



U.S. PRESIDENT'S MALARIA INITIATIVE



RWANDA END OF SPRAY REPORT 2018

SPRAY CAMPAIGN:
SEPTEMBER 10 – OCTOBER 2, 2018

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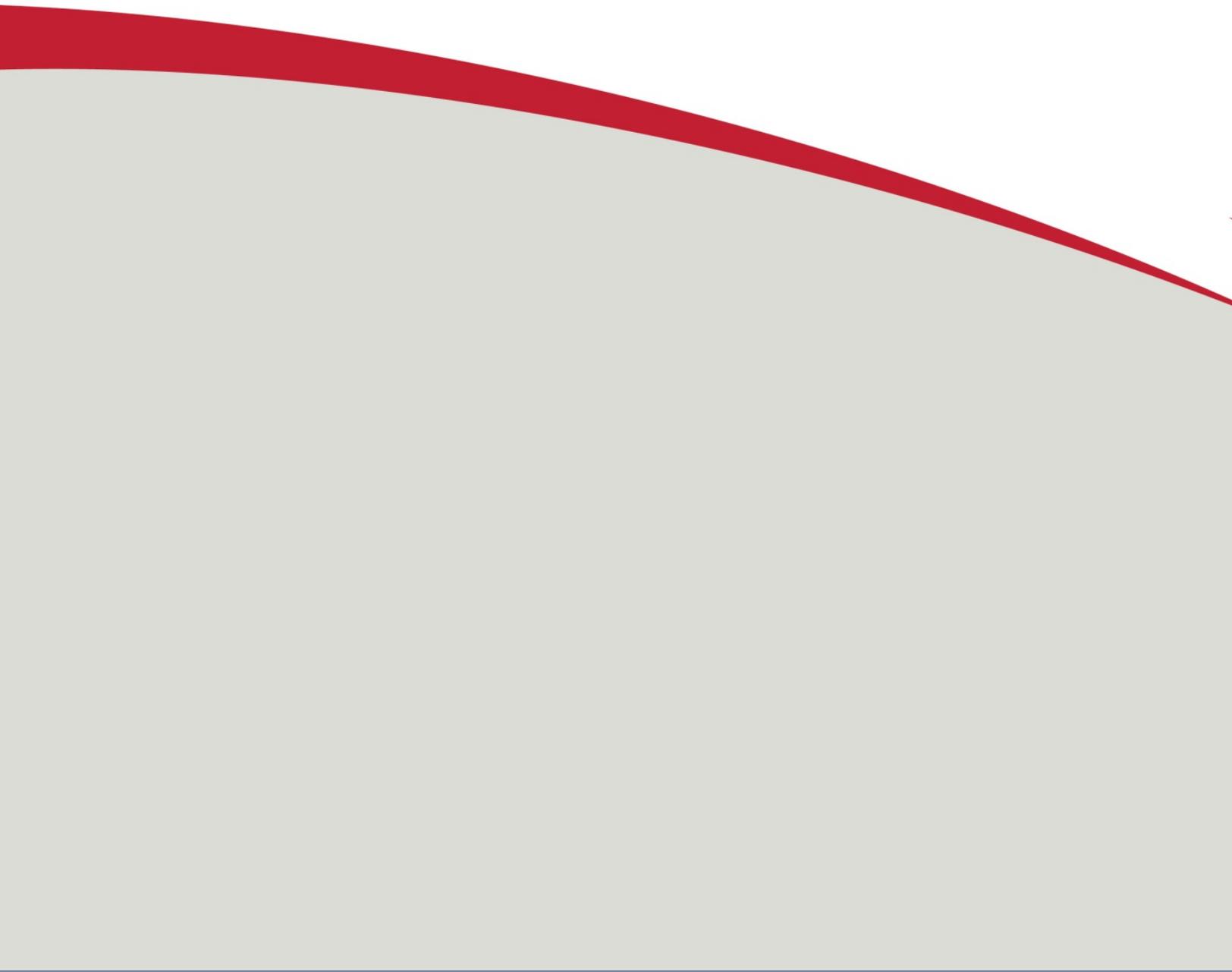
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ACRONYMS

AIRS	Africa Indoor Residual Spraying project
BMP	Best Management Practices
CFV	Control Flow Valve
CHW	Community Health Worker
CS	Capsule Suspension
CTC	Client Technology Center
DC	District Coordinator
DCV	Data Collection Verification
DOS	Directly Observed Spraying
ECO	Environmental Compliance Officer
EHS	Environmental, Health and Safety
EE	Error Eliminator
EMMR	Environmental Mitigation and Monitoring Report
IEC	Information, Education and Communication
IRS	Indoor Residual Spraying
M&E	Monitoring and Evaluation
MOH	Ministry of Health
MOPDD	Malaria and Other Parasitic Diseases Division
ODK	Open Data Kit
OM	Operations Manager
OP	Organophosphate
PMI	President's Malaria Initiative
PNP	Plastered and Not Painted
PP	Plastered and Painted
PPE	Personal Protective Equipment
RBC	Rwanda Biomedical Center
SBCC	Social and Behavior Change Communication
SEA	Supplemental Environmental Assessment
SOP	Spray Operator
SOP	Standard Operating Procedure
SOW	Scope of Work
TL	Team Leader

ToT	Training of Trainers
USAID	United States Agency for International Development
VC	Vector Control
VCM	Vector Control Manager
WHO	World Health Organization
WMP	Waste Management Plan

EXECUTIVE SUMMARY

The President's Malaria Initiative (PMI) has supported indoor residual spraying (IRS) in Rwanda since 2007 to reduce the burden of malaria, especially among pregnant women and children under the age of five years. Abt Associates has implemented the PMI spray program in Rwanda since 2011, under the Africa Indoor Residual Spraying (AIRS) and PMI AIRS projects. In September 2017, USAID/PMI awarded Abt a five-year follow-on to the AIRS project, the PMI VectorLink project, which implements IRS, enhanced entomological monitoring and integrated vector control services in countries worldwide, including Rwanda.

Like its predecessor projects, VectorLink seeks to limit exposure to malaria vectors and reduce the incidence and prevalence of malaria. To achieve this objective, the project conducted IRS from September 10 to October 2, 2018, in Rwanda's Kirehe and Nyagatare districts. It targeted 206,611 structures in 26 sectors in the two districts (12 sectors in Kirehe and 14 in Nyagatare) for blanket coverage using Actellic 300 Capsule Suspension (CS), an organophosphate (OP) insecticide.

The spray campaign lasted 20 operational days in each district (see Table ES-1). Below are the key project achievements and highlights.

VectorLink sprayed 208,026 out of 208,687 structures found by spray operators (SOPs) in the PMI targeted districts, accounting for a coverage rate of 99.7 percent. Included within this total are 173 dormitories in 28 schools in the two IRS target districts which were sprayed, protecting 9,047 people. In total, 840,773 people were protected, including 117,881 (14 %) children under five and 12,132 (1.4 %) pregnant women. Prior to the spray campaign, VectorLink Rwanda mobilized 213,627 structures.

Within Kirehe district, VectorLink Rwanda sprayed the Mahama refugee camp on September 30-October 2. The Ministry of Health provided the insecticide and VectorLink covered all operational costs including data entry management. Virtually all (6,776 of 6,780) structures and shelters found in the camp were sprayed, for a coverage rate of 99.9 percent (see Table ES-2). A total of 53,325 people were protected including 9,810 (18.4%) children under five and 1,328 (2.5%) pregnant women. VectorLink Rwanda also sprayed 173 dormitories in 28 schools in the two target districts, protecting an additional 9,047 people.

VectorLink Rwanda, using PMI funds, trained 4,762 individuals to implement IRS activities in the two districts. Of this number, 1,278 (520 males and 758 females) were SOPs, 301 (162 males and 139 females) were team leaders (TLs), and 2,494 (2,263 males and 231 females) were village Information, Education and Communication (IEC) mobilizers. The breakdown of trainees by gender shows that more than half (56.8%) of the SOPs and TLs trained were female. Overall, 28.9 percent (n=1,378) of all IRS personnel trained for the 2018 campaign were female.

VectorLink Rwanda used 163,215 bottles of insecticide to spray the 208,026 structures in the two PMI target districts, a utilization ratio of approximately 1:1.27 (bottles to structures sprayed). VectorLink Rwanda used 336 bottles of insecticide to spray 173 dormitories in Kirehe and Nyagatare.

VectorLink Rwanda incinerated all IRS contaminated waste (768 kg), including 34,864 used masks. Incineration took place at two incineration plants: Kirehe Hospital for waste from Kirehe and Nyagatare Hospital for waste from Nyagatare. A total of 163,551 empty insecticide bottles, 197 hard hats, 1,658 face shields, and assorted plastic items (damaged barrels, jerry cans, and basins) were sent to ROTASSAIRWA recycling plant. VectorLink Rwanda donated 13,629 uncontaminated cardboard boxes to Cards from Africa Company in Samuduha. It disposed of other uncontaminated waste at Enviroserve Rwanda Green Park (for used dried cell batteries), the Rwanda E-waste recycling facility at Bugesera, and the Nduba dumping site.

The cone wall bioassays that VectorLink Rwanda conducted within one week of spraying showed that the knockdown after 60 minutes ranged from 35 percent to 100 percent in both districts. Mortality rates of 100

percent were recorded on the three different wall surfaces of the structures tested during the week following spraying.

Assessment of the fumigant effect of Actellic within one week of spraying showed that the fumigant effect for exposed mosquitoes varied between 55 percent and 100 percent mortality after 24 hours.

TABLE-ES-1: VECTORLINK RWANDA 2018 IRS CAMPAIGN SUMMARY: KIREHE AND NYAGATARE DISTRICTS

Number of districts covered by PMI-supported IRS	2 districts (Kirehe and Nyagatare)
Insecticide	Actellic CS (OP)
Number of structures sprayed by PMI-supported IRS	208,026
Number of structures found by PMI-supported IRS	208,687
Spray coverage	99.7%
Population protected by PMI-supported IRS	840,773 (12,132 pregnant women; 117,881 children under 5 years old)
Dates of PMI-supported IRS campaign	September 10-October 2, 2018
Length of campaign	20 days
Number of people trained with USG funds to deliver IRS*	1,710 (758 males and 952 females)

Note: USG=U.S. Government

*Based on the PMI indicator definition, this indicator only includes SOPs, TLs, and supervisors. However, in Rwanda, the sector and district IECs are included since they participate in the training of trainers and provide some supervision during the spray campaign.

TABLE ES-2: VECTORLINK RWANDA 2018 IRS CAMPAIGN SUMMARY: MAHAMA REFUGEE CAMP

Number of districts covered by PMI-supported IRS	1 (Kirehe; specifically, Mahama Refugee Camp)
Insecticide	Actellic CS (OP)
Number of structures sprayed by PMI-supported IRS	6,776
Number of structures found by PMI-supported IRS	6,780
Spray coverage	99.9%
Population protected by PMI-supported IRS	53,325 (1,328 pregnant women and 9,810 children under 5)
Dates of PMI-supported IRS campaign	September 30-October 2, 2018
Length of campaign	3 days
Number of people trained with USG funds to deliver IRS	N/A*

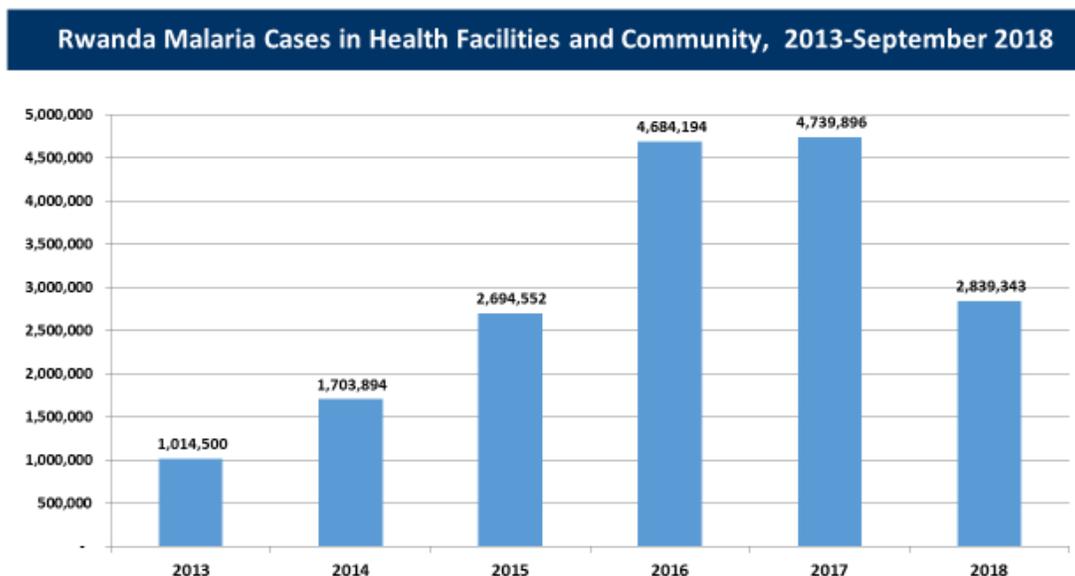
*The project did not need to engage additional personnel to spray the Mahama refugee camp as it used workers trained to support the Kirehe spray campaign.

I. BACKGROUND

Rwanda covers an area of approximately 26,338 square kilometers and has a population of approximately 12 million.¹ The entire population is at risk of malaria, including an estimated 1.8 million children under five years and 450,000 pregnant women.² Malaria is endemic in Rwanda, with the Eastern and Southern provinces accounting for over 60 percent of the disease burden. In the remaining parts of the country, malaria remains unstable. Climate and altitude are major factors that influence malaria prevalence in the country. Other contributors are: population density, population movement (especially from areas of low to high transmission), irrigation schemes (especially in the eastern and southern parts of the country), and cross-border movement (especially in the eastern and southeast parts of the country).

In the fight against malaria, Rwanda has significantly reduced the malaria burden over the past decade. In 2005, malaria was the primary killer of children under five. By 2008, malaria prevalence in that age group had decreased by over 50 percent; by that year, it had dropped to third place and by 2011 to eleventh place as a killer of children under five. Nevertheless, malaria incidence overall increased from 1,014,500 reported cases in 2013 to 4,739,896 in 2017. The increase in malaria cases was observed in all provinces but the largest increases were recorded in the Eastern and Southern provinces.³ The Rwanda Bio-Medical Center (RBC)/Malaria and Other Parasitic Diseases Division (MOPDD) of the Rwanda Ministry of Health (MOH) therefore chose to target malaria control interventions on these areas, as articulated in the Rwanda Strategic Plan for Insecticide Resistance Management in Malaria Vectors (2013-2017) and the Rwanda Extended National Strategic Plan 2013-2020.

FIGURE I: MALARIA CASES IN RWANDA HEALTH FACILITIES AND COMMUNITY, 2013-SEPTEMBER 2018



¹ <http://www.worldometers.info/world-population/rwanda-population/>

² 2012 Population and Housing Census, Nov 2012

³ Rwanda Extended National Strategic Plan 2013-2020

Indoor residual spraying (IRS) is one of the malaria control strategies used in Rwanda since 2007. Declining malaria incidence since 2008 in some districts prompted adjustments from blanket IRS coverage to targeted spraying in high-risk areas. Over time, the RBC/MOPDD in collaboration with the President's Malaria Initiative (PMI) reverted back to blanket coverage because of increases in malaria caseloads.

The September-October 2018 spray campaign was the eighteenth round implemented since IRS started in Rwanda. In this spray campaign, VectorLink Rwanda blanket sprayed two districts, Kirehe (12 sectors) and Nyagatare (14 sectors). A total of 206,611 structures were targeted for spraying. The project also provided technical support in the following activities:

- Daily and weekly monitoring of the VectorLink Rwanda program via supervision of data collection and data entry using the VectorLink monitoring and evaluation (M&E) supervisory tools;
- Logistics assessment and coordination of all procurement, shipping, delivery, and storage of spray pumps, spare parts, insecticides, and personal protective equipment (PPE);
- Safe and correct insecticide application to minimize human and environmental exposure to IRS insecticides, in compliance with the Safer Use Action Plan portion of the Supplemental Environmental Assessment;
- Coordination of information, education, and communication (IEC), sensitization, and mobilization activities with other stakeholders to raise awareness and acceptance of IRS and to encourage ownership;
- Entomological monitoring, including assessing malaria vector density and species composition in intervention areas, establishing vector feeding time and location, monitoring the quality of insecticide application and insecticide decay rates, and assessing vector susceptibility and mechanisms of resistance;
- Training of sentinel site technicians in entomological techniques;
- Promotion of cost efficiency through due diligence and efficiency of operations; and
- Technical assistance to MOH/MOPDD during spray activities in Gatsibo and Bugesera districts and the Mahama Refugee Camp in Kirehe district.

Spray campaigns implemented by VectorLink Rwanda since 2012 are summarized in Table 1.

TABLE I: SPRAY CAMPAIGNS SUPPORTED BY PMI RWANDA SINCE 2012

Year	Month	Number of Districts	Structures Sprayed	Population Protected	Insecticide Used
2012	Aug/Sep	3	236,610	1,025,181	Pyrethroid
2013	Feb/Mar	3	121,154	522,315	Pyrethroid
	Sep/Oct	3	224,708	957,027	Pyrethroid/ Carbamate
2014	Feb/Mar	3	123,919	512,789	Carbamate
	Sep/Oct	3	173,086	705,048	Carbamate
2015	Feb/Mar	2	127,150	517,194	Carbamate
	Sep/Oct	4	215,981	889,326	Carbamate
2016	Feb/Mar	2	144,947	618,696	Carbamate
	Sep/Oct	2	198,970	812,714	OP
2017	Sep/Nov	3	231,258	919,735	OP
2018	Sep/Oct	2	208,026	840,773	OP

OP=organophosphate

2. PRE-SEASON ACTIVITIES

2.1 SELECTION OF IRS DISTRICTS AND SECTORS

VectorLink Rwanda in collaboration with the MOPDD and PMI designated two districts, Kirehe and Nyagatare, for district-wide IRS in the September 2018 spray campaign (see Figure 2). The selection was based on the malaria burden reported in epidemiological data from health facilities. VectorLink Rwanda targeted 206,611 structures for spraying, which would protect a total population of 813,177 (Table 2).

FIGURE 2: MAP OF RWANDA SHOWING THE TWO IRS TARGET DISTRICTS

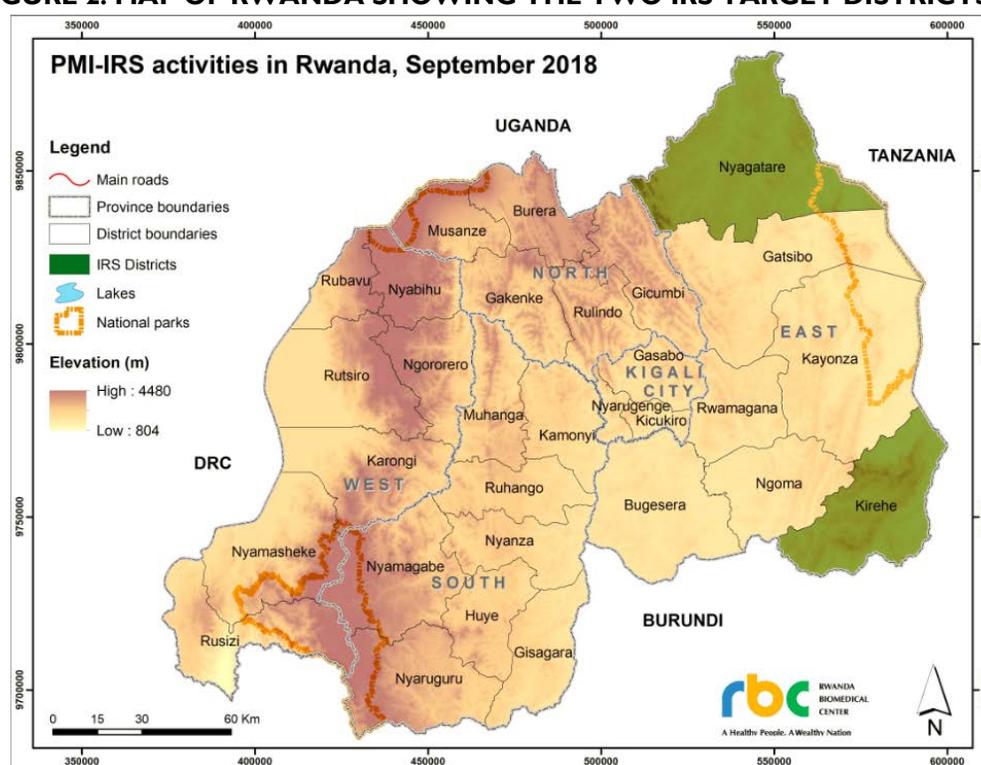


TABLE 2: TARGETED STRUCTURES AND POPULATION FOR THE 2018 SPRAY CAMPAIGN

District	Number of Sectors	Number of Targeted Structures	Targeted Population		
			Female	Male	Total
Kirehe*	12 of 12	87,859	181,716	168,113	349,829
Nyagatare	14 of 14	118,752	239,215	224,133	463,348
Total	26 of 26	206,611	420,931	392,246	813,177

* These numbers do not include Mahama Refugee Camp, because it was not part of the original Rwanda work plan.

2.2 DISTRICT PLANNING MEETINGS

Following the MOH's decision to do blanket coverage of the two districts, VectorLink Rwanda deepened its collaboration and coordination with stakeholders. In July 2018, the project held one-day micro-planning meetings in each of the districts to discuss and develop an IRS operational plan and to agree on the roles and responsibilities of each partner. The MOPDD facilitated invitations to counterparts from local (district and sector) government, district hospitals, and health centers; and a total of 52 persons (41 males and 11 females) participated in the two meetings. Among the issues discussed were recruitment of IRS seasonal staff, roll-out of the IRS Walk to Work Strategy, field simulation trainings for spray operators (SOPs), and supervision at the sector level. The MOPDD/MOH endorsed the support expected from the local government counterparts in each district. The full agenda comprised the following issues:

- Criteria for SOPs and mobilizers selection/recruitment;
- IEC/community mobilization plan for IRS and mobilization strategy;
- Community leaders' involvement;
- Identification of operational sites and storage space for IRS materials at the operational sites;
- 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;
- IRS Walk to Work Strategy;
- Mobile money payment system;
- SOPs' field simulation training; and
- Participation in weekly meetings at the sector level.

Also during the meetings, the appropriateness of IRS operational sites was reviewed, discussed, and agreed upon. Each sector with more than 60 SOPs and at a long distance from the operational sites was split into two operational sites. Eight sectors (in both targeted districts) were divided this way, making for a total of 34 operational sites in the districts' 26 sectors.

2.3 INSECTICIDE SELECTION

VectorLink Rwanda used Actellic 300 CS, an organophosphate (OP) class insecticide, during the 2018 IRS campaign. This was the third spray round in which this chemical was used in both districts. VectorLink Rwanda based its selection on data from insecticide susceptibility assays in 2018. The assays showed that the predominant local vector species (*Anopheles gambiae* s.l.) exhibited varying levels of susceptibility to the different classes of insecticides. In the IRS target districts sites, use of the OP insecticide produced a vector mortality rate of 100 percent.

To manage insecticide resistance, specifically to pyrethroids, Rwanda decided in its National Strategic Plan for Insecticide Resistance Management in Malaria Vectors (2013–2017) to biannually rotate the type of insecticide to be sprayed. The plan stated that spraying with a pyrethroid should be phased to a carbamate for two years followed by an OP (pirimiphos-methyl, Actellic 300 CS) for two years. The switch to carbamates began in September 2013 in only one district. AIRS Rwanda fully implemented the use of carbamates in all IRS districts starting in February 2014 and continued rotating in the subsequent IRS campaigns, up to and including the September 2017 IRS campaign (see Annex A, MOH Letter on Insecticide Choice for 2016/2017, and Annex A, Insecticide Resistance Tests Results). In 2019, once susceptibility results from testing new molecules is available and the Ministry of Health issues a letter recognizing Fludora Fusion as new type of insecticide, the project will propose the use of Fludora Fusion in the 2019 work plan.

2.4 LOGISTICS NEEDS AND PROCUREMENT

The central VectorLink Rwanda warehouse at the Kicukiro Small Scale Industrial area in Kigali served as the hub for storage of IRS commodities, including insecticides before they were distributed to the target districts. VectorLink Rwanda reviewed the inventory records from the previous IRS campaign and assessed logistics needs in April-May 2018, including:

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

2.4.1 INTERNATIONAL PROCUREMENT

Internationally procured commodities included 167,028 bottles of OP insecticide (Actellic 300 CS) from Syngenta and other IRS commodities. Table 3 shows the items and quantities VectorLink Rwanda procured internationally.

TABLE 3: INTERNATIONAL PROCUREMENTS

Description	Unit	In Stock Before Campaign	Received	Total	Disposed Of	In Stock After Campaign
Insecticide (Organophosphates, Actellic 300 CS)	Bottle	0	167,028	167,028	163,552	3,476
Dust Mask	Piece	8,514	34,560	43,028	34,988	8,040
Man Portable First Aid Kits	Piece	51	48	99	83	16
Face Shields Visor	Piece	276	1850	2,126	1,658*	468
Lance for X-pert Pump	Piece	100	100	250	0	250
Hose for Hudson X-pert Pump, with Thrustless Shutoff and Strainer Assembly	Piece	135	50	185	101	84
Hudson Tip-Jet 8002 E Nozzle (Ceramic Nozzles)	Piece	200	100	300	0	300
Apron	Piece	118	50	168	75*	93
Afripads	Piece	0	1100	1100	1100	0
Standard Nitrile Glove (Long)	Pair	1,629	648	2,277	1,213*	1,064
Nitrile Glove (Full Arm Length)	Pair	179	18	197	71*	126

2.4.2 LOCAL PROCUREMENT

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

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

Please see Annex C for the detailed list.

2.4.3 MATERIAL DISTRIBUTION TO THE DISTRICT AND OPERATION SITES

VectorLink Rwanda kept IRS materials, such as coveralls, boots, helmets, gloves, masks, and pumps, in Kirehe and Nyagatare district storage facilities after the 2017 spray campaign. It distributed additional materials to district warehouses to meet additional needs. Other items including respiratory masks and gloves were distributed from the central warehouse to Kirehe and Nyagatare districts stores in August 2018. Insecticide was distributed to Kirehe and Nyagatare in September 2018. VectorLink Rwanda based distribution of materials to the 34 operational sites on the number of target structures for spraying and the number of support staff.

2.5 HUMAN RESOURCE REQUIREMENTS FOR SEASONAL STAFF

Table 4 lists the seasonal support staff, broken down by gender, who were recruited and deployed by VectorLink Rwanda for the 2018 spray campaign.

TABLE 4: SEASONAL IRS STAFF HIRED

Staff Position	Total		Total	% Females Hired
	Male	Female		
District IEC Assistants	1	1	2	50.0%
Data Clerks	14	5	19	26.3%
M&E Assistants	0	2	2	100.0%
Data Cleaners	2	0	2	0.0%
District Storekeepers	2	1	3	33.3%
Sector Storekeepers	9	25	34	73.5%
Logistics Assistants	1	2	3	66.7%
Finance Assistants	2	1	3	33.3%
Sector Coordinators	24	10	34	29.4%
Sector Supervisors	20	14	34	41.2%
Sectors IEC Assistants	19	15	34	44.1%
Spray Operators	488	729	1,217	59.9%
Team Leaders	157	144	301	47.8%
Cell IEC Mobilizers	113	53	166	31.9%

Staff Position	Total		Total	% Females Hired
	Male	Female		
Village IEC Mobilizers	2,263	231	2,494	9.3%
Security Guards	69	3	72	4.2%
Washers	40	73	113	64.6%
Pump Technicians	2	2	4	50.0%
Cleaners	2	1	3	33.3%
Total	3,228	1,312	4,540	28.9%

Selection criteria for SOPs and team leaders (TLs) were as follows:

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

All SOP and TL candidates had to pass a medical examination in their respective district hospitals to ensure that they were medically and physically fit to perform IRS activities. In addition, the hospitals screened for pregnancy all female candidates who might be exposed to insecticide; they included SOPs, TLs, storekeepers, sector supervisors, and sector coordinators.

The medical exam found nine women to be pregnant. VectorLink Rwanda assigned these women to cell IEC mobilizer positions, which would not expose them to insecticide.

As Table 4 (above) shows, the percentage of female SOPs is high relative to other cadres of seasonal staff because SOPs are recruited from the CHW pool at the village level, and two of the three CHWs in each village are female. In addition, the project employed three female security guards and two female spray pump technicians; these roles have historically been held by men. However, the overall gender distribution of the workforce was greatly impacted by the very low percentage of IEC mobilizers who were women, and the total lack of female drivers. This is because women still tend to perceive those local government roles and driving responsibilities as men's roles because they require more hours and even working at night.

2.6 IRS TRAINING

VectorLink Rwanda identified suitable training sites. In addition, it reviewed the IRS training curricula and training materials and condensed the curricula for the training of trainers (ToT) and SOPs from five to three days. This was done in great part because 2018 seasonal support staff had previous IRS experience.

2.6.1 TRAINING OF TRAINERS

In collaboration with the MOPDD, VectorLink Rwanda organized and conducted a three-day refresher ToT on August 20-22, 2018. The MOPDD opened the ToT and facilitated some of the sessions, including introduction to malaria control and management of adverse effects. Although most participants had completed the ToT for previous IRS rounds, it was worth having them repeat because the training approach had been modified to strengthen skills in handling the OP insecticide (Actellic 300 CS) and other aspects of IRS implementation based on lessons learned during the 2017 spray campaign. The ToT emphasized insecticide mixing, use of the control flow valves (CFVs), spraying techniques, full roll-out of IRS Walk to Work Strategy, field simulation for SOPs, data collection and reporting, and supervision. A session on the

new incident reporting requirement was introduced to explain the standard procedures for IRS incident reporting, highlighting incident category and priority levels.

A session on mobile phone supervision highlighted m-Health and Open Data Kit (ODK) application functionalities, such as daily reporting for performance monitoring tracking and mobile application supervisory checklists.

The ToT also incorporated TL training on: a) how to facilitate TL trainings at sector levels, especially on supervision of spray techniques, b) team leadership skills, c) how to use the Directly Observed Spraying (DOS) checklist in supervising the spray quality, and d) how to provide feedback to the SOPs after supervision.

The training consisted of both theory and practical sessions, including group discussions, demonstrations, lectures, and question-and-answer methods. The participants included 34 IRS sector coordinators and 61 IRS sector supervisors, 34 IEC assistants, and two district IEC Mobilizers. After the ToT, the participants were commissioned to different training sites in the IRS target districts to conduct IRS training for SOPs and TLs. VectorLink Rwanda based the number of trainers on the number of training participants at each training site. The number of trainers trained is shown in Table 6.

TABLE 5: TOT PARTICIPANTS BY GENDER

IRS Role	Number of Participants		Total
	Male	Female	
Sector Coordinators	24	10	34
Sector Supervisors	32	29	61
Sector IEC Supervisors	19	15	34
District IEC Supervisors	1	1	2
Total	76	55	131

2.6.2 SPRAY OPERATOR AND TEAM LEADER TRAINING ON SPRAY OPERATIONS

VectorLink Rwanda organized and conducted the SOP and TL trainings on September 4-7, 2018, in Kirehe and Nyagatare districts (see Figure 3). As noted above, the training days were reduced from five to three because most SOPs and TLs had IRS experience. The decrease in training days represented \$14,852 in cost savings. The major objective of the training was to equip the SOPs and TLs with the skills to conduct a high-quality IRS campaign.

The trainings were conducted in close collaboration with district and sector authorities. VectorLink Rwanda rented two sites in Nyagatare district (Mimuri and Nyagatare). Sector authorities provided all training venues free of charge for 12 in Nyagatare and 12 in Kirehe.

FIGURE 3: IRS TOT WALL PRACTICE TRAINING SESSION



The SOPs and TLs attended an intensive three-day theory and practical training (see Annex E). The practical training included:

- Introduction to malaria control;
- TL spray responsibilities;
- Giving and receiving constructive feedback;
- Using the DOS checklist in supervising the spray quality;
- Spray techniques and use of CFVs;
- Handling and managing insecticides including steps of insecticide mixing;
- Handling and maintaining spray pumps;
- Personal and environmental safety;
- IRS Walk to Work Strategy;
- SOP field simulation training;
- Data collection and filling out of data collection forms; and
- Basics of IEC for IRS.

VectorLink Rwanda trained 1,278 SOPs and 301 TLs (Table 6) using 131 facilitators (who had attended ToT) to conduct the training. See Annex D for a detailed SOP program.

TABLE 6: SOPS AND TLS TRAINED TO IMPLEMENT IRS

District	Training Sites	Spray Operators Newly Trained			Spray Operators Previously Trained			Facilitators		
		Male	Female	% Female	Male	Female	% Female	Male	Female	% Female
Kirehe	12	6	25	80.6%	297	345	53.7%	39	24	38.1%
Nyagatare	14	66	135	67.2%	313	392	55.6%	37	31	45.6%
Total	26	72	160	69.0%	610	737	54.7%	76	55	42.0%
		232			1,347			131		

2.6.3 TEAM LEADER TRAINING ON SUPERVISING SPRAY OPERATIONS

VectorLink Rwanda also conducted a one-day TL training in all operational sites in both spray districts on September 7, to build TL capacity and skills to correctly perform their supervisory roles.

Sector coordinators and supervisors who were trained during the ToT sessions facilitated this TL training. The training covered the following key topics:

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

VectorLink Rwanda trained 301 TLs in the two IRS target districts (see Table 7).

TABLE 7: TLS TRAINED BY GENDER

District	Male	Female	Total
Kirehe	75	52	127
Nyagatare	87	87	174
Total	162	139	301

2.6.4 DATA COLLECTION TRAINING

On August 20-22, 2018, the VectorLink Rwanda team, led by the M&E and Database Managers, facilitated data collection training sessions during the ToT for sector coordinators, supervisors, and sector IEC assistants. They also facilitated the data collection training for SOPs, TLs, IEC mobilizers, and data entry clerks. The training focused on the following key topics:

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

2.6.5 LOGISTICS TRAINING

VectorLink Rwanda trained all staff involved in logistics and storekeeping during IRS implementation. Sector coordinators, sector supervisors, and IEC assistants received training on basic skills in logistics and store management during the ToT sessions. VectorLink Rwanda conducted a comprehensive one-day training for 40 logistics assistants and storekeepers (12 males and 28 females) on the following topics:

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

- Environmental compliance; and
- Understanding and preparing for post IRS activities.

Table 8 shows the number of logisticians and storekeepers trained by gender per district.

TABLE 8: LOGISTICIANS AND STOREKEEPERS TRAINED BY GENDER PER DISTRICT

District	Male	Female	% Female
Kirehe	7	12	63%
Nyagatare	5	16	76%
Total	12	28	70%

2.6.6 FIRE, TRANSPORTATION, AND SECURITY TRAINING

Seventy-two security guards received an orientation on fire security and general security protocol for IRS stores. Fifty-five IRS drivers received an orientation on transporting SOPs to and from the field, safety procedures while transporting insecticides, and, in particular, what to do if an accident causes an insecticide spill, and the use of first aid kits.

3. INFORMATION, EDUCATION, AND COMMUNICATION

VectorLink Rwanda collaborated with the MOPDD and district and sector authorities to train implementers in using diverse and effective approaches and channels of communication to sensitize and mobilize communities.

3.1 TRAINING

3.1.1 TRAINING OF TRAINERS

VectorLink Rwanda collaborated with the MOPDD on a one-day ToT on mobilization in Kigali on August 22, 2018. The first objective of the training was to strengthen participants' knowledge and capacity to train and disseminate IEC and behavior change communication messages to IEC community mobilizers. The ToT aspect of the training guided the participants on how to train IEC mobilizers at the cell and village level. The second objective was to plan, coordinate, and supervise IRS-related IEC activities. The training had both theory and practical sessions, including mock IRS mobilization and the completion of data collection tools. The training also covered how to develop and update a community mobilization plan. Finally, it laid out the key messages to be communicated to IRS beneficiaries on the strong smell of the OP insecticide that has been used since September 2016, to mitigate potential resistance to cooperating with spray teams. The MOPDD facilitated the following sessions: introduction to malaria, malaria prevention and control interventions, the malaria burden in Rwanda, and mosquito characteristics.

A total of 131 people (76 males and 55 females) participated in this training. They included two district IEC assistants, 34 sector IEC assistants, 34 sector coordinators, and 34 sector supervisors.

3.1.2 TRAINING OF IEC COMMUNITY MOBILIZERS

VectorLink Rwanda held one-day sector-level IEC mobilization trainings on August 29, 2018 in Kirehe and Nyagatare districts. The trainees were village and cell leaders whom VectorLink Rwanda had recruited based on the following criteria: a cell or village leader and/or in charge of security at the village level, good conduct, respectable, able to read and write, and known by the community. Sector IEC assistants, sector coordinators, and sector supervisors did the actual training while district IEC assistants and VectorLink Rwanda staff provided overall coordination. The training presented the basics of malaria control and IRS, and how to:

- Identify eligible structures for IRS in the two targeted districts;
- Promote understanding and acceptance of IRS by educating the community about the purpose of the IRS campaign;
- Inform beneficiaries about the benefits of IRS;
- Address common myths and misconceptions about IRS;
- Explain the use of insecticide (Actellic 300 CS) and how to address any resistance they encountered from beneficiaries because of the strong smell of the insecticide;
- Discuss with structure owners their role before, during, and after spray operations to ensure a safe and successful IRS campaign; and

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

VectorLink Rwanda trained 2,660 mobilizers (284 females and 2,376 males) at the cell and village level. Each sector and cell team also developed an individual community mobilization implementation plan. Table 9 shows the number of mobilizers VectorLink Rwanda trained by district.

TABLE 9: IEC MOBILIZERS TRAINED TO IMPLEMENT IRS

District	Number of IEC Mobilizers Trained				TOTAL	% Females Trained
	Cell		Village			
	Male	Female	Male	Female		
Kirehe	40	20	1,102	108	1,270	10.1%
Nyagatare	73	33	1,161	123	1,390	11.2%
Total	113	53	2,263	231	2,660	10.7%

3.2 DOOR-TO-DOOR MOBILIZATION

VectorLink Rwanda conducted two days of door-to-door mobilization of structures in each targeted village sprayed in Kirehe and Nyagatare districts between September 10 and October 2, 2018. The trained IEC mobilizers presented IRS messages to the owners of eligible structures and distributed IRS structure cards to those who had lost or never received the cards. The mobilizers also collected data using the IEC Mobilizer form and communicated the dates of spraying to the structure owners. They marked the outside doors with the IRS structure number on the IRS card issued to that structure (Figure 4). Sector IEC assistants, with support from the sector and cell social affairs officers, oversaw the implementation of this activity. They also reviewed the data collected and IRS cards issued to the structures to ensure accuracy and completeness.

FIGURE 4: HOUSE MARKING OF ELIGIBLE STRUCTURE DURING MOBILIZATION “Y”



VectorLink Rwanda mobilized 213,627 structures with a 99.1 percent IRS acceptance rate overall. Table 10 breaks down the results of the mobilization activity.

TABLE 10: RESULTS OF IRS MOBILIZATION

District	Structures Sensitized	Adults Reached with IRS Messages		Structures Accepting IRS	% Structures Accepting IRS
		Male	Female		
Kirehe	91,523	86,234	106,421	90,439	98.8%
Nyagatare	122,104	123,187	143,836	121,213	99.3%
TOTAL	213,627	209,421	250,257	211,652	99.1%

3.3 IEC COORDINATION

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

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

3.4 OTHER IEC ACTIVITIES

3.4.1 IRS LAUNCH

VectorLink Rwanda organized a walk for IRS during the official launches of IRS operations in both Kirehe and Nyagatare districts in September 2018. Among the participants were: district, sector, cell and village authorities and representatives from schools, health facilities, the armed forces (army and police), (private sector) businesses, the media, and communities. Refugee representatives from the Mahama refugee camp in Kirehe also took part. The launch events were broadcast on Rwanda national radio, and they made evening news headlines on two major television stations, Rwanda Television and TV10.

FIGURE 5: LAUNCH ACTIVITIES IN THE SPRAY DISTRICTS



SOPs march during IRS launch in Nyagatare district (left). Kirehe Mayor and other district officials witness mixing of insecticide during IRS launch in Kirehe district.

3.4.2 COMMUNITY MOBILIZATION BY LOCAL LEADERS

Early advocacy and engagement by both VectorLink Rwanda and the MOPDD convinced local leaders to actively participate in mobilization activities. Sector executive secretaries, social affairs officers, and head of health centers helped supervise IRS activities and occasionally accompanied IRS teams to mobilize communities, especially where there was resistance. The cell social affairs officers supervised the mobilization activities in their respective cells. In past spray campaigns, VectorLink Rwanda experienced refusals at district centers. This did not happen in the 2018 spray campaign because all district and sector authorities, including all health facilities, actively participated in community mobilization.

Additionally, during micro-planning meetings, VectorLink Rwanda together with local leaders strategized to start mobilization and spraying in urban centers so that all refusals would be documented and reported to local leaders early enough during spray operations for immediate action. Kirehe district also used letters signed by the district mayor informing the community that every house had to be sprayed. Those letters were posted in places where people come together, such as markets, churches, schools, and playgrounds.

Different institutions/employers operating in Kirehe district willingly gave their employees a day off to prepare their houses for spraying. Each employee who took the day was required to show a signed IRS card to his/her line manager as evidence that his house had been sprayed.

3.4.3 UMUGANDA: MONTHLY COMMUNITY WORK

Rwanda holds a mandatory “*Umuganda*” (community service) day from 8:00 am to 11:00 am on the last Saturday of each month. By law, all able-bodied citizens between 18 and 65 years are expected to participate in voluntary community work. September’s Umuganda occurred during the spray campaign period. VectorLink Rwanda collaborated with local leaders to include IRS as part of the Umuganda agenda and to sensitize the community on the ongoing IRS activities. The IRS district and sector support teams participated in Umuganda at various sites. They shared IRS messages with the community through local authorities, specifically the cell and village leaders who were also the IEC mobilizers. The main message was to encourage community members to embrace IRS and open their houses for the SOPs to spray them. The district vice-mayors for social affairs and sector executive secretaries helped deliver the IRS message in the IRS districts, in addition to mobilizing leaders in their areas of jurisdiction to participate in IRS supervision. In sectors where community members were unlikely to open their structures for spraying, leaders arranged with the community to conduct IRS as their Umuganda activity.

3.4.4 MASS MEDIA COMMUNICATION

Radio spots were contributed by the Kirehe district administration free of charge and aired daily from September 10 to October 2, 2018 in the district. The spots were aimed at sensitizing the community to accept IRS and allow their homes to be sprayed. Specific messages were on the importance of IRS in the fight against malaria, the IRS campaign dates, the role of the community in IRS activities (before, during, and after spraying), management of adverse effects, and information about the funding agency.

Mass media communication also included banners at two IRS district offices and at 34 operational sites. The message on the banners was “*Birakureba*” (Kinyarwanda for “This concerns you”). Table 11 presents details of the mass media communication activities during the IRS operations.

TABLE 11: MASS MEDIA COMMUNICATION ACTIVITIES

Dates	Type of IEC Activity/Material	Frequency/Number Produced
September 10-October 2, in Kirehe	Radio spots aired daily on Radio Izuba	12 times on Radio Izuba
September 4-October 2, in Kirehe and Nyagatare	IRS banner	One banner at each IRS district office and one at each operational site
September 19, in Kirehe	One radio talk show	Radio talk show on Radio Izuba
September 29, in Kirehe and Nyagatare	Umuganda	One meeting in every sector

4. IMPLEMENTATION OF IRS ACTIVITIES

The September 2018 IRS campaign was the eighteenth round of IRS implementation since the start of IRS campaigns in 2007 in Rwanda. VectorLink Rwanda conducted 20 days of spraying in Kirehe and Nyagatare districts. On the first day of spray operations, VectorLink Rwanda in collaboration with the authorities conducted colorful IRS launch activities in one selected sector in each district.

VectorLink Rwanda also sprayed Mahama Refugee Camp in Kirehe district for three days after the end of the 20 day spray campaign in Kirehe. The MOH provided all insecticide used, and PMI VectorLink Rwanda covered all operational costs including data entry management support.

4.1 IRS WALK TO WORK STRATEGY

VectorLink Rwanda implemented the spray campaign using a combination of Walk to Work and vehicle transport strategies in all 34 operational sites. This was to reduce the cost of vehicles used to transport SOPs during spray operations. Additional benefits were reducing the project's carbon emissions and benefiting workers' health by enhancing their physical activity.

To implement the strategy, spray teams were divided into zones A and B. To foster equal treatment, spray teams alternated zones A and B depending on how fast the SOPs finished spraying a specific village: Zone A comprised villages within walking distance of the operational sites and Zone B comprised villages farther away, which required truck transport for the spray teams. Mid-way into the spray operations, the distances for Zone B got shorter while those of Zone A got longer, and as a result, vehicles were doing relatively short distances into Zone B. If the distances to be covered by Zone A SOPs were deemed long, the vehicles did an extra trip to drop off Zone A SOPs after dropping off Zone B SOPs and also picked them up in the afternoon for the end-of-day clean-up.

Before the implementation of the IRS Walk to Work Strategy, VectorLink Rwanda held a consultative meeting with IRS sector coordinators who were involved in implementation when the strategy was piloted in 2017. It also conducted an assessment to determine the appropriateness of IRS operational sites in June 2018 in both Kirehe and Nyagatare districts. The assessment was conducted in collaboration with local leaders at the district, sector, and cell levels. The leaders provided information on sizes of cells and villages and suggested best locations to put IRS stores based on the number of residents in the area. In addition, during micro-planning meetings, VectorLink Rwanda further discussed with district and sector authorities the IRS Walk to Work Strategy to strategize on its implementation during September 2018 spray operation.

The outcomes of the improved IRS Walk to Work strategy are as follow:

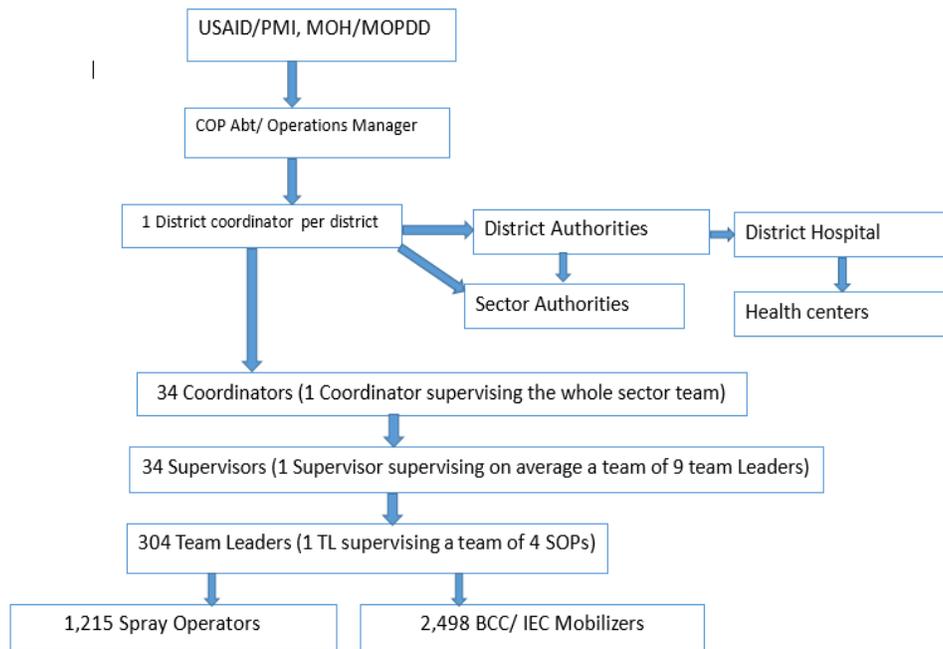
- The adoption of zone A and B operational sites cut the average time SOPs took to reach the villages, spray the daily average of 10 structures, and report back to the operational site from five to three hours in first 10 days of IRS campaign compared to 2017 spray campaign. The general observation was that most SOPs who walked ended their day at around 12-1pm. End-of-day clean-up was done earlier for spray teams who walked because they reached the soak pits earlier than spray teams that used vehicles; these latter teams ended their day around 3 pm as they had to wait for more than one team to finish daily spray activities to board the vehicle and return to the operational site.
- SOPs did not complain about the heavy weight the Walk to Work strategy required them to carry because spray teams alternated between zones A and B unlike in 2017. In addition, TLs were required to carry two bottles of insecticide for each SOP on his/her team; that arrangement significantly reduced the load to be carried by the SOPs.

- Due to the implementation of the improved Walk to Work strategy, VectorLink Rwanda used only 53 vehicles for SOPs rather than 65. This non-use of 12 vehicles over 20 days represented a cost saving of \$18,480.

4.2 IRS SUPERVISION

A team from VectorLink Rwanda, the MOH/MOPDD, PMI, and local authorities at both the district and sector levels supervised IRS. During the IRS campaign, the team ensured supervision of spray operations at all levels. To achieve this, the team used the supervision structure shown in Figure 6.

FIGURE 6: IRS SUPERVISION CHART



The reduction in number of sector supervisors was attributed to strengthened capacity of TLs to handle spray quality and supervision.

In each district, a full-time VectorLink Rwanda staff member helped the VectorLink district coordinator to coordinate routine daily supervision by working closely with the district staff and all other supervisors (from VectorLink Rwanda and other stakeholders). At least seven VectorLink staff, in addition to the two district coordinators, provided supportive supervision to the district and sector staff in the field from Monday to Friday every week.

The MOPDD appointed four staff (two adverse effects coordinators and two MOPDD staff) in the two IRS targeted districts to work closely with the VectorLink Rwanda district coordinators and other supervisors in the field during spray operations.

VectorLink Rwanda implemented a supervision plan to ensure consistency and coordination of supervision and proper follow-up of corrective measures to improve spray operations performance.

Local government officers (sector social affairs, head of health centers, M&E officers at district hospitals, and district health environmental officers) dedicated two days each week to IRS supervision. The district vice-mayors and sector executive secretaries occasionally visited the teams in the field to supervise operations.

Supervision checklists were used to assess the daily performance of SOPs and TLs, adherence to environmental compliance requirements, data collection, and data entry. In addition, during supervision in the field, all supervisors in all targeted districts and sectors used m-Health and ODK e-checklists on mobile phones, which comprised all environmental, operations, and M&E checklists. This promoted real-time tracking and monitoring of issues observed by supervisors during spray operations.

All of the operational sites used the Performance Tracking Sheet on a daily basis. At the end of each day, sector coordinators submitted summary data from the performance tracking sheet to district coordinators. They in turn compiled the data, updated the district Performance Tracking Sheet, and submitted a daily report to the central level (VectorLink Rwanda management and the MOPDD IRS focal point). This daily report comprised the district performance data for that day, the data for all past days, challenges experienced during the day, and how the team resolved them.

VectorLink Rwanda maintained the use of a supervision records book in each sector for coordination and consistency. Every supervisor who visited the sector noted their observations and recommendations in the book. The next supervisor would follow up on the observations and recommendations made by the previous supervisor. Through this practice, performance improved because issues were addressed for specific sectors and not just generally.

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

VectorLink Rwanda received further supervision support from Regional Environmental Compliance Manager Sana Diop Dieng, who provided short-term technical assistance on September 2-17, 2018. She traveled to both Kirehe and Nyagatare districts, where she:

- Participated in the final pre-season environmental compliance assessment and operational site greenlighting process;
- Inspected soak pits and store rooms to ensure they were environmentally compliant according to Best Management Practices (BMPs);
- Participated in vehicle inspections and the driver training
- Supervised the management of insecticide, including transport, storage, inventory, and records management;
- Supervised the morning mobilization activities, including breakfast, and fitness monitoring, and supervised homeowner preparation and SOP performance;
- Supervised end-of-day activities such as the triple rinse, completion of inventory forms from SOP-TL-storekeeper, and handling of contaminated items;
- Reviewed environmental compliance and supervisory tools (m-Health and ODK) used by the project to ensure sound oversight of the program;
- Checked the households' correct marking;
- Met with relevant stakeholders such as PMI to address spray and other miscellaneous project matters; and
- Ensured the adoption of the 2017 recommendations made during short-term technical assistance by the environmental compliance manager and technical program manager.

During spray operations, VectorLink Rwanda continued to use the DOS checklist to ensure that SOPs adhered to spray quality measures, and to standardize spray quality supervision by TLs and other supervisors. TLs used the DOS checklist, at least once a day with every SOP, to supervise insecticide mixing and triple rinsing of insecticide bottles, use of full PPE, use of CFVs during spraying, preparation of households, and

application of proper spray techniques. TLs corrected any mistakes (“red flags”) made by the SOPs and noted the errors on the checklist.

Table 12 is a summary of red flags reported via DOS checklist and the main actions taken by VectorLink Rwanda to address those red flags.

TABLE 12: DOS CHECKLISTS COMPLETED BY TLS AND OTHER SUPERVISORS

Total DOS Checklists Completed	DOS Completed by District and Most Common Errors Found	Action Taken to Resolve Errors
24,798	<p>Kirehe: Targeted total DOS checklists to be filled: 13,040 Number of DOS checklists completed: 13,175</p> <p>Nyagatare: Targeted total DOS checklists to be filled: 16,720 Number of DOS checklists completed: 11,623</p> <p>In both districts, the most common red flag was improper spraying with the tip of the nozzle 45 cm away from the wall. The second most common red flag was all items that could not be removed from structure were not covered with a plastic sheet.</p>	<p>VectorLink Rwanda and field teams increased their communication to address issues reported in DOS checklists.</p> <p>Customized messages about red flags reported the previous day were sent directly to SOPs, TLs, and supervisors in the field on a daily basis.</p> <p>Daily morning briefs were used to remind TLs to observe spray quality for each SOP.</p>

TABLE 13: INSTITUTIONS/STAKEHOLDERS THAT PARTICIPATED IN IRS SUPERVISION

Level	Institution	Responsibilities
National	MOH/MOPDD/Rwanda Biomedical Center, Rwanda Environmental Management Authority USAID/PMI VectorLink Rwanda	Overall supervision of IRS activities
District and Sector (Local Authorities)	District Vice-Mayor/Social Affairs District Health Director District Environmental Health Officer Hospital Director M&E Officer at District Hospital Head of health centers Sector Executive secretaries Sector Social Affairs	Close supervision in districts and environmental protection
Other	Regional Environmental Compliance Manager	Overall supervision of environmental compliance and IRS activities

VectorLink Rwanda stressed the need for strict supervision during ToT and TL trainings to ensure adherence to IRS BMPs. Some of the best practices emphasized were:

- Letting natural light into the structure during spraying by alternating opening and closing doors and windows so that SOPs could see what they were doing, and the TL could complete the DOS form;
- Ensuring proper record keeping on stock cards and other store records for insecticide and empty bottles at each sector store; and
- Conducting physical stock audits twice per week at every district and sector store, including verifying the use of all inventory record keeping forms and the actual stock in the storeroom at the time of the audit matched the balances listed on the insecticide and empty bottle ledgers. The empty insecticide bottles were punctured at district stores before delivery to the recycling plant in Kicukiro to ensure no further use.

VectorLink Rwanda supervisors in the districts met daily with the district teams to share and discuss challenges and observations from their supervision for immediate actions and feedback to all spray teams. Staff from the MOPDD regularly joined VectorLink Rwanda staff in the districts during daily progress review meetings. During these interactions, MOPDD representatives and the VectorLink Rwanda team discussed the issues at hand and provided guidance to the district coordinators and the teams in the field.

VectorLink Rwanda supervisors occasionally convened at the Kigali office on Mondays during the IRS operations period to share notes and district updates and plan for key areas to focus on in the next supervision week based on the reports from the districts.

4.3 M-HEALTH

During the spray campaign, VectorLink Rwanda used CommCare, an m-Health system developed by its subcontractor Dimagi to gain faster access to daily data on spray operations and improve supervisory efforts by different levels of IRS supervisors.

Before 2015, the (PMI AIRS) project reported all data from the field using paper forms, and supervisors used paper checklists to conduct supervision. Identification and correction of issues encountered in the field took up to three days. The use of CommCare for reporting and supervision enables same-day reporting of issues and immediate follow-up. The VectorLink Rwanda IT Specialist worked with Dimagi's remote consultant to update the CommCare application configuration on phones as needed.

Before the start of the September 2018 spray operations, VectorLink Rwanda deployed 34 mobile phones in Kirehe, 38 phones in Nyagatare, and 11 mobile phones to be used by VectorLink Rwanda staff and district and sector leaders during supervision. The team used a gateway phone at the central level to receive data from all sectors and synchronize all data to the Dimagi server.

VectorLink Rwanda used the mobile phones for the three major functions described below:

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

Supervision: Sector coordinators and supervisors used checklists on the mobile phones on a daily basis to supervise spray operations, including environmental compliance. At the end of each day, supervisors submitted completed supervisory forms to the CommCare system. CommCare then sent the submitted reports to both the country-level staff and VectorLink home office staff. A total of 2,689 checklists were submitted using the system. The reports informed VectorLink Rwanda of the challenges encountered in the field in real time. This helped VectorLink Rwanda to immediately address gaps and red flags noted during supervision and customize and send corrective messages directly to SOPs, TLs, and supervisors to reinforce best practices and correct red flags.

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

The mobile phone application added value to operations in that VectorLink Rwanda solved daily issues that arose during IRS spray campaigns. For instance, some supervisors reported wrong information (red flags) such as pump leakage. It seemed they were rushing to complete the number of supervisory checklists required every day. The concerned supervisors were reminded to always be vigilant in completing supervision checklists. In addition, bulk SMS messages were sent to all supervision teams reminding them to always pay attention while completing supervision checklists.

However CommCare application in m-Health smartphones was slow during installation of 54 old smartphones. The affected smartphones were the Samsung Galaxy S3 light model, which was procured in 2015. VectorLink Rwanda suggests replacing all the affected smartphones in future spray campaigns.

4.4 LOGISTICS

4.4.1 IRS STORAGE AND INSECTICIDE STOCK MANAGEMENT

VectorLink Rwanda distributed IRS commodities from the central warehouse at the Kicukiro Small Scale Industrial area in Kigali to the two target district storage facilities. The district-level facilities served as centers for further distribution of IRS insecticide, equipment, supplies, and other materials. A logistics assistant and a storekeeper managed each of the two storage facilities as well as the central warehouse. There were storage facilities at the 34 operational sites in the two districts. All 34 were provided to VectorLink Rwanda free of charge as an in-kind contribution to the IRS campaign by the local authorities. This reflected the good collaboration the project had with district and sector authorities and health facilities in the target districts. Each sector storekeeper was in charge of storage management at the operational site level with oversight from the district logistics assistant and storekeeper.

VectorLink Rwanda carefully tracked stock as insecticide, equipment, and other materials were moved from the central warehouse to the district storage facilities, and subsequently to the operational sites' storage facilities. The team tracked empty insecticide bottles daily at the sector and district stores. Storekeepers accounted for them by recording how many insecticide bottles were received and used by each SOP, team, and operational site. They documented stock records on stock cards, insecticide distribution tracking sheets, and commodity ledger books.

Empty bottles were transported from district stores to the ROTASSAIRWA plastics recycling plant in Kigali on a weekly basis during spray operations. Empty insecticide boxes were dismantled and delivered to Cards from Africa for recycling also on a weekly basis. These activities were done weekly because there was not enough space at the district and sector storage facilities to accommodate both full and empty insecticide bottles until the end of the spray campaign.

4.4.2 IRS VEHICLES

The adoption of the Walk to Work strategy allowed VectorLink Rwanda to contract only 53 vehicles for SOPs during the 2018 spray campaign, down from the 63 vehicles hired in 2017. The project managed logistics so that the teams used all 53 vehicles to transport SOPs only during the first 18 days of the campaign; in the final two days, only 46 vehicles were used. This strategy yielded a total cost saving of IRS Payments

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

- Distribution and collection of signed contracts from all the seasonal staff (SOPs, TLs, washers, security guards, and mobilizers);
- Collection of all timesheets for seasonal staff before preparing payroll;
- Preparation of payroll as approved by the district coordinator and submitted based on the schedule of payments created by the finance manager at the start of the IRS campaign;
- Follow-up with supervisors and local authorities to ensure all the seasonal staff received their payments.
- Collection of invoices from food vendors and conveyance to the VectorLink Rwanda finance office for payment; and
- Collection and reconciliation of IRS vehicle logs sheets.

VectorLink Rwanda adopted the use of electronic banking and mobile money payments during the 2018 spray campaign using Omni System by Ecobank. The project used mobile money payment to pay all transportation allowances for meetings and trainings and for salaries of all spray team members (TLs, SOPs, washers, security guards, mobilizers, etc.). Payments for IRS supervisors and vendors were done by electronic banking. This system significantly increased the security of money transfers and reduced the risks associated with carrying bulky cash, especially in the field.

Before implementing the mobile money payment system, VectorLink Rwanda staff collected the phone numbers of all seasonal staff and gave the list to the finance assistants. The finance assistants verified all the phone numbers to confirm if SIM cards were registered to the owner of the phone. The staff who were not registered with a mobile money service were encouraged to do so during SOP and mobilizer trainings.

Despite its advantages, the electronic system also had limitations, especially with mobile money payments. There were significant delays in paying seasonal staff using Ecobank's Omni platform, which did not have the capacity to remit large amounts of money on a daily basis. In addition, Ecobank's system of verifying which person did not receive payment did not work well. The project will work to resolve these challenges prior to the next spray round.

5. POST-SEASON ACTIVITIES

5.1 POST-SEASON REVIEW MEETINGS

District authorities in collaboration with the VectorLink Rwanda convened IRS evaluation/review meetings at the district level to:

- Review the overall IRS implementation process, experiences, and achievements for the September 2018 spray round;
- Review IRS challenges in the two target districts and identify recommendations for the next spray cycle;
- Reach consensus on the recommendations and way forward for future spray campaigns.

The following categories of people attended:

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

The number of participants who attended the review meetings is shown in Table 14.

TABLE 14: EVALUATION MEETINGS PARTICIPANTS

District	Review Meeting Dates	Participants		Total
		Male	Female	
Kirehe	October 17, 2018	33	12	45
Nyagatare	October 10, 2018	31	8	39
Total		64	20	84

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

Recommendations from the review meetings included:

- In the next spray round, the selection of SOPs *must* be done publicly at the health facility and strictly adhere to all criteria set by the MOH. Any replacement of an unfit SOP will draw from the waiting list established during the initial selection at the health centers. A direct replacement arranged between two SOPs will not be allowed.
- Urban areas need a special plan to spray most of the structures. District leadership agreed to engage with institutions and opinion leaders in the districts to be exemplary by accepting IRS and ask their employees to do the same.

- The new mobile money payment system was discussed and many agreed with its adoption. However, meeting participants noted that the implementing bank still had difficulties with the system that significantly delayed processing payments for seasonal workers. Abt will work with the bank to resolve the identified issues.
- The head of the Rwanda Broadcasting Agency (RBA) Radio Nyagatare suggested that community mobilization for next year's IRS campaign should be aired on Radio Rwanda (Nyagatare Branch) free of charge. This offer was highly appreciated by all participants.
- The district/sector authorities and health facility heads should enhance oversight of SOP recruitment to ensure that SOPs are properly vetted.
- The good collaboration and coordination between district leaders and VectorLink Rwanda that helped the project to achieve excellent IRS results in 2018 should be maintained.
- While not a specific challenge in 2018, it was noted that sector and district IRS support staff should coordinate closely with sector authorities to avoid any unexpected disruption of IRS activities.
- Sector authorities should participate actively in mobilization and implementation of spray operations in their sector to make the work of SOPs easier.
- District and sector authorities including health facilities should continue providing facilities for storage of materials during the spray campaign to save on expenses that the project would incur in renting storerooms, so that more structures can be sprayed.
- Village leaders should always remind their community members not to paint the walls of their houses for at least nine months after spraying because covering the sprayed surface will negate the protective effect of the insecticide.
- Village leaders should remind their community members to observe all other malaria control and prevention interventions.

5.2 INVENTORY

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

6. MONITORING AND EVALUATION

M&E of the IRS campaign closely followed the processes set out in the annual VectorLink Rwanda Work Plan.

6.1 KEY OBJECTIVES

VectorLink Rwanda M&E activities aimed to:

- Emphasize accuracy of data entry and validation processes through comprehensive training and supervision at all levels;
- Streamline and standardize data flow, minimize errors, and facilitate timely reporting;
- Ensure IRS data security and storage for future reference through the establishment and enforcement of proper protocols; and
- Document lessons learned and good practices observed in the implementation of project activities to encourage application of best practices in future project years.

6.2 DATA MANAGEMENT

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

SOPs collected spray data, which TLs and supervisors verified and transmitted to the data centers for entry. Data clerks performed a final verification of spray form data and calculations before entering the data into the database. At the end of each day, the database and M&E managers reviewed the data for anomalies and addressed issues with data center staff. Data clerks entered all data within 48 hours of spraying for quality control purposes and timely generation of weekly spray progress reports. They also filed and archived Daily Spray Operator and IEC/Mobilizer forms at each data center. Data clerks performed a daily electronic back-up to the VectorLink Rwanda server and to an external hard drive for safety and storage.

6.2.1 DATABASE PREPARATION

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

- Reviewed the database based on challenges and lessons learned from the last spray campaign to ensure that data quality assurance and control of IRS data were upheld at all levels;
- Ensured IRS data security and storage for future reference through establishment and enforcement of proper protocols;
- Streamlined and standardized the data information flow to minimize errors and facilitate timely reporting;
- Emphasized accuracy of both the data collection/verification and the data entry process through comprehensive training and supervision at all levels;

- Recruited and trained data clerks in data entry and data management; and
- Facilitated training of data entry clerks, data cleaners, and M&E assistants on the database.

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

6.3 DATA QUALITY ASSURANCE AND CONTROL

VectorLink Rwanda used the VectorLink M&E Supervisory Toolkit, which consists of the two tools described below.

Error Eliminator (EE) forms for mobilizer and spray data are designed to verify the completeness and correctness of data collected in the field. Every day during the spray campaign, supervisory staff (TLs, sector supervisors and coordinators, district IEC assistants and coordinators, M&E assistants, and Abt staff) completed the EE forms for spray data. Also each day, cell IEC supervisors, sector IEC assistants, district IEC assistants, district coordinators, M&E assistants, and Abt staff completed the EE forms for mobilizer data.

Data Collection Verification (DCV) forms are designed to check the accuracy of data collected by SOPs in the field. Supervisors used the DCV form to ensure that the data written on the Daily Spray Operator Forms matched the information reported by households. Supervisory staff (sector coordinators, district IEC assistants, district coordinators, M&E assistants, and Abt staff) used this form to interview households a few days after spraying. The VectorLink team incorporated the DCV form in the m-Health checklists accessed via smartphone. Data collected on the m-Health DCV form were sent directly to the server. The reports generated by CommCare were submitted to the M&E manager and assistants, who then used the report to confirm if the data collected agreed with the SOP structure data.

Supervisory staff visited 1,424 structures (0.7%) with the DCV form and compared the data collected with data collected by SOPs on the data collection forms. VectorLink Rwanda staff addressed and rectified any discrepancies.

Table 15 shows the number of M&E forms completed by VectorLink Rwanda during the September 2018 spray operations, errors VectorLink Rwanda found, and measures taken.

TABLE 15: NUMBER OF M&E FORMS COMPLETED, ERRORS FOUND AND MEASURES TAKEN

Type of Form	Number of Forms	Common Errors Found	Action Taken
Error Eliminator for Spray Data	21,141	Insecticide reported on SOP/TL forms did not match the actual insecticide received. Total population sleeping under nets exceeds the total population living in the structure.	Insecticide distribution cards and other logistics tools were used to cross-check insecticide issued and returned. The team urged SOPs to indicate on the SOP forms the number of insecticide bottles they received immediately after they received them. TLs were urged to do daily form checks before handing them over to their supervisors; supervisors were urged to do the same.

Type of Form	Number of Forms	Common Errors Found	Action Taken
Error Eliminator for Mobilizer Data	2,963	Mobilizer forms were missing mobilizer codes. Errors in summations.	VectorLink Rwanda reminded cell and sector IECs to make sure that they filled out all Mobilizer forms completely before submission to data centers. Sector IECs were advised to verify all village Mobilizer forms before submission to data centers.
Data Collection Verification	1,424	In some cases the number of people residing in structures and number of rooms did not match the SOP forms. Some SOPs did not record 'found and not sprayed' structures on the SOP form.	Corrections were immediately made in the database and SOPs were advised to report accurate data. TLs were advised to diligently track all found structures (sprayed and non-sprayed) by their teams during spraying and cross-check with SOP forms that were recorded.

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

6.3.1 DATABASE QUALITY CONTROL

As in previous spray campaigns, the Access database used programmed audit checks and data locks that prevented data clerks from entering data incorrectly. For the 2018 campaign, Abt's Client Technology Center (CTC) continued to use SQL servers to centralize and connect data clerk computers and avoid duplicate entries at each data center. The SQL servers have the capacity and speed to process large amounts of data (more than 80,000 structures per data center). CTC reviewed the IRS cleaning/reporting tool to help data clerks clean and reconcile data. Sufficient data clerks were hired to allow enough time for one clerk to use the IRS cleaning/reporting tool every day to clean data. As a result, data cleaning in Kirehe and Nyagatare was completed one day after data entry of all spray data. The cleaning/reporting tool also enabled clerks to generate local reports for each district.

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

6.3.2 RANDOM SPOT CHECKS

The M&E and database managers performed daily data verification activities for the Access database to guarantee data quality. They scanned the database and ran spray progress reports to identify anomalies and

data entry errors. In the event that they found discrepancies that they could not reconcile at the data center level, the M&E manager contacted the field supervisor to resolve the issue. At the end of every day, the M&E assistant used the IRS cleaner/reporter to identify data entry errors and provided corrections and feedback to the data clerks.

6.4 IRS RESULTS

During the spray campaign, 208,026 structures of the 208,687 structures found were sprayed, resulting in 99.7 percent spray coverage. A total of 840,773 people were protected, including 12,132 pregnant women and 117,881 children under five years (see Tables 16 and 17).

TABLE 16: SUMMARY OF RWANDA IRS RESULTS FOR SEPTEMBER 2018 CAMPAIGN INDICATORS

District	Total Structures Found	Total Structures Sprayed	Spray Coverage (%)	Total Population Protected			
				Male	Female	Pregnant Women	Children <5 Years
Kirehe	88,910	88,634	99.7%	171,877	186,509	4,747	48,128
Nyagatare	119,777	119,392	99.7%	233,814	248,573	7,385	69,753
Total	208,687	208,026	99.7%	405,691	435,082	12,132	117,881

TABLE 17: SUMMARY OF RWANDA ITN RESULTS INDICATORS

District	Number of Mosquito Nets Found	Number/Proportion of Pregnant Women Sleeping Under Nets	Number/Proportion of Children Under 5 Sleeping Under Nets
Kirehe	83,575	2,509(53%)	29,212(61%)
Nyagatare	110,467	3,896(53%)	39,506(57%)
Total	194,042	6,405(53%)	39,506(58%)

TABLE 18: SUMMARY OF RWANDA MAHAMA REFUGEE CAMP RESULTS FOR SEPTEMBER 2018

Area	Total Structures Found	Total Structures Sprayed	Spray Coverage (%)	Total Population Protected			
				Male	Female	Pregnant Women	Children <5 Years
Mahama Refugee Camp	6,780	6,776	99.9%	27,148	26,177	1,328	9,810

TABLE 19: SUMMARY OF RWANDA MAHAMA REFUGEE CAMPT ITN INDICATORS

Area	Number of Mosquito Nets Found	Number of Pregnant Women Sleeping Under Nets	Number of Children Under 5 Sleeping Under Nets
Mahama Camp	2,473	204	1,678

6.4.1 INSECTICIDE USAGE

VectorLink Rwanda used a total of 163,551 bottles (163,215 for normal houses and 336 for special structure like schools and dormitories) during the 2018 campaign. On average, one bottle sprayed 1.27 structures (see Table 20). Each SOP used on average 7.8 bottles per day, and sprayed on average 9.9 structures per day. Please note that the insecticide burn rate above is for normal structures only.

TABLE 20: INSECTICIDE USAGE

District	Total Structures Sprayed	Total Bottles Used	Average Number of Sprayed Structures per Bottle	Average Number of Bottles per SOP per Day	Number of Structures Sprayed per day per SOP
Kirehe	88,634	70,397	1.26	8.1	10.2
Nyagatare	119,392	92,818	1.29	7.6	9.8
Total	208,026	163,215* ⁴	1.27	7.8	9.9

⁴ This figure is only for normal houses and does not include schools and dormitories

7. ENVIRONMENTAL COMPLIANCE

7.1 ENVIRONMENTAL COMPLIANCE DOCUMENTATION

Rwanda IRS operates under the updated Supplemental Environmental Assessment (SEA) which was prepared in accordance with the provisions of US 22 CFR (216) regarding the use and application of pesticides and approved by USAID for calendar years 2017-2021. The updated SEA authorizes the nationwide use of pyrethroid, carbamate, OP, and clothianidin insecticides in addition to chlorfenapyr (when recommended by the World Health Organization (WHO) Prequalification Team) for the period 2017-2021. The updated SEA also seeks to maintain nationwide coverage of authorized PMI-supported IRS to the entire country, and requests authorization of small-scale, closely supervised hut trials using new IRS insecticides, such as chlorfenapyr and clothianidin, once the insecticides have been submitted for Prequalification Team evaluation and the required country-level documentation has been approved. The Rwanda PMI VectorLink Environmental Compliance Officer (ECO) prepared a letter report to support the 2018 PMI IRS Program in Rwanda.

7.2 PRE-SEASON ENVIRONMENTAL ASSESSMENT

The VectorLink Rwanda team conducted pre-spray environmental compliance assessments on September 3-8, 2018, in the two spray districts. VectorLink Rwanda entered data on smartphones; the data were transmitted to a central database on an automated server at Abt's Bethesda office to generate a work list. The work list was instantly shared with the VectorLink Rwanda chief of party, operations manager, and ECO to guide their actions to prepare the operational sites for IRS. The assessments involved identifying storage facilities, determining the suitability of soak pits from the previous IRS round, and siting locations for new soak pits. All 32 storage facilities at the operational sites were provided to the VectorLink project free of charge, as in-kind contributions to the IRS campaign. Some of the stores required minor refurbishments, which generally included fixing double locks and reinforcing doors and windows. VectorLink Rwanda hired construction contractors from the sectors to build new design of soak pits and bathrooms in all sites. In addition, contractors cleared bushes around the soak pits, added and compacted murrum (gravel) in the wash area, and fixed a polythene sheeting onto the murrum.

Table 21 shows the details of the new design of the soak pit at the operational sites.

TABLE 21: CONSTRUCTION AND REFURBISHMENTS AT IRS OPERATION SITES

District	Number of Operation Sites	Site Refurbished (soak pit, storeroom, fence, etc.)
Nyagatare	18	There are 20 soak pits. One soak pit was refurbished (Nyagatare site I). 19 new soak pits were constructed in new design with a semi-concrete (Rukomo I and II, Rwimiyaga I and II, Nyagatare II, Karangazi I and II, Kiyombe, Karama, Katabagemu I and II, Gatunda, Mimuli, Musheru, Matimba, Rwempasha, Mukama, and Tabagwe I and II operational sites). All 18 offices and storage facility provided by sector and cell authorities

District	Number of Operation Sites	Site Refurbished (soak pit, storeroom, fence, etc.)
Kirehe	16	1 soak pit refurbished (Kigina) 15 new soak pits constructed in new design with semi concrete (Kirehe, Gatore, Gahara I and II, Musaza, Nyamugali I and II, Kigarama I and II, Nasho, Mahama and Mpanga I and II sectors, Mushikiri, Nyarubuye) All 16 offices and storage facilities provided by sector and cell authorities

During the 2018 spray campaign, VectorLink Rwanda built 34 new soak pits, one in each site, using the new design in semi-concrete. The new soak pits have a sloped wash area which pipe effluent to a separate soak pit. Each soak pit has a cover that prevents birds, bees, and other animals from accessing the soak pit. The covers also prevent leaves, trash, and other items from falling into the pit, and it inhibits the growth of vegetation, thus eliminating or reducing annual maintenance, and potential disturbance of the soak pit layers.

VectorLink Rwanda embraced the new soak pit design because it is more durable and has a bigger wash area than traditional soak pits. The cost of the redesigned soak pit (approximately US\$352 per pit) far exceeds the cost of the traditional soak pits currently used in other operational sites. The cost of constructing a new (traditional) soak-pit is approximately US\$145 and renovating an existing soak pit costs US\$70. Figure 7 shows the two soak-pit designs.

FIGURE 7: NEW SOAK PIT DESIGN (LEFT AND BELOW) AND TRADITIONAL SOAK PIT (TOP RIGHT)



7.3 SAFETY AND ENVIRONMENTAL COMPLIANCE DURING THE SPRAY CAMPAIGN

All SOPs, washers, and supervisors underwent medical tests in August 2018 (prior to IRS training) to ensure their fitness to participate in the IRS operations (Table 21). The tests comprised a routine physical examination, and pregnancy tests for all females (including storekeepers, sector supervisors, and sector coordinators). During the medical examinations, medical personnel found 12 SOPs were unfit for IRS operations. Nine of them were pregnant women who were used in other positions that do not involve insecticide contact. Two were found to have eye abnormalities, and one was found to have high blood pressure at an advanced stage (HTN Stage 3).

During IRS operations, VectorLink Rwanda required all staff to adhere to requirements for environmental and human safety related to IRS. The project instituted mitigation measures by providing appropriate PPE to all spray personnel and others who potentially would be exposed to insecticide. PPE included coveralls, gloves, boots, helmets, face shields, neck protection, and dust masks for use during spraying.

Enclosed trucks were used to transport insecticides from the central warehouse to district warehouses. The trucks were certified according to the PMI/ VectorLink BMP⁵ criteria for vehicles that transport pesticide. Trucks covered with tarpaulins distributed insecticides from the district warehouse to the operational sites. Each vehicle had a kit for spill management and first aid, material safety data sheets, and accident/emergency procedure sheets. SOPs moved from operational sites to the field using certified trucks retrofitted with railings on the sides and bench seats. Before using the vehicles, VectorLink Rwanda inspected them against the PMI BMPs to ensure compliance with safety and environmental requirements and compliance for IRS operations.

VectorLink Rwanda monitored soak pits throughout operations. It used plastic sheeting at the wash areas to ensure that insecticide contaminated effluent did not pollute the environment. It replaced the sheeting where and when necessary, and fenced and gated the soak pit and wash areas to ensure no unauthorized access. The project used the progressive (triple) rinsing system at each soak pit for washing spray pumps. Trained washers washed the PPE over the soak pits each spray day. The spray operations teams also bathed themselves in the provided washrooms at the end of every workday, before leaving the operational site for the day. VectorLink Rwanda conducted mid-spray environmental compliance inspections during the spray operations in both IRS districts to ensure adherence to mitigation measures in place. Project staff, in conjunction with the district health environmental officers, used smartphones to conduct the inspections.

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

7.4 MANAGEMENT OF INSECTICIDE ADVERSE EFFECTS AND OTHER INCIDENTS

A team was in charge of adverse effects in each district. The team comprised a coordinator, a doctor who was based at the district hospital, and a nurse at each health center affiliated with each IRS operational site. These teams worked closely with the ECO; their role was to address adverse effects that community members and/or the spray operations support staff might experience during spray operations. Before the start of the

⁵ <http://www.pmi.gov/docs/default-source/default-document-library/tools-curricula/best-practices-indoor-residual-spraying-feb-2015.pdf?sfvrsn=4>

IRS operations, the teams received refresher training at each district on management of IRS adverse effects. Only one incident was reported in Kirehe district (Gahara sector). See incident description below.

VectorLink Rwanda IR001 09122018 Exposure

The SOP was exposed to the insecticide while she was starting to spray the structure at 7:46 am on 12/09/2018. The hose of the pump full of insecticide was not tightly connected, and the insecticide spilled from the pump. The SOP was in full PPE and the insecticide splashed her neck, wetting the neck shield and causing itching of the affected part of the neck. She was rushed to the nearest health center for immediate treatment following standard protocol for insecticide exposure. She was observed for about six hours at the health center. No complications were detected and she confirmed feeling well before she was discharged. VectorLink Rwanda gave her a day off and she resumed her duties the following day. The spill in the house was contained, controlled, and cleaned by the TL under the supervision of the sector coordinator.

7.5 POST-SEASON ENVIRONMENTAL ASSESSMENT

VectorLink Rwanda used smartphones in conducting the post-season environmental assessment in both districts. The assessment confirmed collection of all IRS items from the operational sites and transport of insecticides and IRS wastes to district storage facilities. VectorLink Rwanda cleaned the soak pits and their surroundings, covered them with metallic doors, and securely locked doors. It agreed with the district and sector authorities that the sectors would provide security for the soak pits and wash areas to ensure against vandalism during the non-spraying season. The project cleaned and decontaminated stores before handing them over to the owners

7.6 IRS WASTE DISPOSAL

VectorLink Rwanda disposed of IRS waste at different sites according to the type of waste generated during the IRS operations. The IRS waste disposal sites included recycling plants for plastics and cardboard boxes, an e-waste recycling plant for dry cell batteries, a dump site for uncontaminated waste and incineration plants for contaminated wastes at the district hospitals. The incinerators used for IRS wastes have both primary and secondary combustion chambers with separate burners and blowers for forced air and turbulence. IRS wastes were incinerated separately without mixing with other hospital wastes. Incineration was supervised and witnessed by IRS's ECO and/or the Environmental Health Officer of the district hospital.

VectorLink Rwanda disposed of wastes as described below.

Kirehe

VectorLink Rwanda sent 452 kg of contaminated waste (15,240 used masks and 753 used gloves) from Kirehe district to the ROTASSAIRWA recycling plant in Kigali. A total of 70,517 empty insecticide bottles, 724 face shields, and assorted plastics items (damaged barrels, jerry cans, and basins) were sent to the plant. The project donated 5,876 uncontaminated cardboard boxes to the Cards from Africa Company at Samuduha. It disposed of other uncontaminated waste such as dry cell batteries at the Nduba dumping site and Enviroserve Rwanda Green Park E-waste recycling facility.

Nyagatare

VectorLink Rwanda sent 316 kg of contaminated waste (231 kg of 19,624 used masks from Nyagatare district, 170 used masks from the Kigali central store, 471 pairs of gloves, and 85 kg of neck protectors) from Nyagatare district to the Nyagatare District Hospital incineration plant. A total of 93,034 empty insecticide bottles, 197 helmets, 934 face shields, and assorted plastic items (damaged barrels, jerry cans, and basins) were sent to ROTASSAIRWA Recycling plant in Kigali. The project donated 7,753 uncontaminated carton boxes to the Cards from Africa Company at Samuduha. It disposed of other uncontaminated waste at the Nduba dumping site. It disposed of 50.7 kg of dry cell batteries at Enviroserve Rwanda Green Park, the Rwanda E-waste recycling facility at Bugesera.

TABLE 22: 2018 RWANDA WASTE QUANTIFICATION CHART

Types of Waste	Amount of Waste	Disposal Method	Disposal Site	Date of Disposal (2018)
Empty bottles of Actellic 300 CS	163,551	Recycling	ROTASSAIRWA	5th October
Uncontaminated cardboard	13,629	Recycling	Card from Africa	5th October
Dust mask	35,034	Incineration	District incinerator	5th October
Dry battery	704	Recycling	Enviroserve Rwanda Green Park	19th October
Neck protector	3,546	Incineration	District incinerator	5th October
Helmets	197	Recycling	ROTASSAIRWA	19th October
Face shields	1,658	Recycling	ROTASSAIRWA	19th October
Plastics items: barrels, jerry cans, sand boxes, gloves, boots	N/A	Recycling	ROTASSAIRWA	19th October
Other uncontaminated solid wastes: sacs, papers, files	N/A	General Waste	Nduba Landfill	19th October

8. ENTOMOLOGY

8.1 WALL BIOASSAY TESTS FOR QUALITY ASSURANCE

The 2018 spray campaign began on September 10, 2018, in all operational sites in the two project districts (Kirehe and Nyagatare) using the OP insecticide (Actellic 300 CS). VectorLink Rwanda in collaboration with the MOPDD performed wall bioassay tests for quality assurance within the first week of spraying (September 15-18, 2018). In each of the two districts, two sectors were selected. In each sector, six structures were sampled. The structures sampled were of three different wall surfaces: plastered and painted (PP), plastered and not painted (PNP), and mud. For each of the three wall surfaces, two structures were used for the tests, and structures sprayed by different teams were represented. The tests were done based on WHO approved protocols. Three test cones and one control cone were used. The test cones were placed at 3 different heights (top (2 meters), middle (1.5 meters) and bottom (0.5 meter)) on sprayed wall surfaces while the control cones were fixed on surfaces known to be free of insecticide. Batches of ten (10) 2-5 days old non-blood fed female *Anopheles gambiae* s.s. (Kisumu strain) were introduced in each of the cones. The mosquitoes were left in the cones for 30 minutes, after which they were transferred to insecticide free paper cups. Knockdown was observed and recorded after 30 and 60 minutes respectively, and mortality was recorded 24 hours post exposure. When control mortality was between 5% and 20%, test mortality was corrected using Abbott's formula.

The spraying quality assessment results showed that 100 percent of all exposed mosquitoes to all structure types were killed after the standard 24-hour holding time (Table 23).

TABLE 23: RESULTS OF CONE BIOASSAY FOR IRS QUALITY ASSESSMENT

District	Sector	Types of Surfaces in Sprayed Rooms	T0	
			# Tested	24hrs Mortality (%)
Kirehe	Gatore	PP	60	100
		PNP	60	100
		Mud	60	100
	Nyamugali	PP	60	100
		PNP	60	100
		Mud	60	100
Nyagatare	Nyagatare	PP	60	100
		PNP	60	100
		Mud	60	100
	Rukomo	PP	60	100
		PNP	60	100
		Mud	60	100

The fumigant effect varied between 55 percent and 100 percent mortality after the 24-hour holding period of exposed mosquitoes and with zero control mortality (Table 24).

TABLE 24: RESULTS OF FUMIGANT EFFECT OF ACTELIC 300 CS

District	Sector	Types of Surfaces in Sprayed Rooms	<i>An. gambiae</i> s.s. (Kisumu strain)		
			T0		
			# of Exposed Mosquitoes	24Hrs Mortality (%)	Control Mortality N (%)
Kirehe	Gatore	PP	20	100	10 (0)
		PNP	20	100	10 (0)
		Mud	20	90	10 (0)
	Nyamugali	PP	20	100	10 (0)
		PNP	20	100	10 (0)
		Mud	20	90	10 (0)
Nyagatare	Nyagatare	PP	20	100	10 (0)
		PNP	20	85	10 (0)
		Mud	20	75	10 (0)
	Rukomo	PP	20	100	10 (0)
		PNP	20	55	10 (0)
		Mud	20	80	10 (0)

8.2 REVISION OF THE RWANDA INSECTICIDE RESISTANCE MANAGEMENT STRATEGY

The Rwanda National Strategic Plan for Insecticide Resistance Management 2013-2017 expired last year. As part of its technical assistance, VectorLink Rwanda agreed to cover all costs associated with revising the strategy. Initially, this activity was not in the work plan. However, due to the cost efficiencies it realized in implementing IRS, VectorLink Rwanda was able to fund its work on the development of the revised strategy.

9. GENDER MAINSTREAMING

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

Training: VectorLink Rwanda incorporated gender sessions in all IRS training materials for discussion during the IRS training (ToT, mobilizer, and SOP). The project also appointed gender focal points at district and sectors levels among the IRS support staff.

Increased recruitment of women: VectorLink Rwanda used micro-planning meetings with all district and sector authorities to discuss the importance of increasing the number of female SOPs by recruiting only CHWs with previous IRS experience. The project also continued to advocate with the MOH to increase the number of female mobilizers. It revised all vehicle tender adverts and encouraged vehicle vendors to hire at least 30 percent female drivers during IRS operations. Unfortunately, the 2018 spray campaign had no female drivers. VectorLink Rwanda employed two female pump technicians in the two targeted districts to work with the current male pump technicians at district warehouses to encourage women to apply for technical positions traditionally considered men's jobs. The project will continue to advocate for recruitment of more women for all IRS activities.

Gender-friendly work environment: VectorLink Rwanda ensured the work environment was suitable for mixed-gender teams by constructing separate stand-alone bathrooms for both men and women in each operational site.

Distribution of Afripads to female workers: VectorLink Rwanda distributed 1,100 Deluxe Menstrual Kits (440 in Kirehe and 660 in Nyagatare districts) to female seasonal workers during the spray campaign. This product contains reusable sanitary pads that enable females to manage their periods effectively for more than 12 months. The project did this to eliminate menstruation as a possible barrier to women's participation in the spray campaign. Before distribution, it trained all district and sector gender focal points (34 females), who in return conducted a session on female hygiene and the care and use of the reusable pads for all women seasonal workers at each operational site.

Gender awareness guidelines and messages: VectorLink Rwanda posted the gender awareness guidelines in Kinyarwanda at each operational site to encourage professionalism and mutual respect. In addition, it prepared and disseminated gender messages regularly to all seasonal workers throughout the spray campaign to enhance gender awareness and encourage women and men to express any gender-related issues encountered during IRS operations.

10. CHALLENGES, LESSONS LEARNED, AND RECOMMENDATIONS

10.1 CHALLENGES

VectorLink Rwanda experienced the following challenges during the September 2018 IRS campaign:

After having been trained on safety and having signed the Abt Associates Motor Vehicle and Driver Policy, some drivers delegated their driving responsibility to other, untrained drivers. When the project discovered this, it hired replacement drivers, who were trained and signed the policy.

The soak pit in Musheru operational site flooded during second week of the spray campaign. The reason for flooding was because the soak pit had been dug on rocky ground that could not easily absorb water. The remedy was to dig an adjacent soak pit in order to have two levels of filtration.

The Spray Operator Transport Vehicle Inspection checklist in the CommCare (e-Health) system: whenever a user tried to open the checklist, the whole CommCare application crashed. The issue was referred to the Dimagi team. Unfortunately, the resolutions suggested by the Dimagi technicians did not resolve the issue until the third week of spray operations.

Performance Monitoring Tracking reports from the CommCare application were incomplete due to the application system not functioning well.

TLs observed mistakes made by SOPs during supervision of spray techniques but they did not report the mistakes as red flags in DOS checklists, perhaps because they corrected them during supervision.

Supervisors noted that some SOPs did not record unsprayed structures or mark them during the first week of spraying. The issue was addressed during morning briefs in all operational sites and improvement was noted in the following weeks of the spray campaign.

10.2 LESSONS LEARNED AND RECOMMENDATIONS

Pregnancy tests for female storekeepers will be conducted prior to the delivery of insecticide to site stores to avoid disruption of work.

Vehicle vendors must report to VectorLink Rwanda any need to replace a driver who was trained and signed the Abt Associates Motor Vehicle and Driver Policy prior to making the replacement. This arrangement will give the project time to train the new driver and have him/her sign the policy before being deployed.

Before starting a spray operation, all equipment should be checked, as faulty spray pumps may result in under- or over-application and/or leaks of insecticide. Supervisors, TLs, and SOPs should all examine spray pumps visually to ensure that all parts are present, assembled correctly, and in good condition.

Densely populated and large sectors should be identified ahead of time and where necessary increase a number of village mobilizers to ensure that all structures are mobilized and sprayed within the allotted time.

VectorLink Rwanda will continue to communicate to our spray teams through morning briefs, job aid messages, and regular supervision to ensure that SOPs adhere to rules for mixing insecticide, spray techniques, and removal of household items. Also, regular use of DOS checklists will be emphasized to all TLs and supervisors so that issues of quality of spraying are immediately addressed in the field.

The system implemented by VectorLink Rwanda to separate, label, and keep PPE team by team at each operational site expedited SOPs donning the PPE every morning.

To improve TL DOS reporting, VectorLink Rwanda will enhance its supervision of TLs and encourage them to vigilantly report issues/red flags noted during supervision, even if the issue has been corrected.

Engagement of local leaders at district and sector levels enhanced mobilization and coordination of IRS activities in both urban and rural areas. VectorLink will continue to engage local leaders in mobilizing and enhancing IRS acceptability.

VectorLink Rwanda will adhere to SOP recruitment procedures by engaging the officer in charge of CHWs at the health center, followed by verification and approval by the heads of health centers, sector social affairs, and the sector executive secretary.

Enhanced supervision by the VectorLink staff, the MOPDD, and district and sector staff as well as regular feedback meetings expedited smooth IRS implementation and achieving high spray coverage.

Data cleaning conducted regularly during IRS data entry was instrumental in identifying and correcting errors. It also provided an opportunity to compare insecticide used and recorded in the database with daily logistics records.

District leadership provided most storage facilities free of charge at either sector or cell offices where appropriate.

VectorLink Rwanda will continue to advocate for recruitment only of CHWs who have IRS experience. Micro-planning meetings with district and sector authorities will discuss the importance of adhering to the recruitment criteria set by MOH and increase the number of women SOPs in IRS activities.

VectorLink Rwanda will continue to distribute sanitary napkins to female seasonal workers during future spray operations to eliminate this potential barrier to women's participation.

ANNEX A: INSECTICIDE RESISTANCE TESTING RESULTS (WHO TUBE TEST)

District	Sites	Period	Delta-methrin 0.05%	Per-methrin 0.75%	Lambda-cyhalothrin 0.05%	Pirimiphos-methyl 0.25%	Bendiocarb 0.1%	Fenitrothion 1%	DDT 4%
			24hrs Mortality Rates						
Nyagatare	Mimuli	17.08.2018	97	96	96	95	100	100	91
Bugesera	Mareba	23.09.2018	100	56	88	100	100	100	98
	PBO + Insecticide			100	100				
Kirehe	Bukora	10.09.2018	87	69	74	100	100	100	94
	PBO + Insecticide		100	100	100				

Note: PBO=piperonyl butoxide

ANNEX B: LOCAL PROCUREMENT

Description	Quantity/ Number
IRS Transportation	
Rented vehicles used in micro-planning and logistics assessments	2
Rented vehicles used in IRS implementation	53
IRS supervision vehicles (Country Office)	2
Rented vehicles that facilitated the post IRS activities	2
Printing and Photocopying	
Stock Cards	2,848
Good Delivery Note	50
Goods issued note books	121
Request book	173
Spray Operator Form	27,140
Team Leader Form	6,891
Village IEC implementer Form	21,134
Cell IEC Mobilizer Form	1473
IRS Cards	182,910
Spray Performance Sheets (Sector) A3	41
Spray Performance Sheets (District) A3	3
Daily Health Team Leader Checklist	6500
Material Data Safety sheet	20
Emergency Response	90
Daily Summary report for sector coordinators	632
Insecticide Distribution Card	746
Error Eliminator Form for spray Data	8507
Incident Report Form	100
Error Eliminator Form for Mobilizer Data	4142
Photocopies of assorted documents	60,000
Sector store commodity ledger book	32
Training Manuals	
Assorted materials	
Sisal rope – cylinder roll, 80m length, 2mm diameter	10
Bathing soap (Protex – 250mg)	1400
Dry cell batteries (Tiger head)-Size (12v)Pcs	1,800
Duracell batteries-(AAA) Pcs for digital thermometers	30
Powder soap (Sachet of 100g)- (white OMO)	12,00
Powder (face) tin	377

Description	Quantity/ Number
Liquid hand washing soap – Liquid (small bottle of 50ml/Tin)	55
Lubricant oil, original 125 ml (general purpose)	758
Empty sacs (100kg)	500
Empty Boxes (Cartons) standard	466
Cloth line (Roll of 50 Meters)	20
Chalk (Packets of 100 sticks)	114
Nozzle brush - Tooth brush with soft bristles (Pcs)	800
Padlock for sector stores - Tri-circle medium (Pcs)	34
Padlock for soak pits- Tri-circle medium (Pcs)	39
Paint brush(Pcs)	32
Socks for SOPs and TLs	3048
Aspirin – (tin of 1,000 tablets)	2
Washing/Laundry soap (Tembo- Box of 48 pieces)	45
Polythene sheeting black- roll, 50m	6
Polythene sheeting/ Tarpaulin	58
Stick measure (45 cm)	116
Stick measure (60 cm)	116
Stationery	
Clear sheet protector, A4 size	200
Pens, blue color	5,960
Note Books	5,860
Paper reams	125
HP cartridges 53A	9
Flip chart pads	44
Highlighter (Pcs)	16
Post It (Pcs)	30
Staple remover (Pcs)	2
Staples - Number 16 (24/6), packet of 10 small packets	45
Manilla Paper (Pcs)	200
Scissors (Pcs)	10
Mahama refugee camp procurement	
Sprayer operator form	12,612
IRS Cards	6,603
Team leader form	104
Cell IEC Mobilizer form	32
Village IEC Implementer IEC Form	63
Daily Health Team Leader Checklist	104
Daily summary form for Sector Coordinators	13
Insecticide Distribution Card	13
Powder soap - Omo / Sacket of 100 gm	72

Description	Quantity/ Number
Toilet soap - Protex 100g (pcs)	48
Washing Soap TEMBO - Laundry soap, box of 48 pieces	24

ANNEX C: JOB AID MESSAGES SENT TO SEASONAL STAFF

Time	Recipient	Message	Total to be Submitted in a Spray Season
<i>What time of day should this message be sent? Sprayer operators are not allowed to have phones during the work day.</i>	<i>Who will receive this message?</i>		
10h30AM	Team Leaders	Team Leaders MUST carefully check the filled spray operators' data collection forms at the close of the day, before submitting to the supervisors.	3
7h00 AM	Mobilizers and Sector IECs, and Sector Coordinators	Mobilizers should notify the communities to prepare a day ahead of the arrival of the spray team.	3
9h00 AM	Spray Operators, Team Leaders, Supervisors, and Sector Coordinators	Eating, drinking, or smoking during the spraying period will result in dismissal. It is not allowed.	3
7h00 AM	Spray Operators and Team Leaders	PMI VectorLink project: Good morning! Remember the spray target is 10 structures per spray operator per day. Thanks for the good job.	2
16h30 PM	M&E Assistant	Attention! {case.name} have not submitted their SMS report for today.	20
1h30 PM	Sector Coordinator	# team members. Structures found. #structures sprayed. #insecticide units used.	1
6h30 AM	Spray Operators, Team Leaders, Supervisors, and Sector Coordinators	Full personal protective equipment (PPE) use remains mandatory for the duration of the spray operation.	2
4h00 PM	Spray Operators and Team Leaders	Remember only heavy, non-edible, bulky items should be packed in the center of the room and covered with the polythene sheet before spraying.	2
7h30 AM	Team Leader	Remember your spray nozzle should be 45cm from the surface. Spray pressure is between 35 and 55psi.	2

Time	Recipient	Message	Total to be Submitted in a Spray Season
6h50 AM	Spray Operators, Team Leaders, Supervisors, and Sector Coordinators	To ensure the safety of all seasonal staff and community, report the health status and any adverse effect to your supervisor.	1
15h00 PM	Spray Operators, Team Leaders, Washers, Security Guards, Supervisors, and Sector Coordinators	PMI VectorLink Project will not tolerate sexually-oriented conduct, whether it is intended or not, that is unwelcome.	2
15h00 PM	Spray Operators, Team Leaders, Washers, Security Guards, Supervisors, and Sector Coordinators	Sexual harassment is defined as: sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature.	1
14h30 PM	Spray Operators, Team Leaders, Washers, Security Guards, Supervisors, and Sector Coordinators	Other work-related harassment is the unwelcome, deliberate, or repeated unsolicited verbal, physical, or visual contact or solicitation of favors that are offensive, abusive, intimidating, hostile, denigrating, or demeaning.	1
14h30 PM	Spray Operators, Team Leaders, Washers, Security Guards, Supervisors, and Sector Coordinators	The PMI AIRS Project takes any allegations of sexual harassment seriously. All complaints should be made to your Gender Focal Point at 0786477460. Please also contact the Rwanda National Police, Gender Based Violence Unit at 3512 for further support.	1

ANNEX D: STOCK UPDATE

Description	Quantity in Stock Before Campaign	Quantity Received	Total Quantity	Quantity Used/Damaged/Out of use	Quantity in Stock after the Campaign
Sprayer pump (Hudson)	1,667	0	1667	1	1666
Sprayer pump (Goizper)	300	0	300	0	300
Goizper Repair kit	37	0	37	0	37
Pump strainer (Nylon filter)	380	0	380	8	372
Hose for Hudson pump	135	50	185	101	84
Cover Assembly (Lid)	25	-	25	0	25
Hudson tip- Jet 8002 E Nozzle (ceramic nozzles)	200	100	300	0	300
Control Flow Valve (CFV)	1,624	0	1624	1459	165
Lance for X-pert Pump	150	100	250	0	250
Lance for Goizper Pump	10	0	10	0	10
Repair kit (Hudson pump)	15	0	15	12	3
Repair kit (Goizper pump)	37	0	0	0	0
Pressure gauge Assembly	97	0	0	20	77
Gasket Nozzle XP	0	0	0	0	0
Wash Valve Pin	124	50	174	0	174
Dust Mask	8,514	34,560	43,074	35,034	8,040
Hard Hat (Lightweight Helmet)	2,328	0	2,328	197	2,149
Face Shield (Visor)	276	1,850	2,126	1,658	468
Head Gear (Bracket)	2,589	0	2'589	1825	764
Inner Part	1,341	0	1,341	1341	0
Apron	118	50	168	75	93
Man Portable First Aid Kits	48	48	96	80	16
Standard Nitrile Gloves (Long)	1629	648	2,277	1213	1,064
Nitrile Glove (Full Arm Length)	179	18	197	71	126
Poly/Cotton Coverall	4,274	0	4,274	0	4,274
Black PVC Boot	3,058	0	3,095	226	2,839

Description	Quantity in Stock Before Campaign	Quantity Received	Total Quantity	Quantity Used/Damaged/Out of use	Quantity in Stock after the Campaign
Insecticide (Organophosphate Actellic 300CS)	0	167,028	167,028	163,552 ⁶	3,476
USAID – PMI Logo	750	0	750	750	0
Sprayer Bag - Back pack	1,927	0	1,927	0	1,927
Polythene sheeting/Tarpaulin for Soak Pits and Bathrooms (5x5)	102	58	160	146	14
Rinsing Barrels (100ltrs)	335	0	335	52	283
Sand Box (Plastic Box)	97	0	97	40	57
Water Tank (1000 ltrs)	69	0	69	0	69
Neck Protector	5,073	0	5,073	3,556	1,517
Reflective Jacket for Supervisors (Orange Color)	336	0	336	2	334
Reflective Jacket for Team Leaders (Green Color)	324	0	324	0	324

⁶ One bottle was damaged

ANNEX E: WASTE DISPOSAL CERTIFICATES

Enviroserve Rwanda Green Park
Rwanda E-waste recycling facility
E-WASTE COLLECTION FORM

Date: 19/10/2018

Organization Information
Name: Abt ASSOCIATES
Address: KG 8 Ave, M&M Plaza, 3rd Floor, Nyarutarama
E-mail: Epiphanie_Murindahabi@pmivectorlink.com
Phone: (250) 252 572 321/2/4, (250) 783 299 499

E-waste collector information
Name: Enviroserve RGP Ltd.
Address: Bugeseri Industrial Park
E-mail: rwanda@enviroserve.rw
Phone: +250 787 110 267

NO	ITEM	Qty (Nbr)	Qty (Kg)	Description
1	Batteries (Tiger)	-	54,7	Old batteries
	Total	-	54,7	

For and on Behalf of the organization
Signature:
Name: Epiphanie Murindahabi
Date: 19/10/2018

For and on Behalf of the E-waste collector
Signature:
Name: Eric MURERA
Date: 23/10/2018

E-waste if not properly handled may impact both human health and Environment

ROTASSAIRWA LTD

Certificate of Appreciation

This certificate is awarded to:

Abt Associates/ VectorLink Project Rwanda

In appreciation for **Outstanding donation of 163, 551 empty bottles** to ROTASSAIRWA generated during IRS campaign carried out in September- October 2018 for **plastic recycling** and contribute to protect the environment from pollution and landfill.

Alain RUBASHA
Sales Manager/ ROTASSAIRWA

REPUBLIC OF RWANDA
Oet 17th, 2018

EASTERN PROVINCE
KIREHE DISTRICT
KIREHE DISTRICT HOSPITAL
PO. BOX: 45 Kibungo

CERTIFICATION OF IRS WASTE MANAGEMENT DISPOSAL/ INCINERATION

Following the IRS Activities conducted in Kirehe district, with pleasure we certify that, the waste received are incinerated successfully.

We kindly take this opportunity to request the payment of invoice submitted to Abt Associate for the incineration service. The total amount will be deposited to the account number No0068/0319243/43 of Kirehe District Hospital open in BK Nyakarambi branch.

Dr. Patient Ngamije

Director General of Kirehe District Hospital

Cards From Africa
Beautiful Cards. Better Lives.
PO BOX :4730 KIGALI-RWANDA

Kigali, 30th October, 2018

CARDS FROM AFRICA
CERTIFICATE OF APPRECIATION

This certificate is awarded to:
AIRS Rwanda /ABT Associates.Inc.

In appreciation for outstanding donation of 13,629 empty boxes to CARDS FROM AFRICA (C.F.A) generated during AIRS campaign carried out in September –October 2018 for paper recycling and contribute to protect the environment from pollution and landfill.

BUKURU JEAN DE DIEU,
CARDS FROM AFRICA
MANAGING DIRECTOR

REPUBLIC OF RWANDA



EASTERN PROVINCE
NYAGATARE DISTRICT
NYAGATARE HOSPITAL
PO BOX: 43 NYAGATARE
Email: Nyagatare.hospital@moh.gov.rw

“ CERTIFICATE OF INCINERATION ”

THIS IS TO CERTIFY THAT 316 KGS OF CONTAMINATED WASTES,
FROM **Abt Associates**, WAS RECEIVED BY NYAGATARE DISTRICT
HOSPITAL, ON 09/10/2018, AND HAS BEEN INCINERATED ON 10/10/2018.

KIND REGARDS.

Done at Nyagatare on 10/10/2018.

Dr. MUNYEMANA Ernest.
Director General of Nyagatare District Hospital



ANNEX F: PEOPLE TRAINED TO IMPLEMENT IRS

Categories of Persons Trained	Training on IRS Delivery										Other Trainings																	
	Training of Trainers		Spraying Operations ⁴		Data Capture		Logistics Training		Technical Maintenance		Structure Enumeration/ IEC TOT		Structure Enumeration/ IEC Training		Poison Control		Environmental Compliance		Coveralls Washing		Fire Security		Finance		Transport Security		Total	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Sector Coordinators	24	10																										34
Sector Supervisors	32	29																										61
Spray Operators			520	758																								1,278
Team Leaders			162	139																								301
Data Entry Clerks					14	8																						22
Logisticians							1	2																				3
District Store Keepers							2	1																				3
Sector Store Keepers							9	25																				34
Finance Assistants																							2	1				3
Pump Technicians									2	2																		4

Categories of Persons Trained	Training on IRS Delivery										Other Trainings																	
	Training of Trainers		Spraying Operations ⁴		Data Capture		Logistics Training		Technical Maintenance		Structure Enumeration/ IEC TOT		Structure Enumeration/ IEC Training		Poison Control		Environmental Compliance		Coveralls Washing		Fire Security		Finance		Transport Security		Total	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
District IEC Assistants										1	1																	2
Sector IEC Assistants & Supervisors										39	29																	68
Cell IEC Mobilizers												113	53															166
Village IEC Mobilizers												2,263	231															2,494
Adverse Effects Teams (Clinicians)														35	12													47
Environmental Compliance Officers																1	1											2
Washers																		40	73									113
Security Guards																				69	3							72
Drivers																									55	0		55
TOTAL M/F	56	39	682	897	14	8	12	28	2	2	40	30	2,376	284	35	12	1	1	40	73	69	3	2	1	55	0	4,762	
TOTAL/Training	95		1,579		22		40		4		70		2,660		47		2		113		72		3		55		4,762	

List each Mitigation Measure from column 3 in the EMMP (EMMT Part 2 of 3)	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
<ul style="list-style-type: none"> • Implementing partners and/or sub-contractors will provide training to workers on applicable best practices. • Implementing partners and sub-contractors will follow best practices for properly disposing of waste resulting from renovation or rehabilitation activities. Contractors will train workers on the proper use of PPE, and best practices for handling and disposing of waste. • If the presence of asbestos is suspected in a facility to be renovated, the facility must be tested for asbestos before rehabilitation works begins. Should asbestos be present, implementing partners and sub-contractors must cease work until removal is carried out by others in conformity with host country requirements. Work may not re-commence until the facility is retested to demonstrate that asbestos removal has been effective. • All results of the testing for asbestos shall be communicated to the COR. 	<ul style="list-style-type: none"> a. IRS trainings were conducted to prepare seasonal staff, SOPs, clinical professionals, and drivers for the IRS campaign and PMI best practices. b. All soak pits for the disposal of liquid waste were chosen, inspected, and determined to be ready for operation prior to the beginning of the spray campaign. The pre-seasonal environmental compliance inspection was conducted on September 3-8, 2018, in Nyagatare and Kirehe districts to verify if the soak pits are constructed to the best sites and are well sloped and drain the liquid into the pit. c. Waste disposal plan was established and VectorLink Rwanda signed contracts with recycling plants. d. Two new soak pits design were rehabilitated and the other 32 soak pits constructed using a new design with semi-concrete. The bio beds were installed in new soak pit with charcoal, sawdust, and stones. e. Training on the use of PPE was conducted for all SOPs; there was no case of adverse effect resulting from insecticide contact. f. All SOPs were trained on mixing pesticides before spraying. Triple rinsing of empty bottles in the field was emphasized during the SOP training. g. ECO conducted certification of solid waste disposal sites before the spray campaign. Site visits to all IRS waste disposal areas was completed before the start of operations. <p>All waste at district sectors was properly stored in</p>		

List each Mitigation Measure from column 3 in the EMMP (EMMT Part 2 of 3)	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
	<p>district stores prior to final disposal. All IRS waste was accompanied to disposal sites by storekeepers and logistic assistants.</p> <p>Storekeepers are to maintain and check all records of the stock regularly during IRS operations. The storekeeper performance inspections found 23 instances of non-compliance with stock-keeping guidelines. These cases were all addressed immediately.</p> <p>Solid wastes were kept in sector storeroom and uncontaminated wastes were separated from contaminated wastes.</p>		
5. Small-Scale Water and Sanitation			
6. Nutrition			
<p>7. Vector Control</p> <p>7.1. Health and environmental impacts may result from inadequate quality control of insecticides</p> <ul style="list-style-type: none"> Insecticide selection for any USAID-supported malaria program is subjected to the criteria listed in the USAID Programmatic Environmental Assessment, country SEAs, and host country requirements. Procurement and inventory logs must be maintained. Ensure storage facility and personal protective equipment (PPE) are appropriate for the active ingredient used and in accordance with approved SOPs 	<ol style="list-style-type: none"> Insecticide selection was subjected to the criteria listed in current SEA (2017-2021) and the country requirements. The Ministry of Health wrote a letter that specifies the use of the organophosphate (pirimiphos-methyl (Actellic)) for two years (since the IRS campaign of September 2016). After conducting the need assessment, all items were quantified, ordered, supplied, and cleared. All items were recounted, distributed, and monitored during the IRS campaign and collected and returned to the central warehouse after the campaign. All damaged 	<p>The regulation of insecticide used in health sector is not yet established.</p> <p>Some item were difficult to find in local market: heavy polythene sheeting.</p>	

List each Mitigation Measure from column 3 in the EMMP (EMMT Part 2 of 3)	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
<ul style="list-style-type: none"> Distribute insecticides to facilities than can manage such commodities safely in storage, use, and disposal (i.e., in a manner generally equivalent to implementing partner’s own SOWs/WMP)/ <p>7.2 Occupational risks for workers involved in IRS campaigns. Inspect and certify vehicles used for insecticide or team transport prior to contract.</p> <ul style="list-style-type: none"> Train drivers. Ensure availability of cell phone, PPE and spill kits during insecticide transportation. Initial and 30-day pregnancy testing for female candidates for jobs with potential insecticide 	<p>and waste items were disposed of according to the waste disposal plan.</p> <ul style="list-style-type: none"> c. VectorLink provided the minimum PPE to all seasonal staff according to their work. d. Operations facilities were sited appropriately. e. All insecticide management records were reviewed and maintained on a daily basis. f. Storekeepers were to maintain and check all records of the stock regularly during IRS operations. Storekeeper performance inspections found 23 instances of non-compliance with stock-keeping guidelines. These cases were all addressed immediately. District supervisors checked the spray performance sheet daily to verify the team’s insecticide usage rate. g. During IRS inspection, waste management records and storekeeper performance checklists were reviewed and eventually corrected. h. ECO performed mid-application inspections. i. The storekeeper monitored PPE and SOPs before they went to the field. <p>The ECO and operations manager inspected vehicles to be used during IRS operations to ensure they met IRS standard requirements. 53 vehicles were inspected and hired for the support of the IRS operations in the two districts. Nyagatare used 30, and Kirehe used 23 vehicles.</p>	<p>Vehicle that did not meet PMI IRS</p>	<p>To encourage drivers to keep a close watch on the vehicle operating system.</p> <p>To encourage morning briefs</p>

List each Mitigation Measure from column 3 in the EMMP (EMMT Part 2 of 3)	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
<p>contact.</p> <ul style="list-style-type: none"> • Health test all spray team members for duty fitness. • Procure, distribute, and train all workers with potential insecticide contact on the use of PPE. • Train operators on mixing insecticides and the proper use and maintenance of application equipment. • Provide adequate facilities and supplies for end-of-day clean up. • Enforce application and clean-up procedures. 	<p>53 drivers were trained on safety issues (including wearing coveralls while on IRS field operations). They all signed the VectorLink Motor Vehicle and Driver Policy before starting work.</p> <p>SOP transportation vehicle inspections revealed that all vehicles had spill kits on board during the transportation of SOPs and all drivers had a cell phone. The project provided to the drivers the minimum PPE (coverall, boots, masks, and gloves).</p> <p>SOPs went through screening before training in order to see those who were unhealthy or pregnant. All female SOPs and washers were tested for pregnancy. Nine were found to be pregnant and three unfit. All 1,756 candidates for SOP, washer, and supervisor positions were medically tested for health and fitness.</p> <p>Training on the use of PPE was conducted for all SOPs; there was no case of adverse effect resulting from insecticide contact.</p> <p>All SOPs were trained to mix pesticides before spraying. Triple rinsing of empty bottles in the field was emphasized during the SOP training.</p> <p>Washing soap and other supplies were available at all operational sites to facilitate end-of-day clean-up.</p> <p>There were 402 smartphone-based end-of-day clean-up inspections during the campaign, no case of unavailability of soap or water for clean-up was reported.</p>	<p>requirements (such as insurance, strong benches for SOPs to sit on, etc.) were not contracted.</p> <p>Some vehicle vendors delayed reporting for vehicle inspection, driver training, and signing of contract.</p> <p>Nine pregnant women were assigned to cell IEC mobilizer positions.</p> <p>This year's spray campaign, used the updated lists of medically tested SOPs submitted by hospital directors.</p>	<p>regular checks on safety precautions to drivers and seasonal personnel contracted by vehicle vendors.</p> <p>Medical insurance for drivers and their turn boys will be included in the requirements during vehicles/IRS transportation request for bids.</p> <p>To focus on training of supervision form to reduce number of unwanted red flags.</p>

List each Mitigation Measure from column 3 in the EMMP (EMMT Part 2 of 3)	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
<p>7.3 Health and safety risks for residents of treated houses (e.g., risks from skin contact and/or ingestion of insecticides)</p> <p>a. Implement IEC campaigns to inform homeowners of responsibilities and precautions, including washing itchy skin and going to health clinic if symptoms develop and do not subside.</p> <p>b. Ensure health facility staff are aware of insecticide poisoning management.</p> <p>7.4 Nearby residents may be exposed to insecticides</p> <ul style="list-style-type: none"> • Physically secure storage facilities and transportation vehicles to prevent theft. • Maintain records of all insecticide receipts, issuance, and return of empty containers. • Conduct analysis comparing number of houses treated vs. number of containers used. • Examine houses treated to confirm application • Perform physical inventory counts during application season 	<p>The seven-barrel progressive rinsing procedure was performed by all SOPs. Of the 402 end-of-day clean-up inspections conducted, there were no cases of unsupervised clean-up.</p> <p>IEC campaigns were effectively carried out before the campaign. A total of 2,494 village IECs (2,263 males and 231 females) conducted IEC campaigns to inform homeowners of responsibilities and precautions. Village IEC was supervised by 166 Cell IECs (133 males and 53 females).</p> <p>Health facility staff received IRS side effect training and learned how to identify possible side effects, best management practices for side effects, different prevention and control strategies of side effects, and proper completion of the side effects report form.</p> <p>VectorLink hired guards to ensure the security of all sector storage. The storage sites were double locked including the insecticide room as requested in PMI BMP.</p> <p>Daily checking of spray performance sheet to verify insecticide usage rate team by team and physical inventory counts during inspection.</p> <p>Team leaders, supervisors, and district teams supervised SOPs to identify and correct errors in spray techniques.</p>	<p>16 cases of non-compliance were reported in End-of-Day Clean-up inspections, 85 in Homeowner Preparation and Spray Operator Performance inspection, 15 in Spray Operator Morning Mobilization inspection, 23 in Storekeeper Performance inspection, and 1 in Spray Operator Transportation Vehicle inspections.</p> <p>All non-compliance issues were immediately corrected.</p>	

List each Mitigation Measure from column 3 in the EMMP (EMMT Part 2 of 3)	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
<p>7.5 Ecological risk to non-target species and water bodies from use of insecticides</p> <ul style="list-style-type: none"> For shipments of insecticide over water, sachets/bottles will be packed in 220 liter open top barrels with a water-tight top and a locking ring, or in a similarly durable container. Waterproof labeling must be affixed to the barrel, with the identity of the pesticide, number of bottles inside, the weight, the type of hazard posed by the contents, and the PPE to be worn when handling the barrel. Train applicators on SEA operational requirements, SOPs, PMI BMPs, and approved WMP, developed for the safe and effective storage, distribution, application, and disposal of insecticides Ensure application equipment and PPE are appropriate for the active ingredient used and in accordance with approved SOPs, and maintain equipment to avoid leaks. Maintain application equipment. No application of insecticides within 30 yards of beekeeping sites. <p>7.6 Environmental risk from disposal of liquid and solid wastes</p> <ul style="list-style-type: none"> Handling, treatment, and disposal of nonhazardous (general waste) and hazardous 	<p>The insecticide procured was kept properly at customs and delivered to the warehouse by Bolloré company.</p> <p>Storekeepers received training on logistics and storage of insecticide in the room and handling spillage with appropriate materials. Before the campaign, storekeepers learned how to use forms for recording all pesticides receipts, issuance, and return of empty bottles and item that need daily track and sore card.</p> <ul style="list-style-type: none"> Operational team conducted inspections during operations with smartphone. A daily after-work meeting was conducted to detect issues and discuss on how to handle it. <ul style="list-style-type: none"> VectorLink prepared a waste disposal plan and signed a contract with recycling plants. Contaminated wastes were incinerated at district hospitals, and uncontaminated wastes 	<p>Refusal of households to be sprayed.</p> <p>Some households were not sprayed because they contained food because of the harvest season.</p> <p>The intervention of local leaders helped to</p>	<p>Find strategies to target urban households in campaign.</p> <p>Encourage households to use plastic sheeting during the spray</p>

List each Mitigation Measure from column 3 in the EMMP (EMMT Part 2 of 3)	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
<p>wastes must be in accordance with the approved WMP/SOPs and the PMI BMPs. The WMP, which outlines SOPs for managing waste processes, must be in accordance with PMI best practices and host country requirements.</p> <ul style="list-style-type: none"> Choose sites for disposal of liquid wastes, including fixed and mobile soak pit sites, according to PMI BMPs. Construct fixed and mobile soak pits with charcoal according to BMPs to adsorb insecticide from rinse water. Maintain soak pits as necessary during season. Monitor waste storage and management during campaign. Monitor disposal procedures post-campaign. <p>7.7 Improper incineration of wastes and improper disposal of residual can pose a threat to air quality, soil, and the water supply and result in environmental and public health hazards</p> <ul style="list-style-type: none"> Waste will only be disposed in incinerators that comply with PMI BMPs. Collect and maintain treatment and disposal documents and records on file. Country-level USAID environmental compliance documentation must contain guidance on proper disposal of wastes. 	<p>were dumped at the Nduba landfill. Plastic items were disposed of at the ROTASSAIRWA recycling plant, empty boxes at the Card from Africa recycling plant. Other e-wastes such as dry batteries were disposed of at the Enviroserve Rwanda Green Park E-waste recycling facility. Disposal sites near operational sites are appropriate according to PMI BMPs.</p> <ul style="list-style-type: none"> Soak pits were constructed according to PMI BMPs. Soak pits performed properly throughout the IRS campaign. Wastes are stored and managed according to PMI BMPs. Waste disposal was conducted in accordance with the WMP/SOPs and records maintained. <p>Contaminated wastes were disposed of in district hospital incinerators. VectorLink signed a billing contract for incinerator use. Districts incinerators were constructed by the Ministry of Health and comply with WHO standards. They are maintained once per quarter.</p>	<p>convince some households to accept spraying.</p> <p>There was one reported case of soak pit flooding, at Musheru in Nyagatare district. The soak pit flooded mainly due to heavy rain water and rocky soil, which slowed water filtration. A second soak pit was constructed to support the first one in case of flooding. It was a long-term solution to maintain the soak pit in that area as it was not easy to find another place for storage and soak pit.</p>	<p>During rain, we covered the soak pit/pipes with plastic sheeting to avoid rain water pooling in the soak pit</p>
8. Emergency Response	N/A	N/A	N/A

ANNEX H: MONITORING AND EVALUATION PLAN

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
Objective 1: Implementation of Malaria Vector Control Interventions													
1.1	Successfully execute IRS and other malaria vector control programs												
1.1.1	Number and percentage of complete annual country work plans developed and submitted on-time	Project records Annually	Country	1; 100%	1; 100%								
1.1.2	Number of eligible structures targeted for spraying	Project records Annually	Country	206,611	208,687								
1.1.3	Number of eligible structures sprayed with IRS	Project records Annually	Country	175,619	208,026								
1.1.4	Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	Project records Annually	Country	85%	99.7%								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.1.5	Number of people protected by IRS	Project records Annually	Country Sex Pregnant women Children <5	813,177	840,773 total 405,691 males 435,082 females 12,132pg. women 117,881 children under 5ss								
1.1.6	Number and percentage of vector control project country programs submitting an End of Spray Report within 45 days after the end of spray (including completing MEP and EMMR)	Project Annually	Country	1; 100%	1; 100%								
1.1.7	Number of IRS country programs that conduct a Post-spray Data Quality Audit within 90 days of spray completion	Data Collection Forms Annually	Country	N/A	N/A								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.1.8	Number of Insecticide Treated Nets (ITNs) distributed, by channel	Project Records Annually	Country Channel	N/A	N/A								
1.1.9	Number and percentage of ITN country programs that conduct at least one process assessment of the quality of ITN distribution planning, the quality of household registration, and or ITN distribution implementation during a mass ITN distribution campaign	Project Records Annually	Country Channel	N/A	N/A								
1.1.10	Number and percentage of ITN country programs with operational routine monitoring systems for continuous ITN distribution, disaggregated by channel	Project Records Annually	Country Channel	N/A	N/A								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.1.11	Number and percentage of countries completing ITN durability monitoring data collection on time as planned in a given project year	Project Records Annually	Country	N/A	N/A								
1.2	Provide technical assistance and planning support for IRS and other integrated malaria vector control (VC) activities												
1.2.1	Number of VC project training workshops targeting NMCP and other host country staff	Project Training Records Annually	Country Technical Area Job Function	1; 100%	2 ⁷ ; 100%								
1.2.2	Number of NMCP and other vector control host country staff accessing DHIS2	DHIS2 Logs Annually	Country Job Function	N/A	N/A								

⁷ We held 2 trainings targeting Entomology technicians; the first training was completed in January, the second in May 2018.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.3	Ensure safe and judicious use of insecticides and other malaria vector control products												
1.3.1	Number of vector control personnel trained in environmental compliance and personal safety standards in vector control implementation	Project Training Records Annually	Country Sex (# and %) Job Function	5,225 ⁸ Males: 3,663 Females: 1,562	4,737 Males: 3,368 (71%) Females: 1,369 (29%)								
1.3.2	Number of health workers receiving insecticide poisoning case management training	Project Training Records Annually	Country Sex (# and %)	42 Males:33 Females:9	47 Males: 35 (74%) Females: 12 (26%)								
1.3.3	Number of adverse reactions to pesticide exposure documented	Incident Report Forms Annually	Country Type of Exposure	0	1								
1.4	Strengthen capacity of NMCPs, vector control personnel, and other institutions to implement and manage IRS and other vector control activities												
1.4.1	Total number of people trained to support VC in targeted areas	Project Training Records Annually	Country Sex (# and %) VC Intervention Type	5,253 Males: 3,658 Females: 1,595	4,762 Males: 3,384 (71%) Females: 1,378 (29%)								

⁸ This indicator includes all support staff except: Data cleaners, M&E Assistants, DOS data clerks, and Finance Assistants.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.4.2	Number of people trained during IRS Training of Trainers	Project Training Records Annually	Country Sex (# and %)	340 Males: 192 Females: 148	131 Males: 76 (58%) Females: 55 (42%)								
1.4.3	Total number of people hired to support VC in target districts	Project Records Annually	Country Sex (# and %) Job Function VC Intervention Type	4,572 Males: 3,169 Females: 1,403	4,540 ⁹ Males: 3,228 (71%) Females: 1,312 (29%)								
1.4.4	Number of government/district officials who acted as supervisors during VC campaigns	Project Records Annually	Country VC Intervention Type	49; 100%	49;100%								
1.5	Promote gender equality in all facets of planning and implementation												
1.5.1	Number of women hired to support VC campaigns	Project Records Annually	Country Returning female seasonal workers hired in a more senior capacity	TBD; 35%	1,312 total (29%)								

⁹ District IEC Assistants (2), Data Clerks (19), M&E Assistants (2), Data Cleaners (2), District Storekeepers (3), Sector Storekeepers (34), Logistics Assistants (3), Finance Assistants (3), Sector Coordinators (34), Sector Supervisors (34), Sectors IEC Assistants (34), SOPs (1217), Team Leaders (301), Cell IEC Mobilizers (166), Village IEC Mobilizers (2494), Security Guards (72), Washers (13), Pump Technicians (4), and Cleaners (3)

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.5.2	Number and percentage of women hired in supervisory roles in target areas for vector control activities	Project Records Annually	Country VC Intervention Type Job Function	50%	240 total (42%)								
1.5.3	Number and percentage of staff (permanent and seasonal) who have completed gender awareness training	Project Training Records Annually	Country Sex Job Function	5,115 Males: 3,535 Females: 1,1580	4,444 ¹⁰ Males: 3,166 Females: 1,278								
1.5.4	Number and percentage of women in senior leadership roles in VectorLink country offices	Project Records Annually	Country Sex (# and %)	1	1								
1.6	Implement and support social behavioral change communication (SBCC) and mobilization activities												
1.6.1	Number of radio spots and talk shows aired	Project Records Annually	Country VC Intervention Type	0	12								
1.6.2	Number of print materials disseminated	Project Records Annually	Country VC Intervention Type	N/A	N/A								

¹⁰ Coordinators and Supervisors, SOPs and TLs, Logisticians, Sector IEC's, Cell and Village Mobilizers, and Washers

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.6.3	Number of people reached with vector control and/or SBCC messages via door-to-door messaging	Project Records Annually	Country VC Intervention Type Sex	447,447 Males: 202,530 Females: 244,917	459,678 Males: 209,421 Females: 250,257								
1.6.4	Number and percentage of people who feel that the proposed action (sleeping under an ITN/accepting IRS) will reduce their risk of malaria	Project Records Annually	Country	N/A	N/A								
1.6.5	Number and percentage of people with a favorable attitude toward the practice/product (i.e., ITNs, IRS)	Project Records Annually	Country VC Intervention Type	N/A	N/A								
1.6.6	Number and percentage of people who believe that the majority of their friends and community members practice the behavior	Project Records Annually	Country VC Intervention Type	N/A	N/A								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.7	Environmental compliance												
1.7.1	Number and percentage of SEAs (with EMMPs) or Letter Reports submitted at least 60 days prior to the commencement VC campaigns	Project Records Annually	Country	1; 100%	1; 100%								
1.7.2	Number and percentage of permanent and mobile soak pits inspected and approved prior to IRS campaigns	Project Records Annually	Country Soak Pit Type	34; 100% Fixed Soak pits: 34	36; 100% Fixed Soak pits: 36								
1.7.3	Number and percentage of storehouses inspected and approved prior to IRS campaigns	Project Records Annually	Country Storehouse Type	Storehouse: 37; 100%	Storehouse: 37; 100%								
1.7.4	Number and percentage of fixed soak pits that are compliant with PMI's Best Management Practices	Project Records Annually	Country	34; 100%	36; 100%								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results										
				Year 1		Year 2		Year 3		Year 4		Year 5		
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result	
2. Entomological and Epidemiological Data to Drive Decision-Making														
2.1	Vector control activities monitored via entomological and epidemiological data													
2.1.1	Number and percentage of project-supported entomological sentinel sites established to monitor vector bionomics and behavior (vector species, distribution, seasonality, feeding time, and location)	Entomological Reports Annually	Country VC Intervention Type	19;100%	19 ¹¹ ;100%									

¹¹ PMI supported a total of 19 sentinel sites from January to September 2018. Starting in October 2018, only 7 sentinel sites will be supported by PMI.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
2.1.2	Number and percentage of entomological monitoring sentinel sites measuring all five basic PMI entomological monitoring indicators (i.e., species composition, abundance, and seasonality of malaria vector; insecticide susceptibility and resistance intensity; mechanism of resistance; quality assurance and residual efficacy monitoring of IRS programs; or vector behavior: feeding time and location)	Entomological Reports Annually	Country VC Intervention	19;100%	19;100%								
2.1.3	Number and percentage of entomological monitoring sentinel sites measuring at least one advanced PMI indicator (i.e., identification of mosquito infectivity; parity rates; or blood-meal analysis)	Entomological Reports Annually	Country VC Intervention	19; 100%	19;100%								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
2.1.4	Number and percentage of insecticide resistance testing sites that tested at least one insecticide from pyrethroid, organophosphate, carbamate, clothianidin, and chlorfenapyr insecticides	Entomological Reports Annually	Country Insecticide Type	12;100%	12 ¹² ;100%								
2.1.5	Number of wall bioassays conducted within two weeks of spraying to evaluate the quality of IRS	Entomological Reports Annually	Country	24	30 ¹³								
2.1.6	Number and percentage of cone bioassays conducted within two weeks of spraying with greater than 98% test mortality recorded	Entomological Reports Annually	Country	1; 100%	1; 100%								

¹² All four classes of insecticide were tested except clothianidin and chlorfenapyr.

¹³ The extra six houses were tested during September 2018 in one of our operational sites (Mushikiri sector) where we suspected poor quality spraying.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
2.1.7	Number of wall bioassays conducted after the completion of spraying at monthly intervals to evaluate insecticide decay	Entomological Reports Annually	Country Insecticide Type	11(30 houses)	11(30 houses ¹⁴)								
2.1.8	Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites	Entomological Reports Annually	Country Insecticide Type	4 replicates per 6 insecticides	4 replicates per 6 insecticides								
2.1.9	Number of countries with an integrated VC analytics dashboard available for decision making	Project Records Annually	Country	N/A	N/A								
2.1.10	Number of staff (VectorLink-contracted or non-VectorLink) trained in entomological monitoring	Project Training Records Annually	Country Sex (# and %) Job Function	20	66								

¹⁴ In addition to tests being conducted in Nyagatare and Kirehe, we are conducting wall bioassays in Gisagara district since spraying was implemented there in October 2017.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
2.2	NMCPs develop country-level IRS and other malaria vector control strategies												
2.2.1	Number and percentage of countries with an integrated malaria vector control strategy, including a plan for monitoring and managing insecticide resistance supported by the project	Project Records Annually	Country	0	1								
2.2.2	Number and percentage of countries with integrated data and visualization landscaping for VC decision making complete	Project Records Annually	Country	N/A	N/A								
2.2.3	Number and percentage of countries that implement sub-national insecticide as part of an insecticide resistance management strategy	Project Records Annually	Country	0;	0								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
2.3	Build capacity of NMCPs and local institutions to collect, analyze, and use data for strategic malaria control decision-making												
2.3.1	Number of individuals trained from NMCPs and national institutions to review and interpret data for integrated vector control decision making	Project Training Records Annually	Country Job Function Organization	N/A	N/A								
2.3.2	Proportion of targeted individuals who report using new analytical tools and/or skills in their planning, resourcing, implementation, or measurement activities	Capacity Assessments Thrice Over Project Life	Country Job Function Organization	100%	N/A								
3. Procure insecticides for IRS and support the delivery and storage of IRS and other malaria vector control products													
3.1	Cost-effective procurement mechanism established												
3.1.1	Number and percentage of insecticide procurements that had a pre-shipment quality assurance/quality control test at least 60 days prior to spray campaign	Procurement Records Annually	Country Insecticide Type	1; 100%	1; 100%								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
3.1.2	Number and percentage of insecticide procurements received on-time to allow for the initiation of spray operations as scheduled	Procurement Records Annually	Country Insecticide Type	1; 100%	1; 100%								
3.1.3	Number and percentage of targeted countries with international equipment procurements, including PPE, received on-time to allow for the initiation of VC campaigns as scheduled	Procurement Records Annually	Country VC Intervention Type	1; 100%	1; 100%								
3.1.4	Number and percentage of targeted countries with local procurements for PPE received on time to allow for the initiation of spray operations as scheduled	Procurement Records Annually	Country	1; 100%	1; 100%								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
3.1.5	Number and percentage of countries with PPE procured according to workforce composition	Procurement Records Annually	Country	N/A	N/A								
3.2	Robust inventory management and logistics systems established												
3.2.1	Number and percentage of logistics and warehouse managers trained in vector control supply chain management	Project Training Records Annually	Country VC Intervention Type Sex	47 Males:20 Females:27	40 Males: 12(30%) Females: 28(70%)								
3.2.2	Number and percentage of operational site warehouses where physical inventories can be verified by daily stock records	Inventory and Stock Records Annually	Country Insecticide Type	37; 100%	37(100%)								
3.2.3	Number and percentage of IRS countries that successfully completed spray operations without an insecticide stock-out	Inventory and Stock Records Annually	Country Insecticide Type	1; 100%	1; 100%								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
4. Innovation													
4.1	Conduct operational research or monitoring to scale up new tools, methods, and approaches												
4.1.1	Number of operational research studies on promising new tools or new methods/approaches to existing tools that are implemented	Project Records Annually	Type of Innovation	TBD	0								
4.2	Create and share knowledge through dissemination of best practices and lessons learned												
4.2.1	Number of innovations, best practices, and other data or lessons learned shared with other partners or international institutions for global reporting on the Vector Learning Exchange	Project Records Annually	Country Technical Area	TBD	0								
4.2.2	Number of individual members who use the Vector Learning Exchange	Project Records Annually	N/A	TBD	0								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
4.2.3	Number of symposia and/or presentations submitted to and accepted at global conferences	Project Records Annually	Country Technical Area	TBD	1 ¹⁵								
4.2.4	Number of success stories written or videos produced and shared on the VectorLink project website	Project Records Annually	Country	TBD	0								
4.2.5	Number of peer-reviewed journal articles submitted and accepted	Project Records Annually	Technical Area	TBD	0								
4.2.6	Number of critical guidance, standards, or plans that incorporate disseminated findings/best practices	Project Records Annually	Technical Area	TBD	1								

¹⁵ The Entomology coordinator presented an abstract called: '*Plasmodium sporozoite infection rates among primary and secondary malaria vectors in Rwanda*' during the '5th PAMCA annual meeting' held in Harare/Zimbabwe in September 2018

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
4.3	Develop and deploy cost-savings approaches												
4.3.1	Number of innovative or novel approaches implemented to achieve cost savings in IRS and integrated malaria vector control programs	Project Records Annually	Country VC Intervention Type	1 ¹⁶	1								
4.3.2	Number of cost-effectiveness assessments of existing approaches in the implementation of IRS and integrated malaria vector control programs	Project Records Annually	Country VC Intervention Type	TBD	1								
4.4	Cultivate public-private partnerships												
4.4.1	Number of private sector entities engaged with to establish public-private partnerships to increase the quality and coverage of malaria VC activities globally	Project Records Annually	Country Private Sector Organization	1	3 ¹⁷								

¹⁶ This indicator is referring to the walk to work strategy.

¹⁷ Those are: (1) ROTASSAIRWA (private), (2) EnviroServe Rwanda Green Park (private) and (3) Cards from Africa (private)

ANNEX I: SUCCESS STORY

IRS SUSTAINABILITY INITIATIVE IN RWANDA

To help Rwanda achieve the goal of reaching sustainability in IRS, the VectorLink Rwanda Project's indoor residual spraying (IRS) campaign in September 2018 devised a combination strategy of vehicles and the Walk to Work strategy in all of its 34 operational sites. Adoption of the Walk to Work strategy was intended to reduce the cost of vehicles used to transport spray operators during spray operations.



Spray operators in team A on foot to find houses

such as laptop computers, which VectorLink Rwanda badly needed especially for IRS data entry, and a projector.

Each IRS operational site was divided into two zones, A and B. Zone A comprised villages within a walkable distance. Zone B comprised villages far from the operational site, which required vehicles to transport spray teams.

The above strategy has additional benefits, which include reducing the project's carbon emissions and benefiting the health of IRS seasonal support staff by promoting physical activity and mitigating risks associated with motor vehicle accidents.

By instituting this strategy, VectorLink Rwanda saved approximately US\$18,480 in transportation costs for the 2018 spray campaign. These savings paid for its consultancy to help the Ministry of Health revise the National Strategic Plan for Insecticide Resistance Management (2013-2017). The savings also were used to procure replacements for obsolete equipment and tools