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THE PMI VECTORLINK PROJECT RWANDA

2019-2020 END OF SPRAY REPORT

SPRAY CAMPAIGNS:
SEPTEMBER 2-24, 2019
JANUARY 20-FEBRUARY 11, 2020

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Abt Associates Inc. | 6130 Executive Blvd | Rockville, Maryland 20814
T. 301.347.5000 | F. 301.913.9061 | abtassociates.com

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ACRONYMS

AIRS	Africa Indoor Residual Spraying
BMP	Best Management Practices
CFV	Control Flow Valve
CHW	Community Health Worker
DCV	Data Collection Verification
DOS	Directly Observed Spraying
ECO	Environmental Compliance Officer
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
OP	Organophosphate
PMI	President's Malaria Initiative
PNP	Plastered and Not Painted
PP	Plastered and Painted
PPE	Personal Protective Equipment
PTS	Performance Tracking Sheet
RBC	Rwanda Biomedical Center
SBCC	Social and Behavior Change Communication
SEA	Supplemental Environmental Assessment
SOPs	Spray Operators
SOP	Standard Operating Procedure
TL	Team Leader
ToT	Training of Trainers
USAID	United States Agency for International Development
VC	Vector Control
VL	VectorLink
WHO	World Health Organization
WMP	Waste Management Plan

EXECUTIVE SUMMARY

Abt Associates supports the implementation of indoor residual spraying (IRS) in Rwanda through the PMI VectorLink Project funded by the United States Agency for International Development (USAID) under the U.S. President's Malaria Initiative (PMI). The objective of the PMI VectorLink Project is to support the planning and implementation of IRS programs, and other proven life-saving malaria vector control interventions. To achieve this objective, VectorLink (VL) Rwanda conducted IRS from September 2-24, 2019, in Rwanda's Kirehe and Nyagatare districts, and from January 20 - February 11, 2020, in Ngoma district. The project targeted 298,018 structures in 40 sectors in the three districts (12 in Kirehe; 14 in Nyagatare and 14 in Ngoma) for blanket coverage using Fludora Fusion insecticide (clothianidin/deltamethrin). The spray campaign lasted 20 operational days in each district (see Table ES-1). At the request of the Government, VL Rwanda also sprayed Mahama refugee camp in Kirehe district from September 21-23, 2019; the project targeted 6,780 structures in Mahama Refugee Camp. The Ministry of Health (MOH) provided the insecticide and VL Rwanda covered all operational costs, including data entry management. Virtually all (7,387 of 7,410) structures and shelters found in the camp were sprayed, for a 99.7% coverage rate (see Table ES-2).

Table-ES-1: 2019 IRS Campaign Summary: Kirehe, Nyagatare and Ngoma

Number of districts covered by PMI-supported IRS	3 districts (Kirehe, Nyagatare and Ngoma)
Insecticide	Fludora Fusion
Number of structures sprayed by PMI-supported IRS	307,130
Number of structures found by PMI-supported IRS	312,362
Spray coverage	98.3%
Population protected by PMI-supported IRS	1,229,657 (16,871 pregnant women; 167,492 children under 5 years old)
Dates of PMI-supported IRS campaign	September 2-24, 2019 (Kirehe, Nyagatare) January 20-February 11 (Ngoma)
Length of campaigns	20 days
Number of people trained with U.S. government funds to deliver IRS*	2,874(1,413 males and 1,461 females)

*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: 2019 IRS Campaign Summary: Mahama Refugee Camp

Number of districts covered by PMI-supported IRS	1 (Kirehe; specifically, Mahama refugee camp)
Insecticide	Fludora Fusion
Number of structures sprayed by PMI-supported IRS	7,387
Number of structures found by PMI-supported IRS	7,410
Spray coverage	99.7%
Population protected by PMI-supported IRS	59,295 (1,622 pregnant women and 11,600 children under 5)
Dates of PMI-supported IRS campaign	September 21-23 , 2019
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.

Below are the key project achievements and highlights.

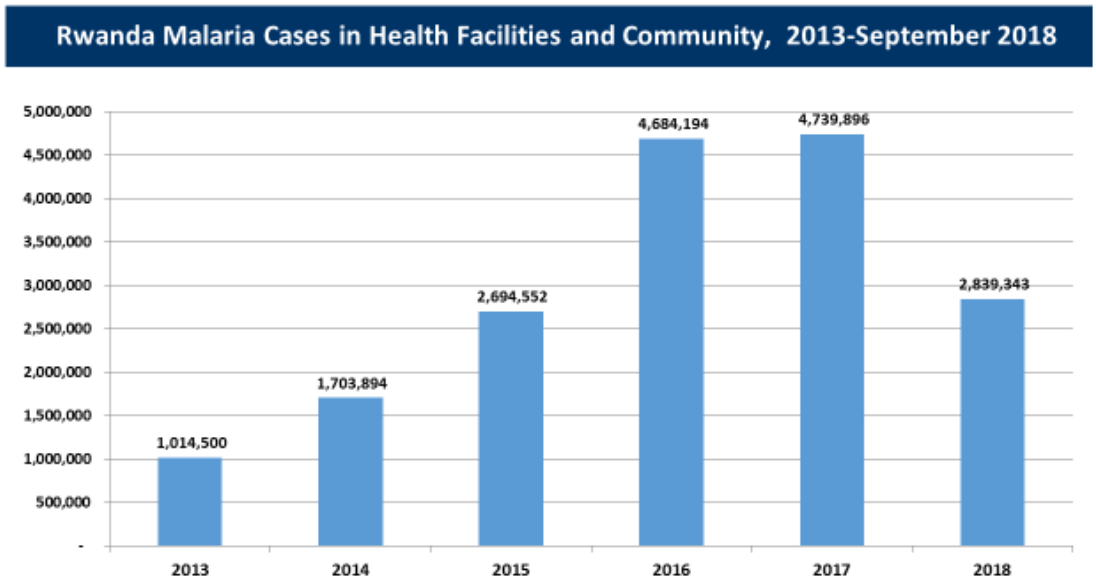
- Sprayed 307,130 out of 312,362 structures found by spray operators (SOPs), accounting for a coverage rate of 98.3%. Included within this total are 244 dormitories in 44 schools in Kirehe, Nyagatare, and Ngoma, protecting 15,207 people, including students, police, prisoners and military personnel.
- In total, 1,229,657 people were protected, including 167,492 (13.6%) children under five and 16,871 (1.4%) pregnant women. Prior to the spray campaign, VectorLink Rwanda mobilized 77,248 structures during door-to-door mobilization in Ngoma district.
- In Mahama refugee camp, 59,295 people were protected, including 11,600 (19.6%) children under five and 1,622 (2.7%) pregnant women.
- Trained 4,376 individuals to implement IRS activities in the two districts. Of this number, 2,312 (1,108 males and 1,204 females) were SOPs, 438 (234 males and 204 females) were team leaders (TLs). The breakdown of trainees by gender shows that more than half (51.1%) of the SOPs and TLs trained were female. Overall, 40.1% (n=1,756) of all IRS personnel trained for the 2019 and 2020 campaign were female.
- Used 239,974 sachets of insecticide to spray the 307,130 structures in Kirehe, Nyagatare and Ngoma, a utilization ratio of approximately 1:1.3 (bottles to structures sprayed). Used 450 sachets of insecticide to spray 244 dormitories in Kirehe, Nyagatare and Ngoma.
- Incinerated all IRS contaminated waste (4593 kg), including 52414 used masks and 240,406 empty sachets in respective district hospitals incinerators. A total of 211 helmets and assorted plastic items (damaged barrels, jerry cans, and basins) were sent to ROTASSAIRWA recycling plant. Donated 1,986 uncontaminated cardboard boxes to Cards from Africa Company in Samuduha. Disposed e-wastes of 1,850 dry cell batteries at Enviroserve Rwanda Green Park. The Rwanda E-waste recycling facility at Bugesera, and other non-contaminated wastes were disposed at Nduba landfill dumping site
- Conducted cone wall bioassays within one week of spraying. Knockdown after 30 minutes ranged between 35% and 95%, depending on structure surface type. After 60 minutes, knockdown ranged between 65% and 100%. The spray quality assessment results showed 100% of exposed mosquitoes to all structure types were killed after the standard 24-hour holding time except in Nyagatare, where on painted plaster the mortality was 90%, however, after 48 hours it reached 100%. In Zaza, on mud the mortality rate 24 hours post exposure was 95%, but reached 100% after 48 hours.
- Assessment of the fumigant effect of Fludora Fusion within one week of spraying showed the fumigant effect varied between 35%-100%, 75%-100%, 95%-100% and 100% after 24, 48, 72 and 96 hours holding time, respectively.

1. Country Background

Rwanda's entire population of approximately 12 million[1] is at risk of malaria, including an estimated 1.8 million children under five years and 450,000 pregnant women.[2] 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 more than 50 percent. From 2008 to 2011, malaria had moved from third to eleventh place as cause of death of children under five. Nevertheless, malaria incidence overall increased from 1,014,500 reported cases in 2013 to 4,739,896 in 2017, followed by a decline in 2018 (Figure 1). The increase in malaria cases was observed in all provinces with the largest increases recorded in the Eastern and Southern provinces.[3] The Rwanda Bio-Medical Center (RBC)/Malaria and Other Parasitic Diseases Division (MOPDD) of the Rwanda MOH therefore chose to target malaria control interventions nationally, with certain interventions focused on high-prevalencei 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.

Rwanda has implemented IRS as one of the malaria control strategies 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 PMI reverted back to blanket coverage because of increases in malaria caseloads.

Figure 1: 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

PMI has supported 19 rounds of spray campaigns since IRS started in Rwanda. In the September 2019 and January/February 2020 spray campaigns, VL Rwanda sprayed three districts, Kirehe (12 sectors), Nyagatare (14 sectors) and Ngoma (14 sectors) using Fludora Fusion. A total of 298,018 structures were targeted for spraying. Spray campaigns implemented by VL Rwanda since 2012 are summarized in Table 1.

Table 1: PMI-Supported Campaigns Since 2012

Year	Month	Number of Districts	Structures Sprayed	Population Protected	Insecticide Used
2012	Aug/Sep	3	236,610	1,025,181	Pyrethroid/Deltamethrin
2013	Feb/Mar	3	121,154	522,315	Pyrethroid/ Deltamethrin
	Sep/Oct	3	224,708	957,027	Pyrethroid/Deltamethrin
2014	Feb/Mar	3	123,919	512,789	Carbamate/Bendiocarb
	Sep/Oct	3	173,086	705,048	Carbamate/Bendiocarb
2015	Feb/Mar	2	127,150	517,194	Carbamate/Bendiocarb
	Sep/Oct	4	215,981	889,326	Carbamate/Bendiocarb
2016	Feb/Mar	2	147,947	618,696	Carbamate/Bendiocarb
	Sep/Oct	2	198,970	812,714	OP/Actellic 300CS
2017	Sep/Nov	3	231,258	919,735	OP/Actellic 300CS
2018	Sep/Oct	2	214,802*	894,098*	OP/Actellic 300CS
2019	September	2	221,712*	915,034*	Fludora Fusion (FF)
2020	Jan/Feb	1	92,805	373,918	Fludora Fusion (FF)

OP=organophosphate
*The numbers for the September 2019 campaign include the sprayed structures and population protected in Mahama Refugee Camp.

2. Pre-Season Activities

2.1 Selection of IRS Districts and Sectors

VL Rwanda in collaboration with the MOPDD and PMI designated three districts (Kirehe and Nyagatare in September 2019 and Ngoma in January/February 20200) for district-wide IRS campaigns (Figure 2). The initial selection was based on the malaria burden reported in epidemiological data from health facilities. The Government of Rwanda has committed to sustaining IRS in these districts in order to maintain the reductions seen following IRS. VL Rwanda targeted 298,018 structures for spraying, which would protect a total population of 1,190,704 (Table 2). A request to spray Mahama Refugee Camp was later made to VectorLink Rwanda and the project targeted 6,780 structures with 53,325 residents.

Figure 2: Map of Rwanda Showing the Three IRS Target Districts

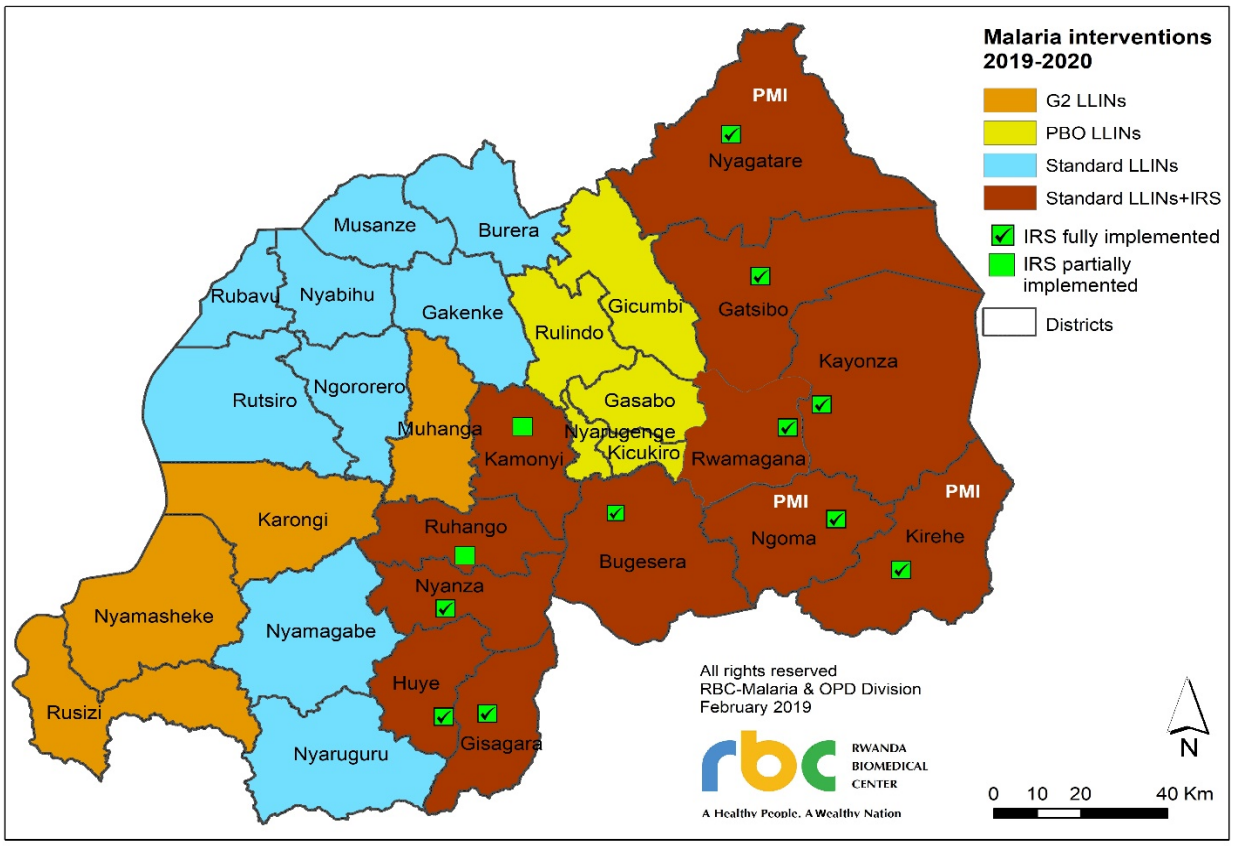


Table 2: Targeted Structures and Population for IRS in 2019-2020

District	Number of Sectors	Number of Targeted Structures	Targeted Population		
			Female	Male	Total
Kirehe*	12 of 12	88,910	170,085	185,172	355,257

District	Number of Sectors	Number of Targeted Structures	Targeted Population		
			Female	Male	Total
Nyagatare	14 of 14	119,777	231,179	245,299	476,478
Ngoma	14 of 14	89,331	197,433	161,536	358,969
Total	40 of 40	298,018	598,697	592,007	1,190,704

**These numbers do not include Mahama refugee camp because it was not part of the original Rwanda work plan.*

2.2 Enumeration and Setting Targets

All eligible structures were recorded two weeks prior to the spray operation in Kirehe, Nyagatare and Ngoma districts. The district coordinated village IEC materials (village forms) issued to the sector social affairs leaders who in return distributed them to village mobilizers to enumerate all eligible structures in their respective villages. The involvement of new mobilizers, such as youth volunteers, reserve CHWs and Social and Economic Development Officers, made mobilization more effective because they helped enumerate all structures in their respective village zones. In the previous years, two village leaders were responsible for enumerating structures and community mobilization, which proved challenging. Some villages were too large to be mobilized by only two people, in other areas the distances among homes is large, and finally, not all village leaders are available during IRS. As per MOPDD requirement the system of using two village leaders (head of the village and security in-charge) in IEC activities at village level was maintained in Ngoma District.

2.3 District Planning Meetings

Following the MOH's decision to conduct blanket coverage of the three districts, VL Rwanda deepened its collaboration and coordination with stakeholders. On July 17-18, 2019, the project held one-day micro-planning meetings in Nyagatare and Kirehe, respectively, and on November 28, 2019, in Ngoma district to discuss and develop an IRS operational plan and 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 three meetings. Issues discussed included:

- Criteria for SOPs and mobilizers selection/recruitment;
- Information, Education and Communication (IEC)/new community mobilization strategy for IRS;
- Community leaders' and other diverse groups and clubs 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.

The appropriateness of IRS operational sites was reviewed, discussed, and agreed upon. Each sector with more than 60 SOPs had a second soak pit added to facilitate wash activities and reduce water flush in a single soak pit. Three sectors had two soak pits at the site.

2.4 Insecticide Selection

VL Rwanda used Fludora Fusion, a formulated combination of clothianidin (neonicotinoid) and deltamethrin (a pyrethroid), during the 2019-2020 IRS campaigns. This was the first spray round in which this insecticide was used in the districts. VL Rwanda based its selection on data from insecticide susceptibility assays in 2019 and the MOH's recognition of Fludora Fusion as a new insecticide for use in the country (see Annex A). The assays showed that the predominant local vector species (*Anopheles gambiae* s.l.) exhibited high levels of susceptibility to the clothianidin.

To manage insecticide resistance, specifically to pyrethroid insecticides, 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 B).

2.5 Logistics Needs Assessment

The central VL 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. VL Rwanda reviewed the inventory records from the previous IRS campaign and assessed logistics needs in April-May 2019, including:

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

2.6 Procurement

VL Rwanda procured both international and local commodities for the three districts, including 239,590 sachets of Fludora Fusion and other IRS commodities. Local procurement involved an open competitive tendering process in which VL 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 (see Annex C).

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.

2.7 Human Resources

Table 3 lists the seasonal support staff recruited and deployed by VL Rwanda for this year's spray campaigns. Selection criteria for SOPs and team leaders (TLs) were as follows: 1) a resident of the sector; 2) a community health worker (CHW); 3) ability to read and write; and 4) less than 40 years of age.

All SOPs, washers, and supervisors underwent medical tests prior to IRS training to ensure their fitness to participate in the IRS operations. 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 20 SOPs were unfit for IRS operations. Seventeen of the SOPs who were pregnant were assigned to positions that do not involve insecticide contact. Three were found to have high blood pressure at an advanced stage.

As Table 3 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; two of the three CHWs in each village are female. In addition, the project employed four 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 female IEC mobilizers, and the total lack of female drivers. These local government roles and driving responsibilities tend to be perceived as men's roles because they require more hours and working at night.

Table 3: Seasonal IRS Staff Hired

Staff Position	Total		Total	% Females Hired
	Male	Female		
District IEC Assistants	1	2	3	66.6%
Data Clerks	21	15	36	41.7%
M&E Assistants	0	3	3	100.0%
Data Cleaners	10	3	13	23.1%
District Storekeepers	0	3	3	100%
Sector Storekeepers	22	26	48	54.2%
Logistics Assistants	1	4	5	80%
Finance Assistants	2	2	4	50%
Sector Coordinators	35	13	48	25%
Sector Supervisors	25	23	48	50%
Sector IEC Assistants	18	30	48	60.5%
Spray Operators	821	891	1712	52.0%
Team Leaders	227	199	426	46.7%
Security Guards	96	4	100	4%
Washers	54	104	158	65.8%
Cell IEC Mobilizers	50	14	64	21.8%
Village IEC Mobilizers	833	112	945	11.8%
Pump Technicians	3	3	6	50.0%
Cleaners	3	2	5	40.0%
Total	2,222	1,453	3,675	39.3%

2.8 TRAINING

Before spray operations began, VL Rwanda collaborated with MOPDD to train personnel involved in IRS. Training on IRS implementation and supervision is central to the overall capacity-building strategy of the PMI VectorLink Project. A variety of trainings were held to develop and/or refresh skills of IRS personnel on IRS implementation for the 2019-2020 IRS campaigns.

The project organized and conducted the SOP and TL trainings on August 28-30, 2019, in Kirehe and Nyagatare districts and on 13-18 January, 2020 in Ngoma district. The trainees included a mix of new and previously-trained SOPs and TLs with IRS experience. All three districts (Nyagatare Kirehe and Ngoma) employed large number of new spray operators in 2019-2020 with several operational sites having nearly 50% seasonal workers who had not worked in IRS in previous spray rounds.. The major objective of the training was to equip the SOPs and TLs with the skills to conduct a high-quality IRS campaign.

VL Rwanda identified suitable training sites, reviewed the IRS training curricula and training materials and condensed the curricula for the training of trainers (ToT) for two days from five days and the number of days for SOPs training were reduced from five days to three days. Team leader training remained one day, as usual. The trainings were conducted in close collaboration with district and sector authorities. VL Rwanda rented only two sites in Nyagatare district (Mimuri and Nyagatare). Sector authorities provided all 24 training venues free of charge in Nyagatare and Kirehe, respectively. All operational sites in Ngoma district were provided free of charge including the one district warehouse. The project trained 2,312 SOPs and 438 TLs using 124 facilitators (who had attended ToT) to conduct the training. See Annex G for details.

Table 4 lists each type of IRS training conducted, a description of topics it covered, and its duration. Table 5 shows the number of people trained, disaggregated by gender. More detailed information by district and types of trainings can be found in Annex G.

Table 4: Category/Staff, Description, and Duration of Trainings

Type	Description of Training	Duration
Training of Trainers/ Supervisors (124)	Collaborated with the MOPDD on a two-day ToT training for IEC Assistants in Kigali on August 6-7, 2019. 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 and new cadres which were added in (youth volunteers, reserve CHWs and Social and Economic Development Officers). The second objective was to plan, coordinate, and supervise IRS-related IEC activities. The training had both theory and practical sessions, including IRS mobilization and the completion of data collection tools. The training also covered how to develop and update a community mobilization plan. Finally, in order to mitigate potential resistance of beneficiaries to a new insecticide, the training laid out the key messages to be communicated to IRS beneficiaries: that it has no side effects on human beings, that it doesn't smell, and lasts 12 to 13 months on walls. The MOPDD facilitated the following sessions: introduction to malaria, malaria prevention and control interventions, the malaria burden in Rwanda, and mosquito characteristics.	2 days
Team Leaders (438)	Trained how to facilitate TL trainings at sector levels, especially on supervision of spray techniques, b) team leadership skills, c) how to use the digitalized checklists in supervising the spray quality, and d) how to provide feedback to the SOPs after supervision.	1 days
Spray operators (2,312)	Topics included: introduction to malaria control; using the new SOPs form; distribution of structure cards; recording of unsprayed structures; spray techniques and use of control flow valves (CFVs); handling and managing insecticides including steps of mixing Fludora Fusion; handling and maintaining spray pumps; personal and environmental safety; IRS Walk to Work Strategy; new community mobilization strategy; SOP field simulation training; data collection and filling out of data collection forms; and basics of IEC for IRS.	3 days for Nyagatare and Kirehe districts and 5 days for Ngoma district
M&E Assistants and Data entry clerks (44)	Trained on the familiarity with data collection forms (Daily Spray Operator and Team Leader forms, and the Spray Quality Checklist), understanding key IRS definitions (e.g., eligible structure) and indicators and responsibilities, reviewing collected data and spotting irregularities, timely, consistent, and accurate reporting, setting appropriate and realistic reporting timelines, and establishing back-up reporting/ communication protocols and VectorLink database and security protocols.	3 days
IRS capacity building for	In collaboration with the MOPDD conducted capacity strengthening for district managers in June 2019. The three-day training on IRS operations implementation covered an	3 days

Type	Description of Training	Duration
District and Sector Managers (130)	overview of malaria and its control; the mosquito development cycle, needs assessments and quantification, environmental compliance, spray quality, and new developments in IRS. The goal of the training was to ensure that participants can successfully explain and implement current IRS best practices, train and supervise spray operators, store keepers, community mobilizers and other seasonal workers at the district level. The training equipped participants with adequate knowledge and skills in environmental compliance and basic IRS to ensure environmental compliance standards are followed. The training also aimed to improve participants' training/facilitation and supervision skills so they can assure quality of IRS implementation.	
Clinicians (61)	Clinicians were recruited from at least one key health facility from each target district. The training focused on insecticide poisoning management, poisoning prevention and mitigation practices, and health hazards and their management.	1 day
Logistics (38)	Topics covered: individual roles and responsibilities in IRS logistics; warehouse and commodity management; store management and recordkeeping; IRS transportation management; management of food vendors; IRS water management for cleaning PPE and progressive rinsing; soak pit management; environmental compliance; and understanding and preparing for post IRS activities. Storekeepers were trained on store and inventory management, including chain of command protocols, limiting authorized entry, and use of stock cards.	1 day
Finance (3)	Before the start of spray operations, trainees were briefed on their responsibilities to ensure efficient management of funds and facilitation of logistical support. Responsibilities included: distribution and collection of signed contracts from all 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 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 seasonal staff received payments; collection of invoices from food vendors and conveyance to project finance office for payment; and collection and reconciliation of IRS vehicle logs sheets.	1 day
Fire and Security (100)	Security guards received an orientation on fire security and general security protocol for IRS stores.	1 day
Drivers (93)	Trained IRS drivers on transporting SOPs to and from the field, safety procedures while transporting insecticides, (in particular, what to do if an accident causes an insecticide spill), and the use of first aid kits. After completing the training, drivers and vehicles were registered and issued VectorLink-branded certificates of training as well as ID cards and decals for easy verification by supervisors.	1 day

Table 5: Number and Type of People Trained to Support IRS, by Gender and Job Category

Category	Total	Males	Females	Total (% Female)
Team Leaders	438	234	204	46.6%
Spray Operators	2,312	1,108	1,204	52.1%

Facilitators	124	71	53	42.7%
Sector Coordinators	34	25	9	26.5%
Sector Supervisors	54	31	23	42.6%
Sector IEC Assistants	34	14	20	58.8%
District IEC Assistants	2	1	1	50%
Logisticians and Storekeepers	38	16	22	55%
Adverse Effects Teams (Clinicians)	61+	43	18	29.5%
Cell IEC Mobilizers	510	14	654	21.5%
Village IEC Mobilizers	825	109	934	11.7%
Drivers	93	93	0	0.0%
Security Guards	100	96	4	4%
Data Entry Clerks/M&E Assistants	44	25	19	43.2%
Finance Assistants	3	1	2	66.6%

3. INFORMATION, EDUCATION, AND COMMUNICATION

3.1 DOOR-TO-DOOR MOBILIZATION

The project conducted two days of door-to-door enumeration of structures in each targeted village sprayed in Kirehe and Nyagatare districts between August 31 and September 24, 2019, and in Ngoma district, the project conducted enumeration and mobilization from January 20 to 11 February 2020. The trained IEC mobilizers presented IRS messages to the owners of eligible structures and collected data using the IEC Mobilizer form and communicated the dates of spraying to the structure owners. The sector coordinator and sector IEC assistants, with support from the sector and cell social affairs officers, oversaw implementation of this activity. They also reviewed the data collected and ensured accuracy and completeness.

VL Rwanda conducted orientation of sector-level IEC mobilization trainings on August 29, 2019, in Kirehe and Nyagatare districts on a daily basis with a new strategy of calling all village leaders in a cell that is to be sprayed for orientation trainings. The trainees were village and cell leaders whom VL Rwanda had recruited based on the following criteria: a cell or village leader and/or in charge of security at the village level should be originating from that village of operation, should be a village committee member, i.e. village leaders and/or in charge of security and capable of reading and writing; has good conduct, respectable, 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. VL Rwanda mobilized structures with a 1 percent IRS refusal rate overall. Key factors driving the low refusal rate include a very high level of collaboration and support from local leadership and understanding in the community of the effectiveness of IRS.

Figure 3: House Marking of Eligible Structure during Mobilization

3.2 IEC Coordination

Local leaders at all levels readily provided support during the entire period of spraying campaigns. Sector executives, social affairs officers and sector community health workers 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. The Sector IEC Assistants and sector coordinators worked closely with sector and cell social local leaders to supervise IEC activities at the sector level.

VL Rwanda piloted a free-of-charge mobilization strategy that used diverse volunteer groups and clubs such as community health workers, youth volunteers, policing, cell and village leaders, those in-charge of security at village level, and the head of *Isibo* (a village group comprised of between 15 and 20 households) to mobilize their neighbors and friends for IRS in Kirehe and Nyagatare. The objective was to promote sustainability of IRS and for cost-savings purposes with the added benefit of promoting community ownership and the journey to self-reliance. Despite, its successful execution, PMI VectorLink Rwanda will return to the payment structure as advised by the Government of Rwanda through its MOPDD. The compensation of two IEC mobilizers at village level (the elected head of village and in charge of security) was reinstated in January –February 2020 with Ngoma district and will continue with future IRSs.

During the September 2019 spray campaign, the spray operators carried IRS cards and issued them to the households on same day of spraying. The supervision team ensured that all volunteers involved mobilized all eligible structures and informed homeowners about the date of spraying at least a day in advance. IEC teams worked according to the updated IRS schedule each day.

On the day of spraying, all volunteers 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. All volunteers also noted structures that were not sprayed on the planned day and coordinated with SOPs to spray them the following day.

3.3 Other IEC Activities

3.3.1 IRS Launch

VL Rwanda organized an official launch of IRS operations in Kirehe and Nyagatare districts in September 2019, and in Ngoma district in January 2020. Among the participants were: district, sector, cell and village authorities and representatives from schools, health facilities, the armed forces (army and police), private sector, the media, and communities. Representatives from the Mahama refugee camp in Kirehe also took part in the respective launch. The launch events were broadcast on Rwanda national radio and covered on evening news headlines on two major television stations: Rwanda Television and TV10. In Ngoma district, the IRS launch was attended by the US Ambassador to Rwanda, Ambassador Peter Vrooman, and a delegation from US Embassy. The Ambassador visited a community health room where malaria is diagnosed and treated in the village by a community health worker (CHW). Due to an increase in malaria cases, Ngoma district instituted a new approach where CHWs are treating malaria in a room dedicated to integrated community case management within CHWs' homes. In addition, the Ambassador had an opportunity to dress in Personal Protective Equipment (PPE) and participated in the spray demonstration inside a house (using water) in Rurenge sector).

3.3.2 Community Mobilization by Local Leaders

Early advocacy and engagement by both VL Rwanda and 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 any IRS refusals. The cell social affairs officers supervised the mobilization activities in their respective cells. In past spray campaigns, VL Rwanda experienced some refusals at district centers. This

did not happen in the 2019 spray campaign because all district and sector authorities, including all health facilities, actively participated in community mobilization.

Additionally, during micro-planning meetings, VL 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. This happened in Nyagatare sector whereby the district mayor got involved and called for meeting of all sector leaders to explain why mobilization was not being done well.

Four live radio talk shows were aired on radio stations (two on Radio Rwanda Nyagatare Branch and two on Radio Izuba) free of charge by the targeted districts' administrations from August 29 to September 18, 2019 and January 20 to February 11, 2020. The live radio talk shows were aimed at sensitizing the community to accept IRS and allow their homes to be sprayed. Specific messages included 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 three IRS district offices and at all 48 operational sites. The message on the banners was "*Birakureba*" (Kinyarwanda for "This concerns you"). In addition, the Government of Rwanda provided a big truck loaded with loud speakers, dancers and singers for two days in Ngoma district to raise community awareness about IRS through entertainment.

4. IMPLEMENTATION OF IRS ACTIVITIES

4.1 IRS WALK TO WORK STRATEGY

VL Rwanda implemented a combination of "Walk to Work" and vehicle transport strategies in all 34 operational sites of Nyagaatare and Kirehe to reduce the cost of vehicles used to transport SOPs during spray operations. In doing so, the project reduced carbon emissions. To implement the strategy, spray teams were divided into zones A and B. To foster equal treatment, spray teams alternated zones depending on how fast the SOPs finished spraying a specific village. Zone A comprised villages within walkable distances from operational sites and Zone B comprised villages farthest away, which required truck transport for the spray teams. Midway 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.

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

- Average time SOPs took to reach the villages, spray the daily average of 10 structures, and report back to the operational site reduced from five to three hours in first 10 days of the campaign. The general feedback was that most SOPs liked the strategy because it enabled them to end 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 targets 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 the wettable power insecticide (Fludora Fusion) is lighter and significantly reduced the load to be carried by the SOPs compared to 2018, and spray teams alternated between zones A and B.

4.2 IRS SUPERVISION

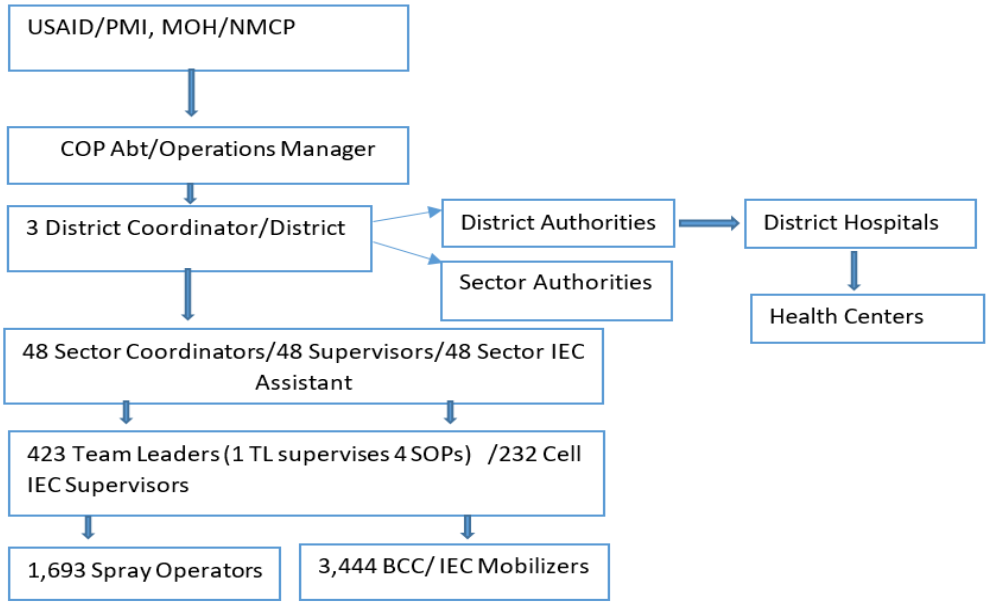
VL Rwanda implemented a supervision plan to ensure consistency and coordination of supervision and proper follow-up of corrective measures to improve spray operations performance. VL Rwanda, MOH/MOPDD, PMI, and local authorities at both the district and sector levels supervised IRS. During the IRS campaign, the team ensured supervision of spray operations at all levels. To achieve this, the team used the supervision structure shown in Figure 4.

In each district, a full-time VL Rwanda staff member helped the VL district coordinator to coordinate routine daily supervision by working closely with the district staff and all other supervisors. At least six VL 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.

MOPDD appointed five staff (two adverse effects coordinators, two MOPDD staff and one monitoring and evaluation (M&E) manager who alternated) in the two IRS targeted districts to work closely with the VL Rwanda district coordinators and other supervisors in the field during spray operations.

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.

Figure 4: IRS Supervision Chart



Supervision checklists assessed 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 operation sites used the Performance Tracking Sheet (PTS) daily. At the end of each day, sector coordinators submitted summary data from the PTS to district coordinators. They in turn compiled the data, updated the district PTS, and submitted a daily report to the central level (VL Rwanda management and 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.

VL Rwanda maintained the use of a supervision records book in each operational site 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.

The project 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. VL Rwanda received further supervision support from the home office M&E Specialist and Vector Control Manager. Both provided short-term technical assistance from August 26 to September 26, 2019, and traveled to both Kirehe and Nyagatare districts. STTA included training of data entry clerks on the new VectorLink Collect system (DHIS2); supervision of data entry and cleaning processes; inspection of soak pits and storerooms to ensure environmental compliance according to Best Management Practices (BMPs); supervision of insecticide management, morning mobilization activities, homeowner preparation, SOP performance, end-of-day activities and household marking.

During spray operations, the project continued to use the DOS checklist to ensure 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, 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 6: Institutions/Stakeholders that Participated in IRS Supervision

Level	Institution	Responsibilities
National	MOH/MOPDD/RBC, Rwanda Environmental Management Authority; USAID/PMI; VL 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	Home office based M&E Specialist and Vector Control Manager	Overall supervision of IRS operations, M&E and EC activities

VL 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 SOPs could see what they were doing and so the TL could complete the DOS form;
- Ensuring proper recordkeeping on stock cards and other store records for insecticide and empty sachets 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 recordkeeping forms and that the actual stock in the storeroom at the time of the audit matched the balances listed on the insecticide and empty sachets ledgers.
- The empty insecticide sachets were collected at district stores and incinerated at Nyagatare, Kirehe and Kibungo respective district hospitals to ensure no further use
- VL 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 MOPDD regularly joined VL Rwanda staff in the districts during daily progress review meetings. During these interactions, MOPDD representatives and the VL Rwanda team discussed the issues at hand and provided guidance to the district coordinators and the teams in the field.

VL 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 Logistics and Inventory Control

The project distributed IRS commodities from the central warehouse at the Kicukiro Small Scale Industrial area in Kigali to the three 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 storage facilities as well as the central warehouse. There were storage facilities at the 48 operational sites in the three districts. One store out of 48 storage facilities was rented in Mimuri sector and the other 47 were provided to VL 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.

The project 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 sachets daily at the sector and district stores. Storekeepers recorded how many

insecticide sachets 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 sachets were transported from district stores to district hospital incinarators on a weekly basis during spray operations as there was not enough space at the district and sector storage facilities to accommodate both full and empty insecticide sachets until the end of the spray campaign. Empty insecticide boxes were dismantled and delivered to Cards from Africa for recycling, also on a weekly basis.

The project kept IRS materials, such as coveralls, boots, helmets, gloves, masks, and pumps, in Kirehe and Nyagatare district storage facilities after the 2019 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 districts stores before the campaigns. Insecticide was distributed to Kirehe and Nyagatare in September 2019, and to Ngoma in January 2020. The project based distribution of materials to the operational sites on the number of target structures for spraying and the number of support staff.

4.3.1 Cost-Savings

The adoption of the "Walk to Work" strategy allowed VL Rwanda to contract only 53 vehicles for SOPs during the 2019 spray campaign versus 63 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 42 vehicles were used. This strategy yielded a total cost saving of $13,860.

VL Rwanda adopted the use of electronic banking and mobile money payments during the 2019 spray campaign using Omni System by Ecobank. The project used mobile 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 payment system, project staff collected the phone numbers of all seasonal staff and gave the list to the finance assistants, who verified all phone numbers to confirm SIM cards were registered to the owner of the phone. Staff not registered with a mobile money service were encouraged to do so during SOP and mobilizer trainings. Mobile payments reduced project costs by $4,000 related to transportation.

Despite its advantages, the electronic system 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.

In September 2019, the VL Rwanda implemented community mobilization free of charge in both Kirehe and Nyagatare districts. The local authorities provided more direct support and accountability of mobilizers to the community-in-charges and increased results in terms of total structures mobilized. This initiative resulted in a savings of $25,300.

4.4 IRS Results

During the spray campaigns, 307,130 structures of the 312,362 structures found in the targeted districts were sprayed, resulting in 98.3% spray coverage. A total of 1,229,667 people were protected, including 16,871 pregnant women and 167,492 children under five years. An additional 7,387 structures were sprayed in Mahama refugee camp, protecting 59,295 people (1,622 pregnant women and 11,600 children under 5).

Table 7: Summary of Rwanda IRS Results

District	Total Structures Found	Total Structures Sprayed	Spray Coverage (%)	Total Population Protected				
				Male	Female	Pregnant Women	Children <5 Years	Total
Kirehe	91,319	89,248	97.6%	170,848	185,370	4,520	47,799	326,218
Nyagatare	127,440	125,077	98.1%	241,748	257,786	7,080	71,248	499,534
Mahama Refugee Camp	7,410	7,387	99.7%	29,874	29,421	1,622	11,600	59,295
Ngoma	93,603	92,805	99.1%	179,345	194,573	5,271	48,445	373,918
Total	319,772	314,517	98.4%	621,815	667,150	18,493	179,092	1,288,965

Table 8: 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	61,175	2,592 (55.3. %)	26,420 (54.1 %)
Nyagatare	75,401	3,457 (46.6 %)	31,135 (42.9 %)
Ngoma	51,624	2,479(46.6%)	21,641(44.4%)
Mahama Camp	562	75(4.6%)	439(3.8%)
Total	**188,762**	**8,603(45.2 %)**	**79,635(43.8 %)**

4.4.1 Insecticide Usage

VL Rwanda used a total of 239,974 sachets (240,257 for houses and 450 for special structures like schools and dormitories) during the September and January/February campaigns. On average, one sachet sprayed 1.3 structures (see Table 9). Each SOP used on average 7.6 sachets per day, and sprayed on average 9.9 structures per day. Please note that the insecticide burn rate above excludes special structures.

Table 9: Insecticide Usage

District	Total Structures Sprayed	Total Sachets Used	Average Number of Sprayed Structures per sachets	Average Number of sachets per SOP per Day	Number of Structures Sprayed per day per SOP
Kirehe	89,248	69,159	1.3	7.5	9.7
Nyagatare	125,077	96,545	1.3	7.7	10
Ngoma	92,805	74,270	1.25	7.7	9.6
Total	307,130	239,974*	1.3	7.6	9.8

*This figure is only for household structures and does not include schools and dormitories. An additional 450 sachets were used to spray schools and dormitories.

5. ENTOMOLOGICAL MONITORING

5.1 WALL BIOASSAY TESTS FOR QUALITY ASSURANCE

All operational sites in the three project districts used Fludora Fusion. VL Rwanda in collaboration with MOPDD performed wall bioassay tests for quality assurance within the first week of spraying (September 5-10, 2019 and January 20-24, 2020). In each of the 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 World Health Organization (WHO)-approved protocols. Three test cones and one control cone were used. The test cones were placed at three different heights (top (1.5 meters), middle (1.0 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 10 two- to five-day-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, 48, and 72 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% of most exposed mosquitoes to all structure types were killed after the standard 24 hours holding time except in Nyagatare where on PP the mortality was 90% but after 48 hours it reached 100%, and in Zaza where on mud, the mortality rate 24 hours post-exposure was 95% but it reached 100% after 48 hours.

Table 10: Results of Cone Bioassay for IRS Quality Assessment

		An.gambiae s.s. (Kisumu strain)								
		Level of cone location					% 24 Hrs Mortality		48 hrs Mortality	
		Top	Middle		Bottom					
Test site	Types of surfaces sprayed rooms	24 hrs Mortality	24 hrs Mortality	48 hrs Mortality	24 hrs Mortality	48 hrs Mortality	Test	Control	Test	Control
Nyagatare	PP	100%	90%	100%	100%		97%	0%	100%	0%
	PNP	100%	100%		100%		100%	0%	100%	0%
	Mud	100%	100%		100%		100%	0%	100%	0%
Rukomo	PP	100%	100%		100%		100%	0%	100%	0%
	PNP	100%	100%		100%		100%	0%	100%	0%
	Mud	100%	100%		100%		100%	0%	100%	0%
Gatore	PP	100%	100%		100%		100%	0%	100%	0%
	PNP	100%	100%		100%		100%	0%	100%	0%
	Mud	100%	100%		100%		100%	0%	100%	0%
Nyamugali	PP	100%	100%		100%		100%	0%	100%	0%
	PNP	100%	100%		100%		100%	0%	100%	0%
	Mud	100%	100%		100%		100%	0%	100%	0%
Remera	PP	100%	100%		100%		100%	0%	100%	0%
	PNP	100%	100%		100%		100%	0%	100%	0%
	Mud	100%	100%		100%		100%	0%	100%	0%
Zaza	PP	100%	100%		100%		100%	0%	100%	0%
	PNP	100%	100%		100%		100%	0%	100%	0%
	Mud	100%	100%		95%	100%	98%	0%	100%	0%

The fumigant effect varied between 35%-100%, 75%-100%, 95%- 100% and 100% after 24, 48, 72 and 96 hours holding time respectively (Table 11).

Table 11: Results of Fumigant Effect of Fludora Fusion

Test site	Types of surfaces sprayed rooms	*An. gambiae* s.s. (Kisumu strain)									
		Test						Control			
		% KD 30'	% KD 60'	% 24 hrs mortality	% 48 Hrs mortality	% 72 Hrs mortality	% 96 Hrs mortality	% 24 hrs mortality	% 48 Hrs mortality	% 72 Hrs mortality	% 96 Hrs mortality
Nyagatare	PP	5	5	100				10			
	PNP	5	5	100				0			
	Mud	0	0	75	75	100		0	0	10	
Rukomo	PP	0	0	50	100			0	20		
	PNP	5	5	50	100			0	0		
	Mud	0	0	60	85	100		0	0	10	
Gatore	PP	0	0	45	100			0	0		
	PNP	0	0	75	100			0	0		
	Mud	0	0	35	100			0	0		
Nyamugali	PP	15	60	90	100			0	0		
	PNP	5	65	100				0			
	Mud	0	70	80	100	100		0	0	0	
Remera	PP	5	35	50	80	100		0	10	10	
	PNP	10	35	85	90	100		0	0	0	
	Mud	0	10	65	80	95	100	0	0	10	10
Zaza	PP	15	60	100				0			
	PNP	20	35	60	95	100		0	0	10	
	Mud	5	65	95	100			0	0		

6. MONITORING AND EVALUATION

6.1 DATA COLLECTION, ENTRY, AND QUALITY ASSURANCE

VL Rwanda incorporated all VL M&E protocol updates, including enhancements to the data collection tools, before the start of mobilization and spraying to ensure collection, management, and reporting of high-quality data.

6.1.1 DATA COLLECTION

SOPs collected spray data on paper forms, 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 VectorLink Collect. At the end of each day, the Database and M&E manager 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 forms at each data center.

6.1.2 DATABASE ENTRY

In 2019, VectorLink switched from the old legacy MS access database to VectorLink Collect, a DHIS2 platform database. The VectorLink Database Manager and IT Coordinator attended a training on the new database in Kigali, Rwanda, on April 25–27, 2019, and upon their return trained VectorLink project staff, M&E assistants, and data entry clerks (DECs) on the use of the new database. The project contracted 44 DECs/M&E assistants to staff three data centers for data entry. The DECs entered spray data everyday throughout the spray campaign period following predefined data entry protocols. The DECs entered spray data at two levels, first by "totals" then by "details," i.e., by each structure captured on the Daily SOP form. VectorLink Collect helped the 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.

6.2 QUALITY ASSURANCE

VL Rwanda used the VectorLink M&E Supervisory Toolkit, which consists of:

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 VL team incorporated the DCV form in the m-Health checklists accessed via tablets 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. VL Rwanda addressed and rectified any discrepancies.

Data Cleaning was done through VectorLink Collect on a daily basis to ensure that any data entry mistakes were immediately corrected. Also, built-in database validations prevented data clerks from making too many errors. Data clerks performed double-data entry in the targeted 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 the project

investigated and reconciled discrepancies between spray totals and detailed data before finalizing and reporting campaign results.

6.3 M-HEALTH

VectorLink Rwanda collaborated with Dimagi to ensure quality reporting and supervision in all target districts. In 2019/2020, the Dimagi platform included daily SMS reminder messages, electronic DCV forms, PMT, and supervisory checklists.

6.4 RESULTS

The results of the 2019/2020 campaign are in Table 12 below. The results for Mahama Refugee Camp are in Table 13.

Table 12: Results for Kirehe, Nyagatare, and Ngoma (not including Mahama Refugee Camp)

Dates of PMI-supported IRS campaign	September 2-24, 2019 (Kirehe, Nyagatare) January 20-February 11 (Ngoma)
Total operational days	20
Insecticides used	Fludora Fusion
Number of districts	3 districts (Kirehe, Nyagatare and Ngoma)
Number of structures found by SOPs	312,362
Number of structures sprayed by SOPs	307,130
Spray coverage	98.3%
Population protected	1,229,657 (16,871 pregnant women; 167,492 children under 5 years old)
Number of people trained with U.S. Government funds to deliver IRS	2,874*(1,413 males and 1,461 females)

*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 13: Results for Mahama Refugee Camp

Dates of PMI-supported IRS campaign	September 21-23 , 2019
Total operational days	3
Insecticides used	Fludora Fusion
Number of structures found by SOPs	7,410
Number of structures sprayed by SOPs	7,387
Spray coverage	99.7%
Population protected	59,295 (1,622 pregnant women and 11,600 children under 5)
Number of people trained with U.S. Government funds to deliver IRS	N/A

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 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 VL Rwanda Environmental Compliance Officer (ECO) prepared a letter report to support the 2019 PMI IRS Program in Rwanda.

7.2 PRE-SEASON ENVIRONMENTAL COMPLIANCE ASSESSMENT

VL Rwanda conducted pre-spray environmental compliance assessments on August 22-26, 2019, in Kirehe and Nyagatare districts, and on December 2-5, 2019 in Ngoma district. VL Rwanda entered data on tablets; the data were transmitted to a central database on an automated server at Abt's home office to generate a work list. The work list was instantly shared with the VL 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 34 storage facilities at the operational sites were provided to the 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. VL Rwanda hired construction contractors from the sectors to build concrete washing areas for soak pits and bathrooms in all sites. Contractors cleared bushes around the soak pits, added and compacted murram (gravel) in the wash area, and fixed a polythene sheeting onto the murram. Table 14 shows the details of the new design of the soak pit at the operational sites.

Table 14: Construction and Refurbishments at IRS Operation Sites

District	Number of Operation Sites	Site Refurbished (soak pit, storeroom, fence, etc.)
Nyagatare	18	20 soak pits One soak pit was refurbished (Nyagatare site I) Concrete wash areas of soak pits were constructed in 19 soak pits. 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) Concrete wash area of 15 soak pits were constructed All 16 offices and storage facilities provided by sector and cell authorities
Ngoma	14	14 soak pits newly constructed. The washing area was constructed in semi- concrete and covered by a plastic sheeting

During the 2019-2020 spray campaigns, VL Rwanda renovated 34 soak pits and constructed new 14 ones. The washing areas were built in concrete and have a slope 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 prevent leaves, trash and other items from falling into the pit and inhibits the growth of vegetation, thus eliminating or reducing annual maintenance and potential disturbance of the soak pit layers.

VL Rwanda embraced the new soak pit design because it is more durable and has a bigger wash area than traditional soak pits. Renovation costs were US$ 300 while the construction of the new soak pits cost US$ 600.

7.3 Safety and Environmental Compliance During IRS

VL 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 BMP4 criteria for vehicles that transport insecticide. 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, VL Rwanda inspected them against the PMI BMPs to ensure compliance with safety and environmental requirements and compliance for IRS operations.

VL Rwanda monitored soak pits throughout operations to ensure all concrete wash area were sloping effluent water well, soak pits were not flooding, washrooms are clean and fixed, and that the soak pit and wash areas were fenced and gated 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. VL 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 district health environmental officers, used tablets 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.

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

The project underwent an external environmental compliance evaluation during the Kirehe and Nyagatare IRS campaign, documented in a separate report. Key findings from the report are integrated into the recommendations section (below).

7.4 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 IRS operations, the teams received refresher training at each district on management of IRS adverse effects. Three incidents were reported in Nyagatare district and two incidents in Ngoma district. See the incident summary below.

Table 15: Summary of Incidents Reported during IRS

	Description	Location
1	5 SOPs experienced skin irritation after touching their faces with gloves contaminated with insecticide	Nyagatare
2	Motorcycle accident on the way to work	Nyagatare
3	Vehicle accident between warehouse and site	Nyagatare
4	Four sachets of insecticide were missing	Ngoma
5	Vehicle accident: empty SOP vehicle rolled into columns of operational site building	Ngoma

7.5 POST-SEASON ENVIRONMENTAL ASSESSMENT

VL Rwanda used smartphones to conduct the post-season environmental assessment in the targeted districts. The assessment confirmed collection of all IRS items from the operational sites and transport of insecticides and IRS wastes to district storage facilities. VL Rwanda cleaned the soak pits and their surroundings, covered them with metallic doors, and securely locked doors. It was agreed with 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.

7.5.1 IRS WASTE DISPOSAL

VL 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 waste was incinerated separately without mixing with other hospital waste. Incineration was supervised and witnessed by the project ECO and/or the Environmental Health Officer of the district hospital. VectorLink Rwanda disposed of wastes as described below. Waste quantification by district can be found in Annex F.

8. GENDER MAINSTREAMING

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

- *Training:* 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 sector levels among the IRS support staff.
- *Increased recruitment of women*: 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 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 2019 spray campaign did not have any female drivers. The project employed three female pump technicians in the three targeted districts to work with the current male pump technicians at district warehouses to further 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.
- *Safe work environment:* 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 single use pads to female workers:* Distributed 1,100 menstrual pads (758 in Kirehe; 1,122 in Nyagatare; 1200 in Ngoma districts) to female seasonal workers during the spray campaign. The project did this to eliminate menstruation as a possible barrier to women's participation in the spray campaign, given long days in the field.
- *Freedom from harassment guidelines and messages:* Posted the freedom from harassment guidelines in Kinyarwanda at each operational site to encourage professionalism and mutual respect. Prepared and disseminated gender integration messages regularly to all seasonal workers throughout the spray campaigns to enhance awareness and encourage women and men to elevate any harassment issues encountered during IRS operations.

9. CAPACITY BUILDING

In 2019, VL Rwanda project continued to build the capacity of key governmental staff at the central, district, sectoral and village levels. The ultimate goal is for the MOPDD/MOH to implement IRS completely on its own. Project capacity building takes various forms.

In June and July 2019, VL Rwanda in collaboration with MOPDD conducted four different capacity strengthening trainings for district and sector leaders from three new IRS districts, namely Kayonza, Rwamagana and Ngoma. The first training attracted 35 participants from the district level. Separate trainings for sector leaders were organized with one for each district. Ninety-five people attended. These trainings were designed to strengthen the ability of decentralized authorities at district and sector levels to plan, implement, supervise and evaluate IRS operations at each level of IRS implementation. The trained local authorities can now effectively explain and demonstrate current IRS best practices for spray managers, spray operators, store keepers, community mobilizers and other seasonal workers. The training equipped participants with adequate knowledge and skills in environmental compliance and basic IRS to ensure environmental compliance standards are followed.

As already discussed, the project conducts training before the IRS campaign begins. In August and December 2019, the project built supervisory skills of national, district, sector and village leaders as well as seasonal staff by incorporating into IRS training programs, including 2 staff from MOPDD, and staff from each of the three targeted districts. The trainings included 35 people from Ngoma district (26 males and 9 females), 32 people from Kayonza (23 males and 9 females) and 33 people from Rwamagana (25 males and 8 females). Subsequently, in coordinating with the MOPDD and district-level staff to supervise and monitor IRS operations, VL Rwanda provided on-the-job capacity building.

VL Rwanda also has been working with MOPDD to build their skills in conducting entomological monitoring and insecticide resistance monitoring so they can serve as training and resource centers on these topics in the future. In 2019, the project trained 36 people in mosquito collection in three sites (Zaza, Musambira and Ngera).

Through these capacity-building activities, VL Rwanda seeks to:

- Build supervisory skills of government staff through training programs and sharing tools on IRS planning and implementation, M&E, procurement and logistics, and environmental compliance issues.
- Build capacity of MOPDD to monitor entomological parameters and be able to make sound decisions for better vector control.
- Build capacity in an equitable manner and begin to address historic inequities in opportunities for men and women to learn these skills in Rwanda.
- In addition, a three day training for four data managers was conducted in Huye and Gisagara districts in January 2020. The purpose of the training was to strengthen the capacity of data managers to be able to provide support to GoR spray campaigns. The training covered the following: familiarization with data collection forms (Daily Spray Operator and Team Leader forms, and the Spray Quality Checklist), understanding key IRS definitions (e.g., eligible structure) and indicators and responsibilities, reviewing collected data and spotting irregularities, timely, consistent, and accurate reporting, setting appropriate and realistic reporting timelines, and establishing back-up reporting/ communication protocols and VectorLink Collect database and security protocols.

10. POST-SEASON ACTIVITIES

10.1 POST-SPRAY INVENTORY

Following completion of IRS operations, VL 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 E for IRS commodities in stock.

10.2 POST-SEASON REVIEW MEETINGS

District and sector authorities, including army and police commanders; hospital and health center representatives, MOH/MOPDD representatives in collaboration with the project convened IRS evaluation/review meetings at the district level to: 1.) review the overall IRS implementation process, experiences, and achievements for the September 2019 and January/February 2020 spray rounds; 2.) review IRS challenges in the three districts and identify recommendations for the next spray cycle; and 3.) reach consensus on the recommendations and way forward for future spray campaigns. Discussions in the review meetings centered on supervision and individual sector IRS performance. Recommendations included:

- 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 asking their employees to do the same.
- 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 2019-2020 should be maintained.
- While not a specific challenge in 2019-2020, it was noted that sector and district IRS support staff should coordinate closely with sector authorities to avoid any unexpected disruption of IRS activities, e.g. competing activities taking place simultaneously.
- 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. In addition, village leaders should remind their community members to observe all other malaria control and prevention interventions.

11. CHALLENGES AND LESSONS LEARNED

11.1 CHALLENGES

- Older face shields compelled SOPs to lift their face shield visors multiple times with gloves contaminated with insecticide to be able to see the walls. As a result, five SOPs (3 females and 2 males) in Nyagatare reported skin itching and irritation.

  SOPs were directed to always open windows or doors a bit to allow in light, especially when they are spraying in dark rooms. The project has since procured new face shields that provide better visibility.

- The number of found and recorded structures were much more than in any previous spray rounds.

  This increase in structures found is attributed to the new community mobilization strategy whereby diverse groups (community health workers, head of Isibo, head of village, the in-charge of security, youth volunteers) at village level fully participated in community mobilization

  During the first week of spray operations in Nyagatare, some village leaders were reluctant to mobilize their communities to support the new strategy of voluntary, community-led mobilization.

  The mayor of Nyagatare district called an emergency community mobilization meeting of all cell and village leaders to warn them against interfering with the district's decision to conduct community mobilization free of charge. The local leaders in attendance apologized to the mayor for not being proactive in mobilizing their own community and pledged to do so immediately.

- VL Rwanda experienced relatively minor but repeated incidents of spray quality in the 2019 spray round. This included incorrect spray technique, speed, house marking and household preparation.

  Bulk short messages (sms) were sent to spray teams, stressing the importance of recording unsprayed houses, house preparation and spray quality in morning briefs.

  Some community members were away from their structures to farm, while some urban communities did not allow their structures to be sprayed or were away from their homes for work.

  In rural areas, homeowners were informed by mobilizers to come back from their agricultural fields before noon and spray teams were sent to spray those isolated structures. In urban areas, the project collaborated with local authorities, community leaders and diverse IEC volunteers to mobilize and disseminate IRS messages. VL Rwanda also collaborated with employers, such as UNHCR and district administrations, to allow employees leave for several hours to have their homes sprayed.

- The CommCare application crashed when a user tried to open the Spray Operator Transport Vehicle Inspection checklist. Performance Monitoring Tracking reports from the CommCare application were incomplete due to the application system not functioning well.

  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.

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

  Various communication channels such as bulk short messages (SMS) were used to remind and encourage all IRS cadres to complete their required supervision checklists. Those who continued to submitted checklists containing errors were directly contacted through their mobile phones and asked always to be vigilant while completing supervision checklists.

- 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.

- The insecticide serialization initiative in Ngoma resulted in significant delays in sending teams to field and going back home. The main challenge was recording serial numbers on TL insecticide serialized forms in the dark without light and while using industrial gloves. The gloves were not soft to enable easy and swift to adherence of serial numbers on sachets. Furthermore, at the 4 sites where barcode scanners and an Excel worksheet were used to record serialized insecticide, there were several issues with the worksheet. On average teams were using one hour and half above to complete the added tasks related to serialization.

  In order to improve the insecticide serialization process and reduce the time it takes to issue, record and reconcile insecticide (morning & evening) solar lamps were purchased and delivered to all operational sites to provide sufficient light in the dark. The sector store keepers organized insecticide in bundles of 10 sachets in the afternoon using sacks (1sack per team leader) and rubber bands for quick distribution the next morning. The team leaders picked up the sacks in the morning to distribute to their teams. In addition softer medical examination gloves were issued to store keepers for the purpose of counting and plastering serials number on every sachet of insecticide.

11.2 Lessons Learned and Recommendations

- The district team and site storekeepers shared stock balances daily to ensure adequate insecticide stock. As a result, Nyagatare district was issued an extra 390 sachets of insecticide from Kirehe stock to cater for the remaining structures. Furthermore, VL Rwanda borrowed 1,000 sachets of Fludora Fusion from the Government of Rwanda to cover extra structures found by spray operators in Ngoma district. The project will reimburse the Government with an equal number of sachets when the next shipment arrives for the coming workplan year. Given the very high level of IRS acceptance in Rwanda, it is particularly important to ensure an adequate supply of insecticide to ensure that all mobilized eligible structures can receive IRS.
- Maintain and budget for IRS seasonal worker training, including five days of training and practice for spray operators and a separate, one-day training for team leaders. This is important to ensure quality IRS.
- Notify district/sectors authorities of challenges in a timely manner during IRS operations.
- Maintain the good existing collaboration/communication with MOPDD officials and district leadership.
- 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. All supervisors, TLs, and SOPs should 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. Where necessary, increase the number of village mobilizers to ensure all structures are mobilized and sprayed within the allotted time.
- Communicate to spray teams through morning briefs, job aid messages, and regular supervision to ensure SOPs adhere to rules for mixing insecticide, spray techniques, and removal of household items. Also, emphasize regular use of DOS checklists to all TLs and supervisors so that issues of quality of spraying are immediately addressed in the field.
- Continue to label and keep PPE separate by team at each operational site to expedite SOPs donning the PPE every morning.
- To improve TL DOS reporting, enhance supervision of TLs and encourage them to vigilantly report issues/red flags noted during supervision, even if the issue has been corrected.
- Continue to engage local leaders at district and sector levels to enhance mobilization and coordination of IRS activities in both urban and rural areas as it proved to increase acceptance of IRS.

- 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.
- Advocate for recruiting only those 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.
- 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 SELECTION

REPUBLIC OF RWANDA

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

Kigali, on 12 FEV 2019

N°20/7.81/RBC/2019

RECEIVED
FEB 13 2019
#0041
USAID
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DIR

Ms Leslie Marbury
USAID Country Mission Director
KIGALI-RWANDA

RE: The choice of insecticide for Indoor Residual Spraying (IRS) 2019-2020

Dear Mission Director

I am honoured to take this opportunity to first address our thankful to USAID/PMI for the support that is provided to the Government of Rwanda to fight against malaria disease in Rwanda.

Considering the integrated malaria control guidelines and the revised National Strategic Plan for insecticide resistance management in malaria vectors 2019-2014 which is under the validation process, it is recommended the rotation of insecticide for IRS at a two-year basis as a key resistance management strategy to prevent the occurrence and the spread up of insecticide resistance in malaria vectors. It is in that context, that we would like to communicate to you the shift from the class of Organophosphates (Actellic®), used from 2016, to Fludora® Fusion from the IRS spray rounds of September 2019. The choice of this insecticide was based on the list of new generation of insecticides recently pre-qualified by WHO and the local evidences on its effectiveness and residual efficacy to control malaria vectors.

We would like to appreciate again your support under the lead of Rwanda Biomedical Center/Malaria and Other Parasitic Diseases Division for implementation of this recommendation in compliance with the environmental safeguards and IEC/BCC related to the introduction of this new product.

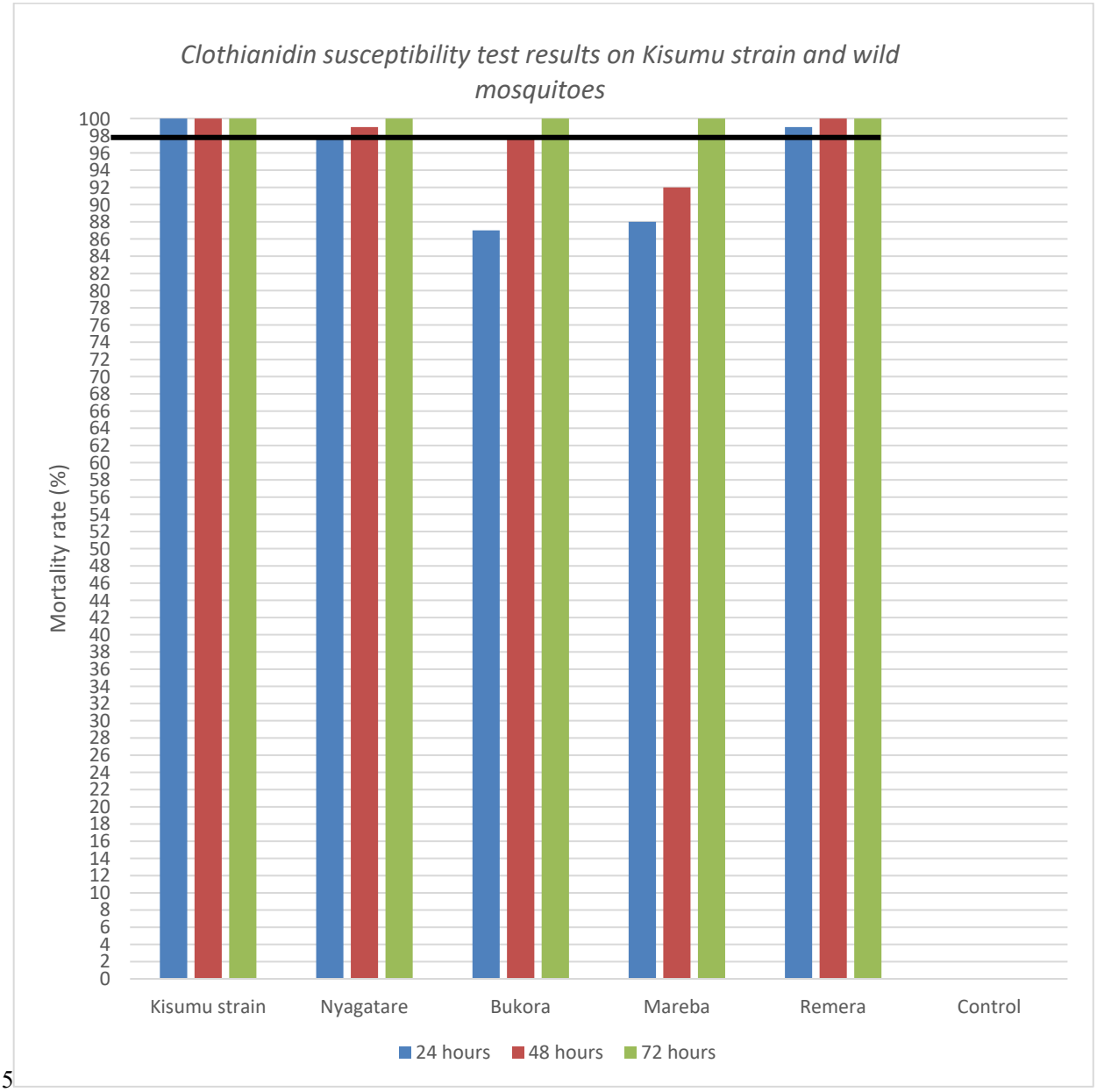
Sincerely,

MINISTERE DE LA SANTE

Dr. Diane GASHUMBA
Minister of Health

Cc:
- **Hon. Minister of State in Charge of Primary Health Care**
- **Director General of Clinical and Public Health Services/MoH**
- **Director General of Rwanda Biomedical Center**

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



5

The black line indicates the minimum acceptable results

ANNEX C: PROCUREMENT

Description	Quantity/ Number
IRS Transportation	
Rented vehicles used in micro-planning and logistics assessments	3
Rented vehicles used in IRS implementation	82
IRS supervision vehicles (Country Office)	3
Rented vehicles that facilitated the post IRS activities	3
Printing and Photocopying	
Goods issued note books	155
Request book	53
Spray Operator Form	84180
Team Leader Form	8773
Village IEC implementer Form	28000
Cell IEC Mobilizer Form	3492
IRS Cards	238032
Spray Performance Sheets (Sector) A3	48
Spray Performance Sheets (District) A3	5
Daily Health Team Leader Checklist	8269
Material Data Safety sheet	129
Emergency Response	129
Daily Summary report for sector coordinators	960
Insecticide Distribution Card	960
Incident Report Form	96
Photocopies of assorted documents	70,000
Daily mixed insecticide returned from field tracking form	960

Description	Quantity/ Number
Assorted materials	
Sisal rope – cylinder roll, 80m length, 2mm diameter	10
Bathing soap (Protex – 250mg)	2149
Dry cell batteries (Tiger head)-Size (12v)Pcs	11,196
Duracell batteries-(AAA) Pcs for digital thermometers	192
Powder soap (Sachet of 100g)- (white OMO)	1972
Powder (face) tin	1630
Liquid hand washing soap – Liquid (small bottle of 50ml/Tin)	35
Lubricant oil, original 125 ml (general purpose)	956
Empty sacs (100kg)	700
Empty Boxes (Cartons) standard	600
Chalk (Packets of 100 sticks)	491
Padlock for sector stores - Tri-circle medium (Pcs)	30
Fire extinguisher	5
Megaphone	5
Socks for SOPs and TLs	4374
Pliers	20
Washing/Laundry soap (Tembo- Box of 48 pieces)	144
Polythene sheeting black- roll, 50m	5
Polythene sheeting/ Tarpaulin	68
Stick measure (45 cm & 60 cm)	91
Torches plastic – Normal	144
Digital thermometer	10
Dustbin	10
Dustbin (Sanitary)	8
Flexible plastic pipe	8

Description	Quantity/ Number
Heavy duty hand brush for cleaning coverall	15
Liquid soap (5 liters jerry can)	4
Towel – Small Size	499
Banner – IRS	8
Banner For Gender	24
Basin plastic -Big	16
Measuring Jug	15
Rising Barrels	88
Sand Box	38
Stationery	
Clear sheet protector, A4 size	200
Pens, blue color	4757
Note Books	4283
Paper reams	125
Flip chart pads	100
liquid Glue	414
Plastic File (Wallet)	17
Staple remover (Pcs)	200
Manila Paper (Pcs)	200
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

Description	Quantity/ Number
Insecticide Distribution Card	13
Powder soap - Omo / Sacket of 100 gm	72
Toilet soap - Protex 100g (pcs)	48
Washing Soap TEMBO - Laundry soap, box of 48 pieces	24

International Procurements

Description	Unit	In Stock Before Campaign	Received	Total	Disposed Of	In Stock After Campaign
Fludora Fusion	Sachets	0	239,590	239,590	165,969	73,621
Dust Mask	Piece	8,040	46,200	54,240	33,641	20,599
Face Shields Visor	Piece	468	2,000	2,468	468	2000
Lance for X-pert Pump	Piece	250	100	350	0	350
Hose for Hudson X-pert Pump, with Thrustless Shutoff and Strainer Assembly	Piece	102	50	152	0	152
Hudson Tip-Jet 8002 E Nozzle (Ceramic Nozzles)	Piece	300	200	500	150	350
Apron	Piece	95	100	195	38	157
Standard Nitrile Glove (Long)	Pair	1064	1872	2937	543	2394
Nitrile Glove (Full Arm Length)	Pair	126	144	270	36	234
Cover Assembly (Lid)	Piece	0	100	100	0	100
Brass Cyl Assm XP	Piece	0	100	100	0	100
Extension lance for X-part Pump	Piece	0	50	50	0	50
Pressure Gauge Assembly	Piece	77	80	157	53	104
Shutoff Assembly Complete, Thrustless	Piece	0	100	100	0	100

Description	Unit	In Stock Before Campaign	Received	Total	Disposed Of	In Stock After Campaign
Sprayer repair kit - Hudson pump	Piece	5	10	15	6	9
Goizper Repair Kit	Piece	37	10	47	12	35
Trigger for Goizper Spayer	Piece	7	100	107	27	80

ANNEX D: JOB AID MESSAGES SENT TO SEASONAL STAFF

Time	Recipient	Message	Total to be Submitted in a Spray Season
1h00PM	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.	20
6h00PM	Mobilizers and Sector IECs, and Sector Coordinators	Mobilizers should notify the communities to prepare a day ahead of the arrival of the spray team.	20
11h30 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.	12
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.	12
8h00 PM	M&E Assistant	Attention! {case.name} have not submitted their SMS report for today.	60
7h00 PM	PMT Gateway	# Team members. Structures found. #Structures sprayed. #Insecticide units used.	60
6h30 AM	Spray Operators, Team Leaders, Supervisors, and Sector Coordinators	Full PPE use remains mandatory for the duration of the spray operation.	12
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.	8
7h30 AM	Team Leader	Remember your spray nozzle should be 45cm from the surface. Spray pressure is between 35 and 55psi.	8

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.	12
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.	12
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.	12
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.	12
14h30 PM	Spray Operators, Team Leaders, Washers, Security Guards, Supervisors, and Sector Coordinators	The PMI VectorLink 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.	12

ANNEX E: 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)	1666	0	1667	0	1666
Sprayer pump (Goizper)	300	0	300	2	298
Goizper Repair kit	37	10	47	12	35
Pump strainer (Nylon filter)	372	0	372	174	198
Hose for Hudson pump	84	68	152	0	152
Cover Assembly (Lid)	25	100	125	17	108
Hudson tip- Jet 8002 E Nozzle (ceramic nozzles)	300	200	500	150	350
Control Flow Valve (CFV)	165	29	194	123	71
Lance for X-pert Pump	250	100	350	190	160
Lance for Goizper Pump	10	0	10	2	8
Repair kit (Hudson pump)	3	12	15	8	7
Repair kit (Goizper pump)	37	10	47	12	35
Pressure gauge Assembly	77	80	157	53	104
Gasket Nozzle XP	500	0	500	100	400
Wash Valve Pin	174	0	174	74	100
Dust Mask	8040	46200	54240	47811	6429
Hard Hat (Lightweight Helmet)	2149	256	2405	212	2193
Face Shield (Visor)	0	2000	2000	1	1999
Head Gear (Bracket)	848	2050	2898	343	2555

Description	Quantity in Stock Before Campaign	Quantity Received	Total Quantity	Quantity Used/Damaged/Out of use	Quantity in Stock after the Campaign
Apron	95	100	195	48	147
Man Portable First Aid Kits	16	130	146	132	14
Standard Nitrile Gloves (Long)	1064	1872	2932	896	2036
Nitrile Glove (Full Arm Length)	126	144	270	61	209
Poly/Cotton Coverall	4274	946	5220	138	5082
Black PVC Boot	2839	5	2844	69	2796
Insecticide (Fuldora Fusion)	0	245670	245670	245490	180
USAID – PMI Logo	1302	0	1302	1266	36
Sprayer Bag - Back pack	1928	295	2223	37	2186
Polythene sheeting/Tarpaulin for Soak Pits and Bathrooms (5x5)	14	142	156	140	16
Rinsing Barrels (100ltrs)	283	88	371	0	371
Sand Box (Plastic Box)	57	38	102	3	99
Water Tank (1000 ltrs)	69	0	69	0	69

ANNEX F: WASTE DISPOSAL CERTIFICATES AND QUANTIFICATIONS

Enviroserve Rwanda Green Park
Rwanda E-waste recycling facility

Invoice Number: 001/03/2020
Invoice Date: March 5th, 2020
Page: 1

INVOICE

Client
Abt ASSOCIATES
Address: KG 8 Ave, M&M Plaza, 3rd floor
Gishushu, Nyarutarama
P.O Box 5200 Kigali-Rwanda

Date	Item Description	Unit	Quantity	Unit Price (Rwf)	Amount (Rwf)
5/03/2019	Disposal of Dry cell batteries	Kg	33	1,000	33,000
	TOTAL (RWF)				33,000

Thank you for your Business. Let's work together to protect Our Environment
Should you have any queries concerning this invoice please revert within seven days, otherwise this Invoice would be deemed correct.

Bank Account Name: ENVIROSERVE RWANDA GREEN PARK LTD
BANK OF KIGALI LTD
Account No: 00097-06953918-85/RWF (IBAN RW4000097069539188500 1)
: 00097-06953919-86/USD (IBAN RW 4000097069539198600 3)
SWIFT: BKIGRWRW
TIN : 107460401

Tel: +250788304682
Tel: +971 4 885243
Email: rwanda@enviroserve.ae
Website: www.enviroserve.a

Done & Authorised by Enviroserve Rwanda Green Park

Enviroserve Rwanda Green Park
Rwanda E-waste recycling facility

DATE 25.10.2019

GREEN CERTIFICATE

All parts handled through enviro-friendly recycling.

This document confirms that Enviroserve Rwanda Green Park has received the following items from your company that have since been segregated, refurbished dismantled and where appropriate forwarded on to our main licensed facility for recycling:

#	Components	Qty (Nbr)	Qty (Kg)
1	Dry Cell Batteries	----------	70.50

E-scrap received from: Abt ASSOCIATES
E-scrap received on : 11.10.2019
Job Completed on : 25.10.2019
Total quantity received: 70.50 Kg

Enviroserve Rwanda Green Park certifies that the recycling of these materials has not caused harm to health or the environment, either within or outside our facility.

We wish to thank you for having made the effort to fulfil this Corporate Environmental Responsibility by using a licensed electronic/electrical equipment recycler.

Olivier MBERA
Country General Manager

CFA
Cards from Africa
Beautiful Cards. Better Lives.
BP 6720, Kigali
RWANDA

Kigali ,05th March 2020

CARDS FROM AFRICA

Certificate of Appreciation

This certificate is awarded to:

PMI / VectorLink Rwanda/ABT Associates

In appreciation for outstanding donation of 573 empty boxes
To CARDS FROM AFRICA (C.F.A.) generated during IRS campaign carried out
In January – February 2020 for paper recycling and contribute
To protect the environment from pollution and landfill.

(C.F.A.) Manager/ P.O. Nsengiyumva T. Paul

REPUBLIC OF RWANDA

MINISTRY OF HEALTH
NGOMA DISTRICT
KIBUNGO REFFERAL HOSPITAL
E-mail: kibungohospital@gmail.com

CERTIFICATE OF WASTE INCINERATION

THIS IS TO CERTIFY THAT 1205 KGs OF CONTAMINATED WASTES FROM Abt Associates Inc WAS RECEIVED BY KIBUNGO REFERRAL HOSPITAL AND HAS BEEN WELL INCINERATED

Done at Ngoma on 13/03/2020

Dr GAHIMA John
Director General of Kibungo Referral Hospital

WASTE QUANTIFICATION BY DISTRICT

Kirehe

VL Rwanda sent 1,247 kg of contaminated waste (937kg of 69,269 empty sachets, 33kg of bags, 40 kg of neck protector, 180 kg of 14,820 masks, 4 kg of 46 towels and 53 kg of old coverall) to the district hospital's incinerator. Assorted plastics items (139 jerry cans, 543 nitrile gloves and 14 basins) were sent to the ROTASSAIRWA recycling plant in Kigali. The project donated 593 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

VL Rwanda sent 2,141 kg of contaminated waste (231 kg of 18,781 used masks, 96,700 empty sachets to the Nyagatare district hospital incineration plant. Assorted plastic items (jerry cans, nitrile gloves and basins) were sent to ROTASSAIRWA Recycling plant in Kigali. The project donated 820 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 70.5 kg of dry cell batteries at Enviroserve Rwanda Green Park, the Rwanda E-waste recycling facility at Bugesera.

Ngoma

VL Rwanda sent 1,205 kg of contaminated waste (1032kg of 74,437 empty sachets, 23 kg of 380 pair of gloves and 178kg of 14,160 masks to the district hospital's incinerator. Assorted plastics items were sent to the ROTASSAIRWA recycling plant in Kigali. The project donated 570 uncontaminated cardboard boxes to the Cards from Africa Company at Samuduha. It disposed of other uncontaminated waste such as 33 kg of 396 dry cell batteries at Enviroserve Rwanda Green Park E-waste recycling facility and others at Nduba dumping site.

Table 16: 2019-2020 Rwanda Waste Quantification Chart

Types of Waste	Amount of Waste	Disposal Method	Disposal Site	Date of Disposal
Empty sachets of Fludora-Fusion,56	165,969	Incineration	ROTASSAIRWA	5th October 2019
Uncontaminated cardboard	1413	Recycling	Card from Africa	2nd October 2019
Dust mask	33,601	Incineration	District incinerator	2nd October 2019
Dry battery	1520	Recycling	Enviroserve Rwanda Green Park	11th October 2019
Neck protector	46	Incineration	District incinerator	5th October 2019
Other contaminated wastes: old coveralls		Incineration	District incinerator	5th October 2019
Helmets	211	Recycling	ROTASSAIRWA	10th October 2019
Face shields	0	Recycling	ROTASSAIRWA	10th October 2019

Types of Waste	Amount of Waste	Disposal Method	Disposal Site	Date of Disposal
Plastics items: barrels, jerry cans, sand boxes, gloves, boots	Nitrile gloves: - For SOPs 543 - For washer 36 Jerricans 139 Bassin 14	Recycling	ROTASSAIRWA	10th October 2019
Other uncontaminated solid wastes: sacs, papers, files	N/A	General Waste	Nduba Landfill	10th October 2019
Empty sachets of Fludora-Fusion	74,437	Incineration	District incinerator	17th February 2020
Uncontaminated cardboard	573	Recycling	Card From Africa	17th February 2020
Dust mask	14,160	Incineration	District incinerator	17th February 2020
Dry battery	396	Recycling	Enviroserve Rwanda Green Park	5th March 2020
Plastics Items	-	Recycling	ROTASSAIRWA	26th February 2020
Other uncontaminated solid wastes: sacs, papers, files	N/A	General Waste	Nduba Landfill	26th February 2020
Nitrile gloves	380	Incineration	District incinerator	17th February 2020

ANNEX G: PEOPLE TRAINED TO IMPLEMENT IRS

annex	Training on IRS Delivery																								Total
	Training of Trainers		Spraying Operations		Data Capture		Logistics Training		Technical Maintenance		Structure Enumeration/ IEC Training		Poison Control		Environmental Compliance		Coveralls Washing		Fire Security		Finance		Transport Security		
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
District IEC	1	1																							2
Sector Coordinators	25	9																							34
Sector IEC	14	20																							34
Sector Supervisors	31	23																							54
Spray Operators			1108	1204																					2312
Team Leaders			234	204																					438

annex	Training on IRS Delivery																								
	Training of Trainers		Spraying Operations		Data Capture		Logistics Training		Technical Maintenance		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	
Data Entry Clerks					25	19																			44
Logisticians							1	1																	2
District Store Keepers							0	2																	2
Sector Store Keepers							15	19																	34
Finance Assistants																					1	2			3
Pump Technicians									3	3															6
Adverse Effects Teams (Clinicians)													43	18											61

annex	Training on IRS Delivery																								
	Training of Trainers		Spraying Operations		Data Capture		Logistics Training		Technical Maintenance		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	
Washers																	54	104							158
Security Guards																			96	4					100
Drivers																							93	0	93
Cell IEC Mobilizers											51	14													65
Village IEC Mobilizers											825	109													934
TOTAL M/F	71	53	1342	1408	25	19	16	22	3	3	876	123	43	18	1	1	54	104	96	4	1	2	93	0	4376
TOTAL/Training	124		2750		44		38		6		999		61		2		158		100		3		93		4376

TOT PARTICIPANTS BY GENDER

IRS Role	Number of Participants		Total
	Male	Female	
Sector Coordinators	25	9	34
Sector Supervisors	31	23	54
Sector IEC Supervisors	14	20	34
District IEC Supervisors	1	1	2
Total	71	53	124

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	14	26	55	67.9%	293	334	53.3%	26	23	46.9%
Nyagatare	15	195	163	45.5%	272	313	53.5%	33	22	40%
Ngoma	14	322	339	51.3%	0	0	0.0%	20	22	52.4%
Total	43	543	557	50.6%	565	647	53.4%	79	67	45.9%
		1100			1,212			146		

TEAM LEADERS TRAINED BY GENDER

District	Male	Female	Total
Kirehe	69	56	125
Nyagatare	103	83	178
Ngoma	62	65	127
Total	234	204	438

LOGISTICIANS AND STOREKEEPERS TRAINED BY GENDER PER DISTRICT

District	Male	Female	% Female
Kirehe	9	9	50%
Nyagatare	7	13	65%
Ngoma	0	0	0.0%
Total	16	22	57.9%

ANNEX H: MONITORING AND EVALUATION PLAN

#	Performance Indicator	Dis-aggregation	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 (VC) Interventions												
1.1	**Successfully Execute IRS and Other Integrated Malaria VC Activities**											
1.1.1	Number and percentage of completed annual country work plans developed and submitted on-time											
1.1.2	Number of eligible structures targeted for spraying	Total (All)	213111	215467	304798	319772	315500					
		Targeted Districts	206611	208687	298018	312362	308090					
		Mahama Refugee	6500	6780	6780	7410	7410					
1.1.3	Number of eligible structures sprayed with IRS[1]	Total (All)	181144	214802	259078	314517	268175					
		Targeted Districts	175619	208026	253315	307130	261877					
		Mahama Refugee	5525	6776	5763	7387	6298					
1.1.4	Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	Total %	85%		85%		85%					
		Targeted Districts	85%	99.70%	85%	98.3%	85%					
		Mahama Refugee	85%	99.90%	85%	99.7%	85%					
1.1.5		Total (All)		894098	1269184	1288952	1299158					

	Number of people protected by IRS	Subtotal: Targeted Districts	813177	840773	1215859	1229657	1239717					
		Sex: Male		405691		591941						
		Sex: Female		435082		637729						
		Pregnant women		12132		16871						
		Children <5		117881		167492						
		Subtotal: Mahama Refugee	53000	53325	53325	59295	59441					
		Sex: Male		27148		29874						
		Sex: Female		26177		29421						
		Pregnant women		1328		1622						
		Children <5		9810		11600						
1.1.6	Number and percentage of vector control project country programs submitting an EOSR within 45 days after the end of spray (including completing MEP and EMMR)	Country										
1.1.7	Number and percentage of IRS country programs that conduct a Post-Spray Data Quality Audit within 90 days of spray completion	Country										
1.1.8	Number of Insecticide Treated Nets (ITNs) distributed, by channel	Channel	N/A	N/A	N/A	N/A	N/A					
1.1.9	Number and percentage of countries completing ITN durability monitoring data collection as planned in a given project year	Country										
1.1.10	Number and percentage of PMI-funded durability monitoring surveys with reports submitted within 90	Country										

	days of the end of data collection											
1.2	**Strengthen Capacity of NMCPs, VC Personnel, and Other Institutions to Implement and Manage IRS and Other VC Activities**											
1.2.1	Total number of people trained to support VC in target areas	Total VC Intervention Sex: Male Sex: Female Job Function	5253 IRS	4762 IRS 3384 1378 See Table 2	4762 IRS	4376 IRS 2620 1756 See Table 2	4328 IRS					
1.2.2	Total number of people trained to support VC in target areas with USG funds[2]	Total VC Intervention Sex: Male Sex: Female Job Function	1500 IRS	1710 IRS 758 952 See Table 2	1710 IRS	2874 IRS 1413 1461 See Table 2	2848 IRS					
1.2.3	Number of people trained during the Master (National) Training and/or IRS Training of Trainers.	Total Sex: Male Sex: Female Type of Training	340	131 76 55 TOT	208	124 71 53 TOT	124					
1.2.4	Total number of people hired to support VC in target areas.	Total VC Intervention Sex: Male Sex: Female Job Function	4572 IRS	4540 IRS 3228 1312 See Table 2	6380 IRS	3675 IRS 2218 1457 See Table 2	3677 IRS					
1.2.5	Number of VC project training workshops targeting NMCP and other host country staff	Total Technical Area Job Function	1	2 Ento technicians See Table 2	1	3 IRS Implementation and Capacity Building; M&E See Table 2	2					
1.2.6	Number of NMCP and other vector control host country staff who have logged into VectorLink Collect	Total Job Function	N/A	N/A	8	10 See Table 2	8					
1.2.7		Country										

	Number and percentage of technical assistance requests to support ITN distribution planning and/or implementation completed on time as planned in a given project year	Technical Area Channel											
1.2.8	Number and percentage of technical assistance requests to support operational routine monitoring systems for continuous ITN distribution completed on time as planned in a given project year	Country Channel											
1.3	**Environmental Compliance and Safety**												
1.3.1	Number of seasonal vector control personnel trained in environmental compliance and personal safety standards in vector control implementation	Total Sex: Male (#, %) Sex: Female (#, %) Job Function	5225	4737 3368 (71%) 1369 (29%) See Table 2	4301	4367 2583 (59.1%) 1784 (40.8%) See Table 2	4328						
1.3.2	Number of health workers receiving insecticide poisoning case management training	Total Sex: Male (#, %) Sex: Female (#, %)	42	47 35 (74%) 12 (26%)	63	61 43 (70.5%) 18 (29.5%)	61						
1.3.3	Number of adverse reactions to pesticide exposure documented that resulted in a referral for medical care	Total Type of Exposure	0	1	0	0	0						
1.3.4	Number of SEAs and Letter Reports submitted at least 60 days prior to the commencement of VC campaigns	Country											
1.3.5	Number and percentage of permanent and mobile soak pits inspected and approved	Total Number Percent	35 100%	36 100%	50 100%	50 100%	52 100%						

	prior to IRS campaigns or before first use											
1.3.6	Number and percentage of storehouses inspected and approved prior to IRS campaigns	Total Number Percent Type: Sector Store Type: Central Warehouse Type: District Warehouse	37 100%	37 100% 34 1 2	52 100%	52 100% 48 1 3	52 100%					
1.4	**Promote Gender Equality in all Facets of Planning and Implementation**											
1.4.1	Number and percentage of women hired to support VC campaigns	Number Percent Job Function	35%	1312 29% See Table 2	35%	1457 39.6%	45%					
1.4.2	Number and percentage of women hired in supervisory roles in target areas for VC activities	Number Percent VC Intervention Job Function	50% IRS	240 42% IRS	50% IRS	303 48% IRS	50% IRS					
1.4.3	Number and percentage of trainees (permanent and seasonal) who have completed gender awareness training	Total Sex: Male (#, %) Sex: Female (#, %) Job Function	5115	4444 3166 (71%) 1278 (29%) See Table 2	4444	2874 1413 (49.2%) 1461 (50.8%) See Table 2	2305					
1.4.4	Number and percentage of women in senior leadership roles in VectorLink country offices	Country Sex (# and %)										
1.5	**Implement and Support SBCC and Mobilization Activities**											
1.5.1	Number of radio spots and talk shows aired	Total VC Intervention Talk Show or Radio Spot	0	12 IRS	1	4 IRS Radio talk show	6					
1.5.2		Total	0	0	0	0	0					

	Number of print materials distributed to or targeted at beneficiaries	VC Intervention										
1.5.3	Number of people reached with vector control and/or SBCC messages via door-to-door messaging	Total VC Intervention Sex: Male Sex: Female	447447	459678 IRS 209421 250257	358969	186,725 IRS 83,825 102,900	0					
2. Entomological and Epidemiological Data to Drive Decision-Making												
2.1	**Vector Control Activities Monitored via Entomological and Epidemiological Data**											
2.1.1	Number of project-supported entomological sentinel sites established to monitor vector bionomics (vector species, distribution, seasonality, feeding time, and location)	Total VC Intervention	19	19 IRS	7	9 IRS	7					
2.1.2	Number and percentage of vector bionomics monitoring sites measuring all basic entomological indicators (species composition, indoor and outdoor human biting rates, hourly human biting rates, indoor resting densities)	Total Number Percent VC Intervention	19 100%	19 100% IRS	7 100%	9 100% IRS	7 100%					
2.1.3	Number and percentage of vector bionomics monitoring sites measuring the following all advanced entomological indicators: sporozoite rates and entomological inoculation rates	Total Number Percent IRS or Entomology Only Program	19 100%	19 100% IRS	7 100%	9 100% IRS	9 100%					
2.1.4	Number and percentage of insecticide resistance monitoring sites that tested all priority insecticides for the relevant local vector control intervention [3]	Total Number Percent VC Intervention	12 100%	12 100% IRS	4 100%	4 100% IRS	4 100%					
2.1.5		Total Number	N/A	N/A	36	36	36					

	Number and percentage of houses in which WHO cone bioassays were conducted within two weeks of spraying with greater than 98% test mortality recorded for IRS countries	Percent Insecticide Type			100%	100% Fludora Fusion	100.00%					
2.1.6	Number and percentage of sites that conducted WHO cone bioassays after the completion of spraying at monthly intervals until test mortality drops below 80% for two consecutive months for IRS countries	Total Number Percent Insecticide Type	N/A	N/A	6 100%	6 100% Fludora Fusion	6 100%					
2.1.7	Number of countries with an integrated vector control analytics dashboard created by PATH, available for decision-making	Country										
2.1.8	Number of people trained (VectorLink and non VectorLink staff) in entomological monitoring	Total Sex: Male (#, %) Sex: Female (#, %)	20	66 Male (42, 63.6% Female (24, 36.4%)	24	60 Male (36, 60%) Female (24, 40%)	66					
2.1.9	Number and percentage of sites in which WHO cone bioassays were conducted to evaluate bio-efficacy of bed nets	Total Number Percent			0	0	4					
2.1.10	Number of nets in which WHO cone bioassays were conducted to evaluate bio-efficacy of bed nets	Total			0	0	60					
2.2	**NMCPs Develop Country-Level IRS and Other Malaria VC 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	Country										

2.2.2	Number and percentage of countries with a data and visualization dashboard complete for IRS and/or entomology data in VectorLink Collect for vector control decision making	Country										
2.2.3	Number of countries that implement sub-national insecticide rotation	Country										
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	Total Job Function Organization	N/A	N/A	4	6 MOPDD MOPDD	0					
2.3.2	Number and percent of targeted individuals that report using new analytical tools and/or skills in their planning, resourcing, implementation, or measurement activities	Total Job Function Organization	N/A	N/A	4	6 MOPDD MOPDD	0					
	3. Procurement and Logistics											
3.1	**Cost-Effective Procurement Mechanism Established**											
3.1.1	Number and percentage of insecticide procurements that had a pre-shipment QA/QC test, done by a third party, at least 60 days prior to spray campaign	Country Insecticide Type										
3.1.2	Number and percentage of insecticide procurements received on-time to allow for the initiation of spray operations as scheduled	Total Number Percent Insecticide Type	1 100%	1 100% Actellic 300CS	1 100%	1 100% Fludora Fusion	1 100%					
3.1.3	Number and percentage of targeted countries with international equipment procurements, including	Country VC Intervention										

	PPE, received on-time to allow for the initiation of vector control campaigns as scheduled											
3.1.4	Number of VectorLink staff trained on procurement	Country										
3.2	**Robust Inventory Management and Logistics Systems Established**											
3.2.1	Number and percentage of logistics and warehouse personnel (seasonal and full-time) trained in VC supply chain management	Total Number VC Intervention Male Female Job Function	47	40 IRS 11 (30%) 29 (70%) See Table 2	39	39 IRS 16 (41%) 23 (59%) See Table 2	39					
3.2.2	Number and percentage of operations site warehouses where physical inventories can be verified by daily stock records	Total Number Percent	37 100%	37 100%	48 100%	48 100%	36 100%					
3.2.3	Number and percentage of IRS countries that successfully completed spray operations without an insecticide stock-out	Country Insecticide Type										
	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	Total Number Type of Innovation	0	0	0	0	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	Country Technical Area										

	global reporting on the Vector Learning Exchange											
4.2.2	Number of individual members who use the Vector Learning Exchange	N/A										
4.2.3	Number of symposia and/or presentations submitted to and accepted at global conferences	Total Technical Area	1	1 Entomology	1	0	0					
4.2.4	Number of success stories written or videos produced and shared on the VectorLink project website	Total	0	1	0	3	0					
4.2.5	Number of peer-reviewed journal articles submitted and accepted	Technical Area										
4.2.6	Number of contributions to vector control global or country policy and/or guidance documents	Total Technical Area	0	0	0	0	0					
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	Total VC Intervention	1	1 IRS: Walk to Work Strategy	0	1 IRS: New mobilization strategy	0					
4.3.2	Number of cost effectiveness assessments of existing approaches in the implementation of IRS and integrated malaria vector control programs	Total VC Intervention	0	1 IRS: Walk to Work Strategy	0	1 IRS: New mobilization strategy	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 vector control activities globally	Total	1	3	3	3	3					

[1] Target based on 85% of estimated eligible structures in indicator 1.1.2

[2] For IRS programs, this includes spray operators, team leaders, and supervisors.

[3] Performed by MOPDD with with funding from GF

#	Selected Indicators *with Job Function Disaggregates*	By Job Function	Annual Targets and Results									
			Year 1		Year 2		Year 3		Year 4		Year 5	
			Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.2	**Strengthen Capacity of NMCPs, VC Personnel, and Other Institutions to Implement and Manage IRS and Other VC Activities**											
1.2.1	Total number of people trained to support VC in target areas	Total	5253	4762	4762	4376	4328					
		District IEC		2		2						
		Sector Coordinators		34		34						
		Sector IECs		68		34						
		Supervisors		61		54						
		Spray Operators		1278		2312						
		Team Leaders		301		438						
		Clinicians		49		61						
		M&E Asst, Data Clerks		22		44						
		Storekeepers, Logistics		40		38						
		Security Guards		72		100						
		Washers		113		158						
		Spray Pump Technicians		4		6						
		Finance Assistants		3		3						
		Drivers		55		93						
		Cell IEC Mobilizers		166		65						
		Village IEC Mobilizers		2494		934						

1.2.2	Total number of people trained to support VC in target areas with USG funds[2]	Total	1500	1710	1710	2874	2848					
		District IEC		2		2						
		Sector Coordinators		34		34						
		Sector IECs		34		34						
		Supervisors		61		54						
		SOPs		1278		2312						
		Team Leaders		301		438						
1.2.4	Total number of people hired to support VC in target areas.	Total	4572	4540	6380	3675	3677					
		District IEC Asst		2		3						
		Data Clerks		19		36						
		M&E Assistants		2		3						
		Data Cleaners		2		13						
		District Storekeepers		3		3						
		Sector Storekeepers		34		48						
		Logistics Assistants		3		5						
		Finance Assistants		3		4						
		Sector Coordinators		34		48						
		Sector Supervisors		34		48						
		Sector IEC Assistants		34		48						
		SOPS		1217		1712						
		Team Leaders		301		426						
		Cell IEC Mobilizers		166		64						
		Village IEC Mobilizers		2494		945						
		Security Guards		72		100						
		Washers		113		158						

		Pump Technicians		4		6						
		Cleaners		3		5						
1.2.5	Number of VC project training workshops targeting NMCP and other host country staff	Total	1	2 Ento technicians	1	2 IRS District/Sector Mngrs in 3 districts; MOPDD M&E Assistants	2					
1.2.6	Number of NMCP and other vector control host country staff who have logged into VectorLink Collect	Total	N/A	N/A	8	10	8					
		Vice Mayor				3						
		Health Director				3						
		MOPDD Staff				4						
1.3	**Environmental Compliance and Safety**											
1.3.1	Number of seasonal vector control personnel trained in environmental compliance and personal safety standards in vector control implementation	Total	5225	4737	4301	4367	4328					
		District IEC		2		2						
		Sector Coordinators		34		34						
		Sector IECs		68		34						
		Supervisors		61		54						
		SOPs		1278		2312						
		Team Leaders		301		438						
		M&E Asst and Data Clerks				44						
		Storekeepers, Logistics, EC Assistants, Spray Pump Technicians		46		38						
		Cell IEC Mobilizers		166		65						
		Village IEC Mobilizers		2494		934						
		Security Guards		72		100						
		Drivers		55		93						

		Washers		113		158						
		Clinicians		47		61						
1.4	**Promote Gender Equality in all Facets of Planning and Implementation**											
1.4.1	Number and percentage of women hired to support VC campaigns	Total		1312		1457						
		District IEC Asst		1		2						
		Data Clerks		5		20						
		M&E Assistants		2		3						
		Data Cleaners		0		3						
		District Storekeepers		1		3						
		Sector Storekeepers		25		26						
		Logistics Assistants		2		4						
		Finance Assistants		1		2						
		Sector Coordinators		10		13						
		Sector Supervisors		14		23						
		Sector IEC Assistants		15		30						
		SOPs		729		891						
		Team Leaders		144		199						
		Cell IEC Mobilizers		53		14						
		Village IEC Mobilizers		231		112						
		Security Guards		3		4						
		Washers		73		104						
		Pump Technicians		2		3						
		Cleaners		1		1						
1.4.2	Number and percentage of women hired in supervisory roles in target areas for VC activities	Total		240		303						
		Sector Coordinators		10		13						

		Sector Supervisors		29		23						
		Sector IECs		29		32						
		Storekeepers, Logistics		27		33						
		Team Leaders		143		199						
		M&E Assistants		2		3						
1.4.3	Number and percentage of trainees (permanent and seasonal) who have completed gender awareness training	Total	5115	4444 [1]	4444	2874	2305					
		District IECs				2						
		Sector Coordinators				34						
		Sector IECs				34						
		Supervisors				54						
		SOPs				2312						
		Team Leaders				438						

2. Entomological and Epidemiological Data to Drive Decision-Making

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	Total	N/A	N/A	4	6	0					
		Category/Function				MOPDD staff						
2.3.2	Number and percent of targeted individuals that report using new analytical tools and/or skills in their planning, resourcing, implementation, or measurement activities	Total	N/A	N/A	4	6	0					
		Category/Function				MOPDD staff						

3. Procurement and Logistics

3.2	**Robust Inventory Management and Logistics Systems Established**											
3.2.1	Number and percentage of logistics and warehouse personnel (seasonal and full-time) trained in VC supply chain management	Total	47	40	39	39	39					
		Central Warehouse Storekeeper		1		1						
		District Logistics Asst		2		2						

		District Storekeepers		3		2						
		Sector Storekeepers		34		34						

[1] Nearly all trainees were trained on gender awareness but the job function disaggregates are no longer available.

ANNEX I: ENVIRONMENTAL MITIGATION AND MONITORING REPORT

This Environmental Mitigation and Monitoring Report (EMMR) documents the status of each required mitigation measure as stipulated in the associated EMMP. It summarizes field monitoring, issues encountered, actions taken to resolve identified issues, outstanding issues, and lessons learned.

List each Mitigation Measure from column 3 in the EMMP Part 2 of 3	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
1. **Education, Technical Assistance, Training**	N/A	N/A	N/A
2. **Research and Development** • Implement laboratory environmental, health, and safety manuals with standard operating procedures (SOPs), or use existing SOPs, for laboratory operations in accordance with country-specific compliance mechanisms. • Implement SOPs for the safe storage, transport, and use of equipment, chemical reagents, insecticides, and supplies in conformance with international best practices (e.g., WHO, FAO) and host country requirements. • Provide training to workers on the approved SOPs or Waste Management Plan (WMP) developed for properly handling and disposing of wastes.	a. The chemical reagents and other supplies that are used in entomology laboratory are managed according to SOPs and their MSDS, the wastes from the laboratory are separated uncontaminated from contaminated, and there is a company which is in charge of their disposal. b. The storage facilities were premises provided by local authorities. They were chosen according to the BMP requirements. The security of storage were ensured by the system of double locking and availability of security guards. Vehicle transportation were pre-inspected and given a vehicle certificate. Needed materials were quantified and procured with international standard. c. 3,559 SOPs, 62 storekeepers, 180 seasonal staff were trained on health & safety and waste management. 61 health providers at district level were trained on insecticide side effects	Health centers do not post safety data sheet of the insecticide for reference in case of poison exposure.	Recommend to health centers that safety data sheet should be made available or easily accessible during the IRS campaign.

List each Mitigation Measure from column 3 in the EMMP Part 2 of 3	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
	and safety data sheet of Fludora Fusion.		
3. Public Health Commodities	N/A	N/A	N/A
4. Small-Scale Construction a. Obtain all needed authorizations prior to construction: permits, environmental and social impact assessments, etc. b. Retain competent, licensed professionals to design and supervise construction. c. Establish health, safety and environmental obligations in all contracts. d. Complete a site emergency action plan. e. Provide safety training to all workers using construction equipment. f. Identify closest health care facility to handle injuries. g. Asbestos, lead-based paints and other toxic	a. All soak pits for the disposal of liquid waste were chosen, inspected and determined to be ready for operation prior to the beginning of the spray campaign. The pre-seasonal environmental compliance inspection was conducted from August 22 to 26 August 2019 in Kirehe and Nyagatare districts; and from January 6 to 10 January 2020 in Ngoma district to verify the soak pits which required rehabilitation. All soak pit shift from semi concrete to concrete washing area except in Ngoma district b. The local authorities provided competent workers repair and construct soak pits. Rehabilitation of so was completed before spraying operations.		

List each Mitigation Measure from column 3 in the EMMP Part 2 of 3	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
materials will not be used under any circumstances. If the presence of asbestos is suspected in a facility to be renovated, the facility must be tested before rehabilitation works begins. Should asbestos be present, then the work must be carried out in conformity with host country requirements and with guidance to be provided by the implementing partner. All results of the testing for asbestos shall be communicated to the COR. h. Develop and follow a waste management plan (WMP). Identify authorized recycling or disposal facilities prior to generation of waste. i. Minimize the generation of waste by: - Correctly assessing material needs (not over-buying) - Reducing amount of packaging used by suppliers - Reusing material on site, such as use of discarded materials for leveling ground and filling trenches, etc. j. Designate secure on-site waste storage facilities k. Ensure all workers are trained and dispose of wastes properly. l. Complete and track hazardous waste manifests for all shipments m. Source all construction material from an ecologically-safe provider. n. Contractor must provide and all workers must use PPE such as hardhats, footwear, dust mask, safety glasses and reflective vests, as needed. o. Ensure first aid and spill clean-up kits are easily available p. Contractors must comply with the "Small-Scale Construction" chapter of the USAID Sector Environmental Guidelines (www.usaidgems.org/sectorGuidelines.htm	c. 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. All recycling plants, districts hospitals signed contract and billing contract of incinerators for solid contaminated and non-contaminated wastes. Waste disposal plan was established prior to IRS campaign. d. All spray operators, supervisors, sign contractsts prior to IRS campaign. District hospital and health centers were standing by to receive eventual injury caused by incident. First aid kits were distributed to all sites and emergency call responses were available and hung on at operation sites. e. Training of spray operators was conducted with application of spraying techniques. There were few cases of SOPs not in compliance with the insecticide mixing procedure, spray speed and 5 cm swath overlap guidelines. f. At all operation sites a health facility was identified during the pre-seasonal environmental assessment. All health facilities were located at almost within 1 km. g. No asbestos was identified in used operation site. h. Prior to IRS campaign a waste disposal plan was established. The plan was shared with district coordinators and logistics to plan the disposal accordingly and monitor timely the solid contaminated wastes and non-contaminated waste. i. Required materials are procured based on quantification. Many of them are re-used and old		

List each Mitigation Measure from column 3 in the EMMP Part 2 of 3	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
q. Contractor will provide drinking water, latrine and a handwashing station to workers. r. Contractors will arrange working hours to minimize disruption to the community. s. If needed, construct drainage canals and infiltration pits for management of storm water and prevention of soil erosion. t. Post-construction: ensure leftover materials have been properly disposed of.	ones are disposed according to their type and renewed according to needed material j. The storage had at least two rooms. Contaminated waste and non-contaminated waste were stored separately. Contaminated waste was kept in insecticide room. All supervisors were trained on waste management. The transport of insecticide from the central warehouse to district is monitored according to the BMP. The truck is covered by a well-fitted polythene sheeting. k. All workers are trained on waste disposal and storekeepers and logisticians ensure that they are kept in separate rooms and are disposed properly. l. IRS materials and insecticide are procured from recognized company that provide warranty and safety data sheet. m. All required PPE were procured and distributed in timely manner. n. Training on the use of PPE was conducted for all SOPs; there was no case of adverse effect resulting from insecticide contact. However, minor skin rashes that were relieved after washing were incurred. Each site now is equipped with Vitamin E lotion to alieve any rashes. o. First aid kits and spill clean-up kit were procured and distributed to all operation sites. Each store disposed a sample and every transportation vehicle. p. At each operation site two washing rooms were constructed, one for male and another for female. Soap, basin and other needed accessories were provided. Spray operators were using the		

List each Mitigation Measure from column 3 in the EMMP Part 2 of 3	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
	latrine available at cell or sector level where the storage is located. q. SOPS took breakfast in morning and worked until 2: PM so they can rest and have access to drinking water. r. SOPs were working almost eight hours a day, starting at 6:00 AM. s. Soak pits were maintained by draining rainwater and where the leftover water exceeded the tank, washers dug a pit to contain water. t. Post-campaign evaluation was conducted to ensure that all storage was handed over to local authorities and soak pits were cleaned and securely closed.		
5. Small-Scale Water and Sanitation	N/A	N/A	N/A
6. Nutrition	N/A	N/A	
7A. Vector Control- Indoor Residual Spraying a. Insecticide selection for any USAID-supported malaria program is subject to the criteria listed in the USAID Programmatic Environmental Assessment, country SEAs, and host country requirements. b. Procurement and inventory logs must be maintained. c. Ensure storage facility and PPE are appropriate for the active ingredient used and in accordance with approved SOPs. d. Distribute insecticides to facilities that can manage such commodities safely in storage, use, and disposal (i.e. in a manner generally equivalent to Implementing Partner's own SOPs/WMP).	a. The current used insecticide fell into the range of of insecticide recommended in the SEA, which is nationwide through 2021 and authorizes the use o pyrethroid, carbamate, organophosphate, and neonicotinoid classes of insecticide. b. Fludora Fusion was procured according to the Material Safety Data Sheet (MSDS) and PMI BMP for IRS. c. All storage facility predisposed at least two rooms including the insecticide room. Training on the use of PPE was conducted for all SOPs, there was no case of adverse effect resulting from insecticide contact. d. Insecticides have been distributed to facilities that can manage such commodities safely in		

List each Mitigation Measure from column 3 in the EMMP Part 2 of 3	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
e. Inspect and certify vehicles used for insecticide or team transport prior to contract. f. Train drivers g. Ensure availability of cell phone, PPE and spill kits during insecticide transportation. h. Initial and 30-day pregnancy testing for female candidates for jobs with potential insecticide contact. i. Health test all spray team members for duty fitness. j. Procure, distribute, and train all workers with potential insecticide contact on the use of PPE. k. Train operators on mixing insecticides and the proper use and maintenance of application equipment. l. Provide adequate facilities and supplies for end-of-day cleanup. m. Enforce application and clean-up procedures.	storage, use, and disposal (i.e. in a manner generally equivalent to Implementing Partner's own SOPs/WMP) e. ECO, logistic coordinator and district coordinators inspected vehicles to be used during IRS operations to see if they met IRS standard requirements. A total of 85 vehicles were inspected and hired for the support of the IRS operations in Kirehe, Ngoma and Nyagatare districts. Nyagatare used 30, Kirehe used 23 and Ngoma used 28 vehicles. Four additional supervision cars were inspected. f. 85 drivers were oriented on safety issues. They all signed the Abt Motor Vehicle and Driver Policy before starting their work. g. All drivers were wearing minimum PPE and provided their contact phones numbers. h. The screening of SOPs in order to see those who were unhealthy or pregnant were conducted. All female SOPs and washers were tested for pregnancy. Seventeen pregnant women were assigned to other roles on the project. Three other individuals were found unfit due to other medical conditions. i. All SOPs, washers, and supervisors were medically tested for health and fitness. A total of 2,316 SOPs, 158 washers and 101 supervisors were screened for health and fitness and the 20 found to be unfit were excluded from participating in IRS operations j. Training on the use of PPE was conducted for all SOPs, there was no case of adverse effect resulting from insecticide contact. k. All SOPs were trained on mixing pesticides before spraying. Triple rinsing of empty		

List each Mitigation Measure from column 3 in the EMMP Part 2 of 3	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
	bottles in the field was emphasized during the SOP training. l. Washing soap and other supplies were available at all operational sites to facilitate end-of-day cleanup. There were 819 smartphone-based end-of-day cleanup inspections during the campaign and in no case was the unavailability of soap or water for cleanup reported. m. The seven-barrel progressive rinsing procedure was performed by all SOPs. Of the 819 end-of-day cleanup inspections conducted, there were 11 red flags reported that correspond to 1.3%. All issues were corrected immediately.		
n. Implement Information, Education and Communication (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 o. Ensure health facility staff are aware of insecticide poisoning management	n. Implement Information, Education and Communication (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. o. IEC campaigns were effectively carried out before the campaign. A total of 945 Village IEC's (833 males and 112 females) conducted IEC campaigns in Ngoma to inform homeowners of responsibilities and precautions. Village IEC was supervised by 64 Cell IECs (50 males and 14 females). p. Health providers were trained on side effects of insecticide. They were trained on the safety data sheet of the used insecticide where they focused on minor, mild and severe symptoms of poisoning and the current treatment.		
p. Storage facilities and transportation vehicles must be physically secured to prevent theft.	q. All storage sites had 2 security guards who worked 24 hour shifts. Transport vehicles have		

List each Mitigation Measure from column 3 in the EMMP Part 2 of 3	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
q. Maintain records of all insecticide receipts, issuance, and return of empty containers. r. Conduct analysis comparing number of houses treated vs. number of containers used. s. Examine houses treated to confirm application. t. Perform physical inventory counts during the application season.	a tight polythene sheeting that covered and secured the insecticide. r. Storekeepers are to maintain and check all records of the stock regularly during IRS operations. During the 120storekeeper performance inspections, there were 32 storekeeper red flags, which corresponds to 26% instances of non-compliance with stock-keeping guidelines. These cases were all addressed immediately. s. Daily checking of spray performance sheet to verify insecticide usage rate team by team. t. VL Rwanda continued to use the DOS checklist to ensure quality of spraying was adhered to by all SOPs in the field, and to standardize spray quality supervision by TLs and other supervisors. TLs used the DOS checklist to supervise insecticide mixing and triple rinsing of insecticide bottles, full PPE use by all SOPs, use of CFVs during spraying, household preparation, and application of proper spray techniques. TLs used the DOS form to supervise each SOP on their team at least once per day. TLs corrected any mistakes (red flags) made by the SOPs and noted the errors on the DOS checklist. u. Inventory check was completed by district coordinators, storekeepers, and supervisors during the spraying periods in all districts sectors.		
u. 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 similar durable container. Waterproof labeling must be affixed to the barrel, with the identity of the	v. N/A w. District and sectors managers were trained on the curriculum of IRS training which was developed by PMI (2015). It was intended to provide clear information on IRS operations		

List each Mitigation Measure from column 3 in the EMMP Part 2 of 3	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
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. v. Train applicators on the SEA operational requirements, SOPs, PMI BMPs, and approved WMP, developed for the safe and effective storage, distribution, application, and disposal of insecticides w. Ensure application equipment and PPE are appropriate for the active ingredient used and in accordance with approved SOPs, and maintain equipment to avoid leaks. x. Maintain application equipment y. No application of insecticides within 30 yards of beekeeping sites	and guidance on overall management of IRS program together with practical steps on household spray application. The training will help new IRS district and sector managers to focus on safe and effective IRS program and make effective possible use in their respective area. x. Training of SOPs was conducted with application of spraying techniques. There were few cases of SOPs not in compliance with the insecticide mixing procedure, spray speed and 5 cm swath overlap guidelines. All persons with potential direct contact with or exposure to insecticides were wearing appropriate PPE. y. VL Rwanda provided tablets for all supervisors to check whether all operations are undergoing. Two pump technicians (1 male and 1 female) were placed at each district warehouse to repair and maintain pumps before and during IRS operations. In addition, the technician made site visits to fix the pumps with leakages. There were few reported cases of a leaking pump and they were immediately repaired. z. Insecticide was applied within the house. No insecticide sprayed outside.		
z. Handling, treatment, and disposal of nonhazardous (general waste) and hazardous 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	aa. All disposal sites were identified, certificated at prior IRS campaign bb. Effluent were disposed of into the soak pit. The biobed established were used for the second time for some soak pits. Solid contaminated waste was incinerated at district hospitals. Remaining solid non-contaminated waste was disposed at dumping site. E-waste was disposed of at e-recycling plant.		

List each Mitigation Measure from column 3 in the EMMP Part 2 of 3	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
aa. Choose sites for disposal of liquid wastes, including fixed and mobile soak pit sites according to PMI BMPs bb. Construct fixed and mobile soak pits with charcoal according to the BMPs to adsorb insecticide from rinse water cc. Maintain soak pits as necessary during season dd. Monitor waste storage and management during campaign ee. Monitor disposal procedures post-campaign	cc. VL Rwanda used fixed soak pits this round. The biobed was used for the second time except two soak pits which were constructed in 2017. In Ngoma district, all pits were newly constructed. dd. No soak pit was reported to be flooded. But two soak pits were showing infiltrating water slowly because of the mud. ee. All waste at district sectors was properly stored in district stores prior to final disposal. ff. All IRS waste was accompanied to disposal sites by storekeepers and logistic assistants. Contaminated wastes were disposed of at district hospital and incinerated. The district hospital provided the certificate. 1550 dry batteries were disposed at E-waste recycling plant.		
ff. Wastes will only be disposed in incinerators that comply with PMI BMPs Collect and maintain treatment and disposal documents and records on file gg. Country-level USAID EC documentation must contain guidance on proper disposal of wastes.	gg. Contaminated wastes were incinerated at district hospital with incinerator constructed by MOH that meet international standards (WHO). hh. The SEA document and PMI BMPs 2015 version guided us on proper disposal of wastes.		
7B. Vector Control Testing of Insecticide-Treated nets (ITN) a. Store nets only in storerooms secured with sturdy doors, locks, and barred windows.	a. N/A		
7C. Vector Control- Distribution of Insecticide treated nets (ITN) a. Where there is evidence of misuse for fishing, assess the extent of misuse and collaborate across sectors (Ministries of Health,	a. N/A		

List each Mitigation Measure from column 3 in the EMMP Part 2 of 3	Status of Mitigation Measures	List any outstanding issues relating to required conditions	Remarks
Environment, and Agriculture) to develop a sustainable, locally relevant solution. b. Store ITNs in dry, ventilated facilities. c. Store in a secure facility to prevent theft or unauthorized access. Post guard or use barred windows as needed. d. Do not store ITNs with food, feed, or potable water supplies. e. Provide worker training on the proper handling of ITNs.			
f. Ensure SBCC materials and outreach activities are coordinated with ITN distribution activities during campaigns, and include guidelines on how to properly wash and maintain ITNs (e.g., discourage disposal of wash water in sensitive ecosystems, discourage washing and rinsing ITNs in water bodies).	f. N/A		
g. Ensure SBCC messages inform campaign distributors and local communities about the potential harm to human health and environment if bags and baling materials are reused; support the development of a communication plan that provides messages on best practices for handling and disposing of bags and baling materials.	g.		
8. Emergency Response	N/A	N/A	

Prepared by:

Murindahabi Epiphanie Date: 3/11/2020

Environmental Compliance Officer