trainer ratio compromised the quality of the IEC/ mobilizer training.
- Lack of coordination of mobilizer and spray operator teams in some sectors resulted in delays in covering the targeted numbers of structures.
- The spraying period coincided with the farm preparation season and this led to the unavailability of some household owners to prepare and make available their houses for IRS.
- There was some absenteeism among households because people were at the market, weddings or funerals resulted in some structures not being sprayed as planned.

- Refusals/reluctance by some householders to open their houses for IRS resulted from their ignorance of the role of IRS in malaria prevention.
- The temporary suspension of IRS operations following the death of a SOP led to an increase in expenditure and the need for enhanced mobilization.
- The online database could not provide real time data due to challenges in internet connectivity in the field.
- Poorly maintained vehicles, poor road networks and rainfall led to minor accidents.
- Non-adherence to established recruitment guidelines for SOPs and mobilizers by sector officials led to attrition during the IRS operations, hence affecting IRS operations.
- Sparsely located structures 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

- IRS activities need to be initiated early and with sufficient lead time to ensure adequate preparation of districts, hence determining target IRS districts early on is critical.
- It is important to ensure that the ratio of trainees per trainer is sufficient to ensure quality training for mobilizers.
- Local radio and door-to-door/ group mobilization are effective communication channels in sensitizing communities and ensuring acceptability of the IRS in the target districts. The IRS household brochure, though important for reminding community members how to prepare their homes before, during, and after spraying, is limited only to a small fraction of the population that is literate.
- Take advantage of the community work day (Umuganda) for community mobilization for IRS.
- There is need to engage the CHW Sector in-charges as sector IEC assistants in order to enhance coordination and acceptability of IRS.
- Regular information sharing and weekly feedback on spray performance with the district and sector officials improved acceptance and coverage by the AIRS project.
- Allocate the number of operational sites in the districts/ sectors based on geographic area to ensure smooth running of IRS operations.
- Ensure adequate training and sensitization of supervisors (district and sector officials) on their roles and responsibilities.
- Implement and adhere to IRS best practices in order to minimize incidents of adverse-effects.

10. LIST OF ANNEXES

Annex 1: 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: Quality Assurance Results of Deltamethrin WG 250 Samples, SABS

TEST REPORT



Bayer CropScience (Pty) Ltd
Attention: Mr Mark Edwardes
 PO Box 143
 ISANDO
 1600

PHARMACEUTICAL CHEMISTRY
 Your ref: O/N 4500509394
 Dated: 2012-08-29
 Our ref: 213864
 Enquiries: Penny Manganyi
 Tel: (012) 428 6373
 Date: 2012-09-20
 Report No: **2416/F1026PC**
 Page: 1 of 1

**K-OTHRINE 250g/kg WG
 RESULTS OF ANALYSIS**

Date received: 2012-08-31

Date commenced: 2012-09-09

Method used	Test performed	Requirement	Batch No. J10	Batch No. J11	Batch No. J12	Batch No. J13
Visual	Appearance	-	Beige/light brown course powder with weak odour			
CIPAC L	Deltamethrin content,g/kg	235 to 265	239	251	237	248
Method used	Test performed	Requirement	Batch No. J17	Batch No. J18	Batch No. K001	Batch No. K003
Visual	Appearance	-	Beige/light brown course powder with weak odour			
CIPAC L	Deltamethrin content, g/kg	235 to 265	237	246	247	248

Bongani Mahlangu: Test Officer

Penny Manganyi: Laboratory Manager

Fax No. +27 (11) 921 5754
 E-mail: mark.edwardes@bayer.com

1 Dr Lategan Road, Groenkloof, Private Bag X191, Pretoria, 0001. Tel +27 12 428 7911, Fax +27 12 344 1568

The test work relating to this report was performed by SABS Commercial (Pty) Ltd. This report and its test results relate only to the specific sample(s) identified herein. They do not imply SABS approval of the quality and/or performance of the item(s) in question and the test results do not apply to any similar item that has not been tested. (Refer also to the conditions of test printed on the back of this page.) This report may not be reproduced except in full. The authenticity of this report and its contents can be confirmed by contacting the person who signed it.

Annex 3: Quality Assurance Results of Deltamethrin WG 250 Samples, Belgium

Walloon Agricultural Research Centre, CRA-W, Gembloux, Belgium

3/12

PLANT PROTECTION PRODUCTS AND BIOCIDES PHYSICO-CHEMISTRY AND RESIDUES UNIT (U10)

Summary of the results

Test item

Name : K-Othrine WG 250.

Type of formulation : water dispersible granules (WG).

Active substance content (nominal concentration) : deltamethrin 25 % w/w or 250 g/kg.

Test	Method	Batch number	Initially	WHO Specification 333/WG (May 2008)	Conformity with the specification
Appearance	METDESCR visual method	AR1-DT 05737442 J011sa	Granules, dry, free-flowing, essentially non-dusty, and free from visible extraneous matter and hard lumps	Granules, dry, free-flowing, essentially non-dusty, and free from visible extraneous matter and hard lumps	Yes
		BR2-DT 05737442 J018s			
		CR1-DT 05737442 J013dw			
		CR2-DT 05737442 J012dw			
		CR4-DT 05737442 J018dw			
Deltamethrin content	CIPAC 333/WG/M/3	AR1-DT 05737442 J011sa	246.6 g/kg	250 ± 15 g/kg	Yes
		BR2-DT 05737442 J018s	248.2 g/kg		Yes
		CR1-DT 05737442 J013dw	246.6 g/kg		Yes
		CR2-DT 05737442 J012dw	251.3 g/kg		Yes
		CR4-DT 05737442 J018dw	251.1 g/kg		Yes

Conclusion : The 5 batches (AR1-DT 05737442 J011sa, BR2-DT 05737442 J018s, CR1-DT 05737442 J013dw, CR2-DT 05737442 J012dw and CR4-DT 05737442 J018dw) of the formulation K-Othrine WG 250 are compliant with the appearance and deltamethrin content clauses of the WHO specification 333/WG (May 2008).

Annex 4: Local Procurement

Description	Quantity / Number
IRS Transports	
Rented vehicles used in Micro-planning and logistic assessments	3
Rented Vehicles used in IRS implementation	92
Special Team Vehicles	7
IRS Supervision vehicles(Country Office)	3
Rented vehicles that facilitated the Post IRS activities	5
Printed materials	
SOP Forms	60,525
Team Leader Forms	18,758
IRS cards	519,000
Brochures	260,172
IEC Forms	45,116
Stock Cards	3,400
Delivery Note Books	100
Request Books	63
Goods Issued Note Books	258
Food vendors	
Gisagara District	6
Nyagatare District	6
Bugesera District	7

Annex 5: SOP training program 2012

Time	Item	Facilitator
Day 1		
08.00 - 09.00	Arrival and Registration	Supervisor
09.00 - 09.15	Opening Ceremony	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
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
Day 3 - 5	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 6: 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 7: Summary findings pertaining to the technical assessment of the death of SOP in Nyagatare District

Done by:

1. Dunia MUNYAKANAGE: MOPDD, Vector Control Assistant Director, Team leader
2. John RUZIGA: Abt Associates, Operations Manager
3. Vincent TUZINDE: Abt Associates, Spraying Operation Coordinator
4. Patrick Karakwende: IRS Side effects supervisor, Nyagatare District

This summary is based on the four hypotheses formulated during the joint preparation meeting between representatives of PMI-USID, Abt Associates and MOPDD-MOH:

1. The key findings

1.1. Health Problems:

Personal Health problems

- Results from IRS Medical checkup as per the guidelines are normal
- Observed shaking of hands while writing during training (As put forward by Sector Supervisor interviewed)
- Observed shaking of hands, sweating, appearing weak, not in jovial mood and smelling of alcohol during spray activities (As put forward by the owners of the structures sprayed on 1st and 2nd day during interview)
- Claimed fatigue and unable to take super at the end of first spraying day and slept earlier than usual (As put forward by the godson to the deceased)
- Previous history of epistaxis (Nasal bleeding) episodes in the last 3 years (As put forward by parents during interview)
- Depression episodes during the first four months after the death of his wife (As put forward by parents during interview)

Family Health Problems/Background

- Reported episodes of prolonged unconsciousness (lasting for about an hour) among the deceased's two children; daughter 13 yrs old and son 3 yrs old (As put forward by parents and close relatives during interview)
- Episodes of epilepsy among the deceased's two children; daughter 13 years old and son 3 years old (As stated by close friends relating to periods of unconsciousness during interview)
- Reported sudden death of a close relative recently (As put forward by Sector Social Affairs)
- Report that the deceased's wife committed suicide last year (As put forward by Sector Social Affairs)

1.2. Behavior

- Man of integrity and respectful in community (As put forward by Sector Social Affairs, close friends and Village Heads of the 2 villages during interview)
- He did not like eating food (As put forward by close friends)
- He was a frequent alcohol drinker (As put forward by close friends and Village Head)
- He was operating a bar with illegal liquors i.e.; Zebra Gin (As put forward by Village head and also evidenced by empty sachets of this liquor at deceased's trash bin (photos taken).
- Found with illegal liquor (Zebra sachet in his pocket) at the death scene

1.3. Chemical Used

- Insecticide used is K-Othrine WG 250 (20g) – Deltamethrin (Pyrethroid)

- Insecticide used was manufactured on July 2010 and will expire in July 2013
- The insecticide the deceased used was used by all the spraying teams
- The insecticide he used on Day 1 remained and he continued to use it on 2nd day
- No pump refilling was done on the 2nd day
- All the 5 sachets given to deceased on 2nd spraying day remained intact and unused (As reported on the SOP daily report card)
- The moment he died he had not yet started spraying the house in which he died
- No side effects reported in all 5 structures sprayed by deceased on day 1 and day 2
- No faultiness/breakdown reported with pump used by the deceased

1.4. Training

- The deceased underwent a 5 day SOP training from 13th – 17th Aug 2012
- He has participated in 3 IRS rounds previously in 2009 and 2010 and lastly in 2012

1.5. Performance

- He was wearing PPEs at all times during the spraying sessions
- He had a low spray coverage compared to his spray teammates; 1st day sprayed 3 structures and 2nd day sprayed 2 structures, which is considered low coverage compared to a daily average 8 structures per SOP.

2. Conclusions

The investigation team examined the information gathered and made the following conclusions:

- That he underwent the proper training for the current 2012 IRS operation and that he had previously been trained on IRS in 2009 and 2010. He skipped the 2011 which would be considered appropriate to avoid cumulative exposure to insecticide, if any.
- That there was no adverse effect reported on the use of insecticide (Deltamethrin) on him and that he used the PPE correctly at all times.
- That he was believed to drink illicit hard liquor in sachets and also sold it in his bar.
- That he often seen shaking and sweating which could have been as a result of the liquor on an empty stomach and could probably account for his low spray coverage.
- That there was a history of some underlying medical problems as reported on nose bleeding and loss of consciousness for extended periods each episode.
- That there was a family history of the same medical condition of losing consciousness reported with his two children (daughter and son aged 13 and 3 years respectively).

Recommendations:

- Medical checkups before the spray rounds should be comprehensive to cover individual and family health background so as to determine the health risks associated with the operations. (NMCP to agree on a format of the medical exam)
- Team leaders should continuously check health status of the SOPs in their team and this should be integrated into the team leaders checklist (Tell-tale signs of ill health to be developed)
- Since there was no reason to attribute the cause of death to the IRS operations, the suspension on the spraying imposed 10 days ago should be lifted as soon as possible so as to prevent malaria morbidity and mortality.
- Technical assessment Team should consider interviewing the Health Center and Community Health Workers Cooperative President in Karangazi Sector, his colleagues CHWs for more information on the deceased's performance.

Annex 8: IRS Wastes Incineration Certificate



**MEDICAL & ALLIED
SERVICES SOLUTIONS**

Medical and Allied Services Solutions (Mediasol), TIN No:102466123, PO Box: 3124 kigali,telephone:0787089000

TO WHOM IT MAY CONCERN

Date: 07/11/2012

Ref: 001/MEDIASOL/D/2012

RE: CERTIFICATE OF IRS SOLID WASTE INCINERATION

Client: Abt Associates, PoBox 5200 Kigali-Rwanda

This is to certify that 1,807.65 Kgs of IRS solid waste collected on 26/10/2012 and 30/10/2012
have been completely incinerated and destructed.

Kind regards.


Alfred MAZIMPAKA
Managing Director/MEDIASOL Ltd



Annex 9: Stock update

Category	Item	Initial Stock	New Procurement	Used	Equipment Damaged/ Needing Repair)	Usable Stock Remaining
PPE						
	Coveralls	5035	0	4062	0	5035
	Boots	2525	0	2201	360	2165
	Helmets	2405	39	2009	226	2218
	Gloves	10850	210	4091	0	6969
	Dust masks	8121	48200	51556	0	4765
	Raincoats	0	0	0	0	0
Spray Equipment						
	Spray pumps	1772	0	1599	0	1772
	Repair kits	8	20	13	0	15
	Nozzle gaskets	0	0	0	0	0
	Nozzle O-rings	0	0	0	0	0
	Nozzle tips	364	1000	875	0	485
	Strainers	0	0	0	0	0
	Cover gaskets	0	0	0	0	0
Insecticides						
Pyrethroid	Deltamethrin	92827	274050	170892	-	195985
Empty Sachets						
	Pyrethroid	0	0	170892	-	0