



U.S. PRESIDENT'S MALARIA INITIATIVE



THE PMI VECTORLINK PROJECT UGANDA

2019 END OF SPRAY REPORT

PHASE I: MARCH 18 - APRIL 15, 2019 AND PHASE II: MAY 27 – JUNE
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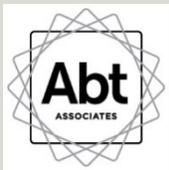
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ACRONYMS

BMP	Best Management Practices
CDFU	Communication for Development Foundation Uganda
DCV	Data collection and verification
CFV	Control Flow Valve
DEC	Data entry clerk
DECS	Director of Environmental Compliance and Safety
DFID	Department for International Development
DHE	District Health Educators
DHT	District Health Team
DOS	Directly observed spraying
EC	Environmental compliance
IEC	Information, education and communication
IPC	Interpersonal communication
IRS	Indoor residual spraying
LC	Local Council
M&E	Monitoring and Evaluation
MOH	Ministry of Health
MOU	Memorandum of Understanding
MSP	Mobile soak pit
NDA	National Drug Authority
NMCD	National Malaria Control Division
ODK	Open Data Kit
PMI	President's Malaria Initiative
PMT	Performance monitoring tracker
PPE	Personal protective equipment
PSC	Pyrethrum spray catch
PSECA	Pre-season environmental compliance assessment
RSL	Race to the Starting Line
SBCC	Social and behavior change communication
SMS	Short message service
SOP	Spray operator

TC	Town Council
TOT	Training of trainers
WHO	World Health Organization

EXECUTIVE SUMMARY

In 2019, the United States Agency for International Development/President's Malaria Initiative (USAID/PMI) VectorLink Uganda project successfully conducted a two-phase indoor residual spraying (IRS) campaign in 15 districts in Uganda. The project used Actellic 300CS (pirimiphos-methyl, an organophosphate) in 13 districts (Alebtong, Amolatar, Budaka, Bugiri, Butaleja, Butebo, Kaberamaido, Kibuku, Namutumba, Otuke, Pallisa, Serere, and Tororo) and piloted the use of SumiShield 50W (clothianidin, a neonicotinoid) in two additional districts (Dokolo and Lira). USAID/PMI funds supported spraying for 10 of the districts, while the United Kingdom's Department for International Development (DFID) funded spraying in the other five. PMI VectorLink Uganda sprayed the eight Phase I districts (Budaka, Bugiri, Butaleja, Butebo, Kibuku, Namutumba, Pallisa, and Tororo) on March 18–April 15, 2019, and the seven Phase II districts (Alebtong, Amolatar, Dokolo, Kaberamaido, Lira, Otuke, and Serere) on May 27–June 27, 2019. Having confirmed with the district authorities that there is no more organic farming in Dokolo and Lira districts, the historical organic farming sub-counties of Amach and Agali in Lira and Bata and Okwalongwen in Dokolo were sprayed with the rest of the Phase II districts. During this campaign, the project targeted 1,369,305 structures for IRS. It collaborated with the district and Ministry of Health (MOH) staff to supervise the trainings and the spray campaign.

The following are project achievements and highlights of the 2019 spray campaign (Table I shows the details of the spray campaign):

- The project sprayed 1,291,569 of the 1,393,562 structures found by spray operators (SOPs) in the 15 IRS target districts, for a coverage rate of 92.7%.
- The project protected 4,479,157 people, including 862,536 (19.3%) children under five years and 119,077 (2.7%) pregnant women.
- The project trained 8,580 individuals, using US and DFID government funds, to support vector control activities in the 15 districts.
- The project consumed 449,604 bottles of Actellic 300CS and 91,553 sachets of SumiShield 50WG in spraying the 1,291,569 structures. SOPs sprayed approximately 2.4 houses per bottle/sachet of insecticide, leaving a balance of 71,794 bottles of Actellic 300CS¹ and 28,161 sachets of SumiShield 50WG² at the end of the spray round. This insecticide balance will be used for the 2020 spray campaign.
- The project incinerated all IRS insecticide-contaminated wastes, including used masks, at Green Label Ltd, a private incineration plant in Iganga district. Green Label Ltd. Other solid wastes, including empty bottles and assorted plastics, were recycled at Gentex Enterprise Ltd, while paper cartons were recycled at Pulp and Paper Mills Ltd.
- The project conducted wall bioassays within one week of spraying to assess the quality of spraying in eight of the 15 target districts, and these recorded 100% mortalities for susceptible *Anopheles gambiae* s.s. The average mortality at one and two months post spray was 100%. This implies that the quality of spraying was satisfactory.

¹ Expires in November 2020

² Expires in June 2021

TABLE 1: 2019 IRS CAMPAIGN SUMMARY RESULTS

Funding		DFID		PMI	
Insecticide used		Actellic 300CS	SumiShield 50WG	Actellic 300CS	SumiShield 50WG
Number of districts covered by PMI/DFID-supported IRS		4	1	9	1
Number of structures found by SOPs		295,941	80,472	844,591	172,558
Number of structures sprayed		281,838	75,219	789,621	144,891
2019 spray coverage		95.2	93.5	93.5	84.0
Population protected with PMI/DFID support	Total Pop:	790,044	198,440	3,044,358	446,315
	Children < 5:	143,615	32,889	619,909	66,123
	Pregnant Women:	15,648	3,807	88,950	10,672
Length of campaign (total days)		24	24	24	24
Number of people trained with PMI/DFID government funds to support vector control activities		2,365 (1,454 SOPs, 379 team leaders, 28 pump techs, 273 mobilizers, 91 storekeepers, 90 site supervisors, 20 data clerks, 5 project/Monitoring and Evaluation (M&E) assistants), 6 national trainers, 10 IRS technical staff 5 MOH, and 10 district supervisors,		6,216 (4,074 SOPs, 859 team leaders, 83 pump techs, 545 mobilizers, 185 storekeepers, 186 site supervisors, 185 parish supervisors, 40 data clerks, 18 project/M&E assistants, 6 MOH, 26 district supervisors, and 9 IRS technical staff	
Dates of PMI- and DFID-supported IRS campaign		May 27 - June 22, 2019		March 18 - April 15, 2019 and May 27 - June 27, 2019	

I. INTRODUCTION

I.1 COUNTRY BACKGROUND

Uganda is among the fifteen countries in sub-Saharan Africa that carry almost 80% of the global malaria burden. Five countries account for nearly half of all malaria cases worldwide: Nigeria (25%), Democratic Republic of the Congo (11%), Mozambique (5%), India (4%) and Uganda (4%). Malaria accounts for 20% to 34% of outpatient visits and 25% to 37% of hospital admissions. Of all the reported malaria cases in 2016, an average of 60% was laboratory confirmed, with the highest rate at 90% (World Malaria Report 2018, World Health Organization (WHO)).

As a result, the Ministry of Health (MOH) through the National Malaria Control Division (NMCD) has put in place several policy guidelines to address the situation. According to the Uganda Malaria Reduction Strategic Plan 2014–2020, the vision of the NMCD is that by 2020 malaria will no longer be the major cause of illness and death in Uganda, and families will have universal access to malaria prevention and treatment measures. The MOH/NMCD's goal is to control and prevent malaria morbidity and mortality so as to minimize social ill effects and economic losses attributable to malaria.

The President's Malaria Initiative (PMI) supports the NMCD through the implementation of malaria control activities through a broad Roll Back Malaria partnership, which includes all stakeholders, such as the Global Fund, the World Bank, the United Nations Children's Fund, the United Kingdom's Department for International Development (DFID), and the private sector.

I.2 PROJECT BACKGROUND

In September 2017, Abt Associates was awarded the PMI VectorLink Project to support the implementation of indoor residual spraying (IRS) and other integrated vector control activities. Under this new contract, Abt is expanding entomological monitoring to guide programs focused on insecticide-treated mosquito nets and IRS.

In Uganda, the project is being implemented under three result areas that include:

- Result 1: High-quality IRS program implemented in target districts
- Result 2: Institutionalized IRS is implemented, and Government of Uganda capacity to conduct IRS built
- Result 3: Comprehensive (entomological, environmental, and epidemiological) M&E of the IRS program performed.

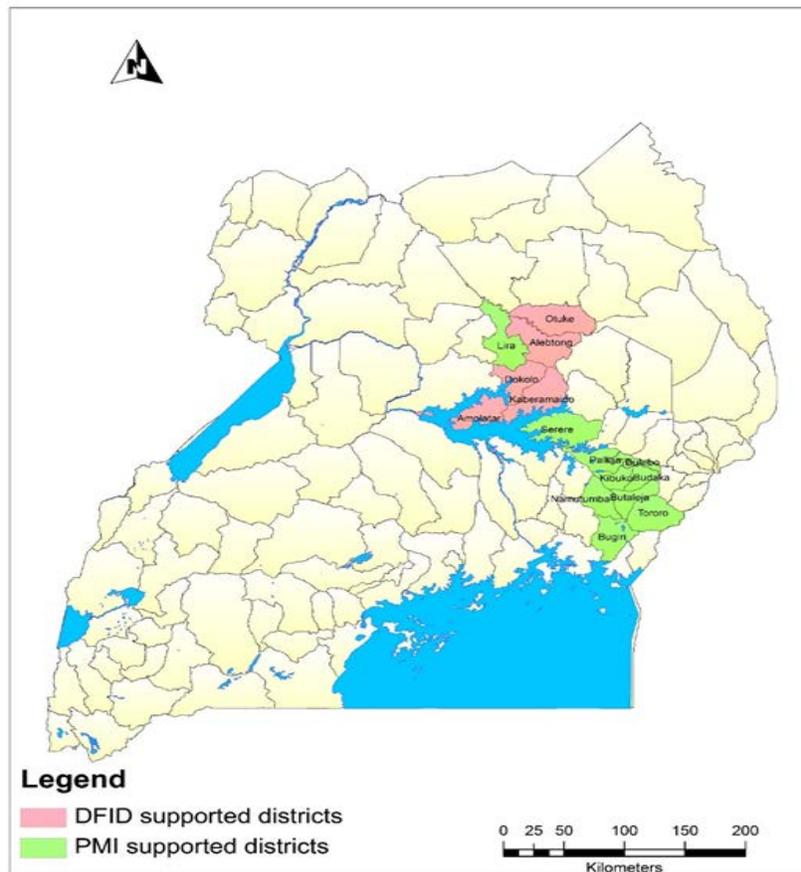
2. PRE-SEASON ACTIVITIES

2.1 IRS TARGET DISTRICTS

PMI VectorLink Uganda sprayed 15 high-burden malaria districts in the northern (Alebtong, Amolatar, Dokolo, Lira, Otuke) and eastern (Budaka, Bugiri, Butaleja, Butebo, Kaberamaido, Kibuku, Namutumba, Pallisa, Serere, and Tororo) parts of Uganda. The project based the district selection on the malaria burden in these districts, which was determined in collaboration with the MOH/NMCD and USAID/PMI Uganda.

Figure 1 shows the 15 IRS districts; the DFID-supported districts are Alebtong, Amolatar, Dokolo, Kaberamaido, and Otuke, while the PMI-supported districts are Budaka, Bugiri, Butebo, Butaleja, Kibuku, Lira, Namutumba, Pallisa, Serere, and Tororo. Table 2 shows the targets in the IRS districts.

FIGURE 1: MAP OF PMI- AND DFID-SUPPORTED DISTRICTS IN 2019



2.2 INSECTICIDE SELECTION

The project used Actellic 300CS, an organophosphate, for the 2019 spray campaign in 13 districts and SumiShield 50WG, a neonicotinoid, in two additional districts. The decision to use these insecticides was based on data obtained from insecticide susceptibility tests conducted from 2012 to 2018, which showed that the main malaria vector, *Anopheles gambiae* s.l., was susceptible to these insecticides in all testing sites, as well as the insecticide's long residual life as documented in previous PMI-funded spray campaigns.

2.3 IRS PREPARATION

The project developed the Race to the Starting Line (RSL) document and an IRS activity schedule, and disseminated these to all stakeholders for review in planning for the IRS campaign. The RSL calls for a nine-week pre-spray countdown, and shows deadlines for activities leading to the spray campaign. The IRS activity schedule lists activities and exact dates to implement these. The RSL and the IRS activity schedule ensured harmonization of spray schedules to protect vulnerable populations during historic peak transmission seasons.

Because of the massive scale of the Uganda spray campaign, the project sprayed the target districts in two phases, with each phase lasting a maximum of 24 operational days. The project has reviewed the spray campaign timing being mindful of the meteorological, entomological and epidemiological data. The project will implement IRS in early March in Phase I districts and mid-April 2020 for Phase II districts. This approach will reduce the time gap between the two spray campaigns phases thus ensuring that the spray dates coincide with the two key malaria transmission periods in the target districts.

2.4 DISTRICT-LEVEL CONSULTATIONS AND SENSITIZATION MEETINGS

In preparation for the spray campaign, the project's field team in collaboration with the MOH/NMCD conducted courtesy visits in all 15 districts to inform the district stakeholders about the upcoming spray round. The team also met with each individual district, focusing on the upcoming priority activities.

After the district planning and review meetings the district health teams (DHTs) and the project staff sensitized the sub-county-level leaders at their respective sub-counties. These leaders cascaded the IRS messages to their local administrative units' leaders (parish and village leaders) and communities.

2.4.1 MICRO PLANNING

The field teams together with the DHT members also conducted micro-planning meetings with the sub-county leaders of all 15 districts to share the IRS schedule and solicit their support for IRS activities. During micro-planning, the team also: confirmed the availability of sub-county supervisors and parish storekeepers who had worked in the previous spray round; confirmed the availability of previously used parish stores; and discussed roll-out and implementation of the IRS operational plan in their respective sub-counties. Participants at the meetings included district malaria focal persons who are district vector control officers in a majority of the districts, district health educators (DHEs), district biostatisticians, district environment officers, district supply officers, and district health officers. These six district officers constitute the DHT during the campaign. During micro-planning, the team discussed several key issues that ranged from IRS activity schedule, recruitment of temporary IRS staff, districts' roles and responsibilities to provide stores in all district operations sites and data centers, role of local leaders in supervision of IRS activities during the operations, renovation of IRS operations sites, progress in implementation of the planned activities, and the community mobilization plan. Team members agreed that daily feedback would be the cornerstone for success at each stage during project implementation.

2.4.2 RECRUITMENT OF SPRAY TEAMS

In collaboration with the DHT and sub-county leaders, the project confirmed the availability of previous spray team members and assessed their medical fitness to be part of the spray round. The field teams also recruited new spray team members to replace those who had dropped out or were otherwise unavailable, as well as three parish mobilizers for each parish store to lead the daily community mobilization activities at the village level.

2.4.3 TRAINING OF SPRAY TEAMS (CASCADE TRAINING)

In 2019, the project conducted a series of training sessions aimed at enhancing IRS managers' skills to implement and supervise IRS operations, and to strengthen their training and coaching capabilities. Table 2 shows the different trainings conducted by the project. The details about the trainings are included in Annex A. The main objective of all the trainings was to improve the skills and performance of spray operators (SOPs), thus enhancing the quality of IRS activities. Table 3 shows the gender breakdown of participants at these trainings.

TABLE 2: IRS TRAININGS CONDUCTED IN 2019 TO IMPROVE SPRAY QUALITY

Training	Dates	Participants Trained	Key Topic Areas Covered
National training of IRS master trainers (boot camp)	<ul style="list-style-type: none"> Dec 3 – 8, 2019 	<ul style="list-style-type: none"> 10 MOH/NMCD 36 district malaria trainers 19 PMI VectorLink project staff 	IRS planning, implementation, supervision, community mobilization, environmental management, spray techniques, logistics quantification, and warehouse management
Training of trainers (TOT)	<ul style="list-style-type: none"> Feb 11–15, 2019, Phase I districts May 6–10, 2019, Phase II districts 	276 Site supervisors	IRS planning, implementation, supervision, mobilization, environmental compliance (EC), and spray techniques
Training of team leaders	<ul style="list-style-type: none"> Feb 11–15, 2019, Phase I districts May 6–10, 2019, Phase II districts 	1,238 team leaders	Spray techniques, pump maintenance, safe handling of insecticides and environmental safety issues in IRS, community mobilization, supervision techniques, and directly observed spray (DOS)
Training of spray operators	<ul style="list-style-type: none"> March 11–15, 2019, Phase I districts May 20–24, 2019, Phase II districts 	5,528 spray operators	Spray techniques, pump maintenance, safe handling of insecticides and environmental safety issues in IRS, community mobilization
Training of parish mobilizers	<ul style="list-style-type: none"> Feb 11–15, 2019, Phase I districts May 6–10, 2019, Phase II districts 	818 parish mobilizers	Community mobilization including IRS key messages – before, during, and after and community engagement
Training of storekeepers	<ul style="list-style-type: none"> Feb 11–15, 2019, Phase I districts May 6–10, 2019, Phase II districts 	276 Storekeepers	Store management and inventory tracking, use of mHealth tools

Training	Dates	Participants Trained	Key Topic Areas Covered
Pump technician	<ul style="list-style-type: none"> Feb 11–15, 2019, Phase I districts May 6–10, 2019, Phase II districts 	111 pump technicians	Repair and servicing of sprayers, community mobilization including IRS key messages – before, during, and after and community engagement
Data clerks	<ul style="list-style-type: none"> March 13–14, 2019, Phase I districts May 27–28, 2019, Phase II districts 	60 data clerks	IRS data collection and management, integrity, and security; IRS data entry and practice

TABLE 3: NUMBER OF PEOPLE TRAINED WITH U.S. GOVERNMENT/DFID FUNDS TO SUPPORT VECTOR CONTROL ACTIVITIES

Category	DFID- Supported Districts		PMI- Supported Districts		Total
	Female	Male	Female	Male	
Parish mobilizers	59	214	115	430	818
Parish supervisors	0	0	56	129	185
Pump technicians	1	27	3	80	111
Site supervisors	18	72	36	150	276
Spray operators	378	1,076	1,264	2,810	5,528
Storekeepers	20	71	52	133	276
Team leaders	77	302	249	610	1,238
District supervisors	3	7	8	18	36
MOH supervisors	0	5	1	5	11
IRS technical staff	2	8	5	4	19
Data clerks	9	11	20	20	60
M&E assistants	*	*	6	2	8
Project assistants	3	2	6	4	15
Grand Total	570	1,795	1,821	4,395	8,581

*M&E Assistants engaged in PMI supported districts in phase I were deployed in DFID districts (phase II)

2.5 LOGISTICS NEEDS AND PROCUREMENT

The project referenced the inventory records from the previous IRS campaign, and also conducted a logistics needs assessment in November 2018 to develop the logistics and procurement plan that considered:

- Spray data based on 2018 IRS performance
- Available stock of materials, consumables, and equipment
- Transport arrangements for distribution of equipment, materials, and supplies
- Estimation of insecticide, personal protective equipment (PPE), and spray equipment required to fill any gaps

Based on the information from each district, the project performed a detailed analysis to determine the total number of spray pumps and amount of PPE, insecticide, and other IRS materials needed. The two

central warehouses, in Lira and Bugiri, served as the hubs for storage of other IRS commodities before distribution to the target districts. Actellic 300CS and SumiShield 50WG were delivered directly to each district store by Arysta and Sumitomo, respectively.

2.6 LOGISTICS AND STOCK MANAGEMENT

The project conducted a gap analysis and stock inventory assessment to establish the quantities of available spray supplies for all 15 districts and identify the procurement needs for the upcoming spray round.

At the end of the 2018 spray campaign, the balance of 32,743 bottles, 8,005 from the eastern region and 24,738 from the northern region, were transferred to two central locations, the Tororo district store and Dokolo district store. These were used during the 2019 campaign.

The PMI VectorLink Project received 488,651 bottles of Actellic 300CS and 119,715 sachets of SumiShield 50 WG for the 2019 IRS campaign. 348,204 bottles of Actellic 300CS were distributed to the 138 operations sites in Phase I districts. Phase II districts received 173,200 bottles of Actellic 300CS and 119,715 sachets of SumiShield to cover the 138 operations sites in the seven districts. The balance of insecticide at the end of the 2019 spray campaign is 99,954 units (71,793 bottles of Actellic 300CS and 28,161 sachets of SumiShield).

The receipt of locally procured supplies in the Lira and Bugiri warehouses started in mid-January 2019 (Table 4). These supplies were distributed to the district stores and subsequently to the parish stores. The distribution of spray supplies from the district stores to the parish stores in the Phase I districts took place from February 26 to March 17, 2019, followed by Phase II districts from May 13 to May 26, 2019.

To ensure proper tracking of the insecticide bottles and cartons, the project serially numbered them; this involved physically writing the tracking serial numbers on all bottles and cartons.

Upon completion of the spray activity, the logistics team retrieved the equipment from the Phase I districts and transferred the required logistics to the Phase II districts to address any gaps and ensure a timely start to the spray campaign there.

Annex B shows the detailed list of the items procured for the 2019 spray campaign.

TABLE 4: PPE AND OTHER SUPPLIES RECEIVED AT THE CENTRAL WAREHOUSE IN BUGIRI AND LIRA

Item Description	Totals	Units
International Procurement		
Actellic 300CS	488,651	Bottles
SumiShield	119,715	Sachets
IK sprayers	1,500	Units
Aprons	71	Pieces
Long gloves	432	Pairs
Short gloves	6,336	Pairs
Coveralls	7,650	Pieces
Gumboots	2,775	Pairs
Respirators	1,480	Cartons
Face shields	102	Cartons

Item Description	Totals	Units
Helmets	6,144	Pieces
Pelican torches (flashlights)	6,888	Pieces
Neck covers	14,250	Pieces
Local Procurement		
HDPE polythene sheets	401	Rolls (gauge 800 & 1200)
Thermometers	211	Pieces
Tarpaulin haversacks	1,620	Pieces
Fire extinguishers-1Kg.	266	Units

FIGURE 2: OFFLOADING AND VERIFICATION OF IK SPRAYERS AT THE BUGIRI CENTRAL WAREHOUSE



To ensure proper logistics management, the project’s logistics team provided supportive supervision to the parish storekeepers to ensure that they adhered to the required store management procedures. The district store managers were constantly on the move, addressing gaps that were identified in their respective districts throughout the spray periods.

Upon completion of the spray campaign, re-usable spray supplies were retrieved back to the district stores. Phase I districts conducted retrieval from April 15-27, 2019, and Phase II districts conducted retrieval from June 26-July 6, 2019, for a period of ten days.

2.7 HUMAN RESOURCE REQUIREMENTS

PMI VectorLink Uganda used the total number of structures found during the 2018 spray campaign in the 15 target districts to determine the number of seasonal workers needed for 2019 IRS activities. To enhance supportive supervision for this spray campaign, the project recruited and deployed one team leader for every five SOPs for the entire spray campaign. Team leaders and parish supervisors were recruited from the village health team and other community structures such as parish development committees working in the IRS target districts. Table 5 shows the number of seasonal staff hired for each cadre during the 2019 campaign, disaggregated by sex. The proportion of women hired for each cadre is indicated in the last column. During this spray campaign, women accounted for 25.7% of all supervisory positions, which included parish supervisors, site supervisors, and team leaders. This was significantly higher than the 2018 spray campaign (21.7%) and was a result of the project’s enhanced engagement with the different women’s groups and religious institutions in the target districts.

TABLE 5: SEASONAL STAFF HIRED BY CATEGORY

Category	Female	Male	Total	% Female
Parish mobilizers	174	644	818	21.3
Parish supervisors*	56	129	185	30.3
Pump technicians	4	107	111	3.6
Security guards	158	388	546	28.0
Site supervisors*	54	222	276	19.6
Spray operators	1,642	3,886	5,528	29.7
Storekeepers	72	204	276	26.1
Team leader*	326	912	1,238	26.3
Wash persons	518	56	574	90.2
Data clerks	29	31	60	48.3
Project assistants	9	6	15	60.0
M&E assistants	6	2	8	75.0
Grand Total	3,048	6,587	9,635	31.6

*These categories are people hired as supervisors and 25.7% are women

3. INFORMATION, EDUCATION AND COMMUNICATION

3.1 INTRODUCTION

Information, education and communication/social behavior change communication (IEC/SBCC) activities are vital for IRS implementation to ensure a successful spray campaign by promoting community acceptance of the intervention. PMI VectorLink Uganda's SBCC partner, Communication for Development Foundation Uganda (CDFU), spearheaded the implementation of IEC/SBCC activities in the field.

The primary objectives of the 2019 communication and mobilization efforts of the project IEC activities were: informing and preparing homeowners for the 2019 spray campaign; sensitizing and mobilizing all targeted households before and during spray, and providing post-spray key messages ensuring acceptance and enhancing commitment and ownership of IRS by the community. Community mobilizers were engaged to ensure that households were adequately informed of actual spray dates, and that eligible structures were adequately prepared in advance of arrival of SOPs.

Key SBCC achievements during the 2019 spray campaign were:

- Sensitizing 647 district leaders (420 males and 227 females) in the 15 districts, in close collaboration with the DHEs.
- Sensitizing 3,815 sub-county leaders (2,487 males and 1,328 females), and 6,540 Local Council (LC) I chairpersons (3,253 males and 3,287 females) to become IRS champions.
- Distributing 7,267 IRS role posters for passing key messages to the households, and 1,500 leaflets of frequently asked questions to the 15 districts. These helped provide greater clarity regarding areas that were of concern to community members. The pictorial role poster helps inform and educate householders about the details of preparing their homes for spraying and post-spray safety requirements.
- Conducting 30 radio talk shows with 259 callers (220 males and 39 females), and airing 600 radio spot messages and 75 radio announcements in the 15 districts to increase awareness about IRS.

- Conducting 324 dialogues across the 15 districts, reaching out to 9,231 males and 10,768 females to pass on key messages about IRS to the communities.
- Orienting 28 media personnel from all 15 districts about IRS and how to answer questions on air regarding IRS.
- Recruiting and training 831 (549 male and 282 female) mobilizers to carry out door-to-door mobilization.
- Orienting 30 participants from 15 media companies on IRS.
- Conducting 38 school outreaches reaching 20,558 pupils (8,896 males, 11,662 females) and students (source: school registers). Also reached 3,252 members (1,596 males and 1,656 females) through mobilization at religious institutions (churches and mosques) in the 15 IRS districts.

Table 6 provides a summary of people reached through the different mobilization channels employed in the 2019 spray campaign.

TABLE 6: SUMMARY OF PEOPLE REACHED THROUGH DIFFERENT CHANNELS

SBCC Approach	Male	Female	Total
Community dialogues	9,231	10,768	19,999
Radio talk show call-ins	220	39	259
Interpersonal communication (IPC)/door to door	896	793	1,689
District leaders' sensitizations	420	227	647
Sub-county leaders sensitizations	2,487	1,328	3,815
LCI sensitizations	3,253	3,287	6,540
Mobilizers recruited and trained for house-to-house mobilization	549	282	831
Total	17,056	16,724	33,780

3.2 DISTRICT, SUB-COUNTY AND LCI LEADERS SENSITIZATION

The project in collaboration with the MOH conducted sensitization of all key stakeholders at both district and sub-county levels in the 15 IRS districts. During these meetings, district leaders were urged to use all available resources and channels, such as the radio talk show airtime allocated to them to communicate IRS-related information to their communities. Sub-county task forces and the LCI chairpersons in all 15 districts were urged to show their support and help with IPC/door-to-door sensitization in their respective communities to increase IRS acceptance.

FIGURE 3: IEC PROJECT ASSISTANT ADDRESSING MUSLIM CLERICS DURING FRIDAY PRAYERS IN AMOLATAR



3.3 RECRUITMENT, TRAINING, AND ENGAGEMENT OF IRS COMMUNITY MOBILIZERS

The project recruited, trained, and engaged 831 IRS site mobilizers across the 276 sites at an average ratio of three community-based mobilizers per site. The mobilizers delivered key messages such as roles and responsibilities of households before, during, and after the house was sprayed, disseminated key integrated messages on malaria prevention including the correct and continuous use of long-lasting

insecticidal nets, visiting health facilities and testing for fevers before treatment. They also addressed common concerns and misconception about IRS among the community members such as IRS leads to infestation of bed bugs, and causes impotency among men and miscarriages among women. Mobilizers also reached institutions like schools, churches, leisure places like drinking spots, football grounds, and marketplaces to mobilize the public about IRS.

3.4 COMMUNITY DIALOGUES

The project's SBCC team, DHEs, and DHT members conducted 324 community dialogues during the spray campaign. The dialogues focused on communities that had considerably resisted IRS in the previous spray round and had attained low IRS coverage. These resistant communities were mainly religious sects (Kanyirir, Basalafu, traditional healers, and 666 cult) in a few sub-counties of Bugiri, Butebo, Kaberamaido, and Pallisa districts. The SBCC team enlisted the support of cult/religious sect leaders to help overcome the resistance, which improved acceptance.

3.5 RADIO TALK SHOWS, SPOT MESSAGES AND ANNOUNCEMENTS

The project together with the DHEs and in consultation with the DHT and 15 district IRS task forces organized project-initiated interactive IRS radio programs. The DHEs in the districts took the lead in identifying, inviting, and briefing guest speakers for the talk shows. The major objectives were to sensitize community members and inform them about IRS; respond in depth to community concerns about the insecticide; and communicate what is expected of households during pre-spray and preparations during spraying, and precautions that need to be taken after spraying. Similarly, radio talk shows were aired in the districts to effectively communicate spray dates and IRS key messages, and to bolster mobilization amongst the target communities.

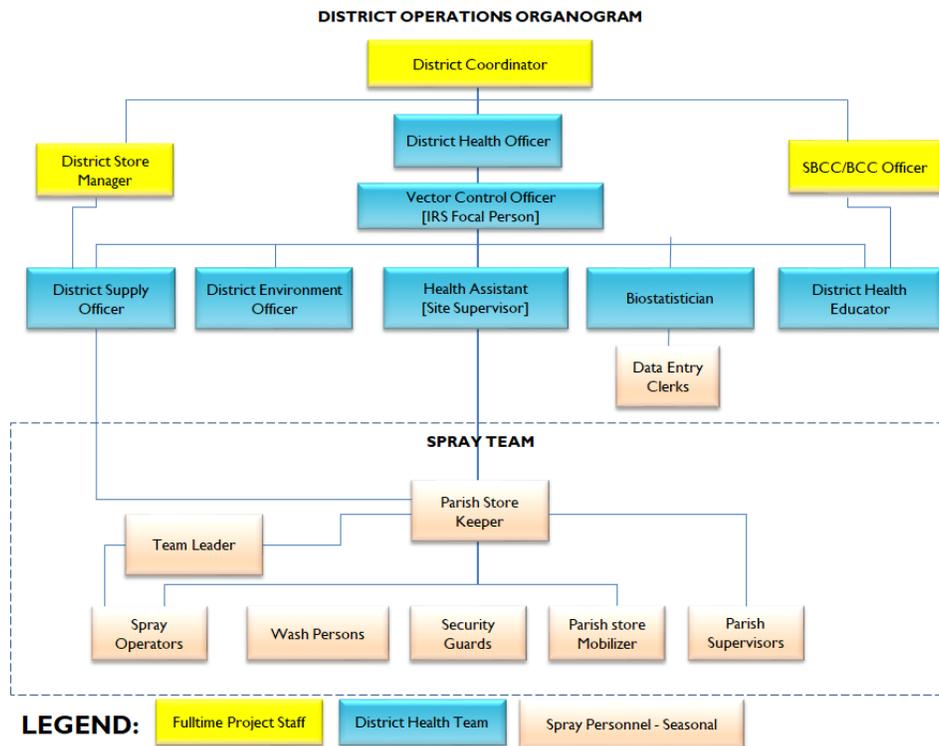
4. IMPLEMENTATION OF SPRAY ACTIVITIES

4.1 COMPOSITION AND MANAGEMENT OF IRS ACTIVITIES

The project implemented a successful spray round in 2019 in close collaboration with the MOH/NMCD and district local governments. Together with the MOH/NMCD, the project provided all the technical and logistical support required for the operation in the 15 districts. Based on lessons learned from the 2018 spray campaign, the project implemented several measures during this spray round that included the reduction of operation sites from 462 sites to 276 in the 15 districts. This reduction was achieved by merging sites that were geographically near to each other and had fewer structures targeted for spraying. The reduction in operation sites was an effort to improve project’s supervision efficiency, and made it easier to promptly respond to site-level challenges during the campaign. The project also used trucks to transport the SOPs to the sites more than 10km range from the operation site while in the nearby sites SOPs still used bicycles for easy access.

The field team included PMI VectorLink Uganda staff (seven district coordinators and seven store managers) and seven IEC/SBCC coordinators (seconded by CDFU) who resided in the districts during IRS implementation. Each paired district coordinator and store manager were in charge of two paired districts, with the exception of one pair who spearheaded field operations in the three districts of Butebo, Pallisa, and Serere. The district coordinators, store managers, and IEC/SBCC coordinators provided coordination and supportive supervision, working closely with the operations manager and the district and sub-county leaders as shown in Figure 4.

FIGURE 4: DISTRICT OPERATIONS ORGANOGRAM



4.1.1 IRS SUPERVISION

IRS supervision was conducted by project staff in close collaboration with NMCD staff, the DHT, and district and sub-county technical and political leaders. Supervisors used the standard supervision tools in both hard copy and electronic format to assess spray quality, EC, M&E data, and store management.

4.1.2 MHEALTH

PMI VectorLink Uganda worked in partnership with Dimagi LLC to use the CommCare mobile health (mHealth) system for the 2019 IRS campaign. Using the system, the project staff, MOH staff, and district supervisors were able to conduct routine standard supportive supervision, access real-time spray data, conduct data verification at the household level, and remind spray teams about regulations and operational procedures through daily job aid messages. The system enabled real-time sharing of data and facilitated results-based decision-making. The team monitored parish store-level spray progress through daily short message service (SMS).

The mHealth reporting tools used throughout the campaign included:

- **Supervisory Tools**

The supervisory application tool was used by sub-county supervisors, district coordinators, MOH supervisors, and project staff to support IRS supervisory activities. The application was accessible through CommCare, and users received training during the boot camp and the TOT trainings. The mobile phone application contained multiple forms covering key supervisory functions, including morning mobilization, storekeeper performance, household preparation, SOP performance, and end-of-day clean-up. Users completed forms during their routine supervision activities and submitted data to the CommCare system. Based on the information reported each day, CommCare used daily email alerts to report any red flags that the supervision teams had observed during the campaign. Examples of red flags included pump leakages, refusals by households, and need for additional items at the parish stores, such as gloves and pump spare parts. In total, the PMI VectorLink Uganda supervision team completed 36,650 of these supervisory forms.

- **Data Collection and Verification**

The MOH supervisors, DHT, site supervisors, M&E assistants, and project staff used the Data Collection and Verification (DCV) mobile tool to validate household-level information on the spray status in randomly sampled households. They verified the collected information by comparing it with the daily SMS Phone Mobile Technology data, and Spray Operator forms. The project verified this information with households' information as entered into the PMI VectorLink Collect database using the findings of the spray coverage for each of the tools. The spray coverage for each of the tools is as follows; DCV 97.3%, PMI VectorLink Collect database 92.7%, Performance Monitoring Tracker (PMT) 93.7% (within the 5% error). Non-recording of unsprayed structures by the SOPs on the daily spray forms is the key source of discrepancies. The project is reviewing further the supervision structure to provide more efforts to validate the data as they are being collected.

- **Performance Monitoring Tracker**

During training, the storekeepers learned how to manage the PMT sheet at their respective parish stores. They received instruction on how to maintain a constant flow of up-to-date operational data on the spray performance sheet, which served as the basis for the daily PMT short message service (SMS) system. At the end of each spray day, the storekeepers sent the aggregated data from the day's operations via SMS to the Telerivet system; this system populated the daily PMT emails reporting spray progress and coverage figures from the parish stores to the chief of party, operations manager, and the M&E manager. The PMI VectorLink Uganda team used the report to monitor parish stores with low spray coverage, fluctuating progress, and increased insecticide consumption.

- **Job Aid Messages**

Supervisors, SOPs, team leaders, and storekeepers also received SMS messages throughout the IRS campaign to remind them about key topics including SOPs' daily structure targets, the importance of wearing PPE and avoiding eating while on duty. The project also sent emergency messages to the parish storekeepers and sub-county supervisors to remind them about the daily spray data card collection, to ensure quick entry of data into the IRS database. Other messages that supervisors sent via SMS included ensuring proper use of PPE by the spray team, delivery of correct messages on malaria prevention to homeowners, and the need to meet the daily target of 10 structures per SOP. Findings from the Home Owner Preparation Tool informed some of the job aids, especially on house preparation and safety.

4.1.3 DIRECTLY OBSERVED SPRAYING

In addition to using the mHealth supervisory tools, the project assistants entered the DOS data into an Excel file during the 2019 spray campaign. The data were captured by supervisors when they directly observed SOPs' insecticide mixing and spray techniques. The gaps identified were corrected on the spot. The information collected complemented PMT reports and mHealth supervisory feedback, and helped focus supervisory efforts on teams with identified red flags. This in turn helped supervisors institute timely corrective measures during spraying and provide overall feedback about issues regarding spray techniques.

The senior management team joined the national supervisors and the DHT in supportive supervision for each district. The project assigned 4–7 supervisors per district (depending on targeted structures) to facilitate supervision, better management of IRS quality, and follow-up using DOS and DCV. All supervisors conducted supervision activities based on the supervision plan prepared ahead of the operation. Accordingly, the team conducted continuous follow-up of activities over the course of the IRS operation.

Team leaders used this tool to oversee and improve SOPs' performance and spray quality. Team leaders conducted supervisory visits throughout the spray campaign to observe SOPs' performance and record whether or not the SOPs correctly mixed the insecticide and complied with spray techniques as well as with personal, household, and environmental safety procedures. Any gaps identified during the observed visit were recorded, creating a red flag in the database, and corrected on the spot. Daily alerts were sent to supervisors, containing a summary of all red flags from the previous day, which enabled supervisors to monitor closely the quality of SOPs' performance and take corrective action to address any errors and ensure better quality of spray operations.

4.2 SUPERVISION FINDINGS

The supervisors carried out daily data verification using the DCV form. This helped verify the data the SOPs collected and enabled them to compare these data with spray card data. The findings from the analysis of the data collected over the 25 operational days of the campaign informed both mop-up activity and strategies to monitor any possible data falsification amongst the spray teams. Unlike the spray campaign in 2018, when compliance with use of the DCV tool and set targets was 15%, in 2019 the project made all efforts to increase the use of this tool, and as a result more than 55% of the targeted DCV forms were submitted by supervisors across the 15 districts. The project is mindful of the DCV's low performance and this underachievement in use of the supervisory tools is believed to have been the result of overly ambitious targets that will need to be revised to be more realistic during the next campaign.

During the campaign, the project noticed improvements in insecticide usage rate (IUR) with the progress of the spray campaign days; this is attributed to supervisors' compliance with the use of the DOS tool that supported improvements in spray techniques.

4.3 INSECTICIDE DISTRIBUTION AND MANAGEMENT

In 2019, 488,651 bottles of Actellic 300CS and 119,715 sachets of SumiShield 50WG were procured. The project prepared a distribution plan to ensure safe and timely delivery of the insecticide to the district stores, which was carried out successfully in all 15 districts.

The store managers managed the district stores with oversight from the central warehouse manager, and ensured timely distribution and tracking of supplies and materials at the spray sites. They documented store records in ledger books and stock cards. The parish storekeepers recorded the daily movement of both the full and empty bottles/ sachets to ensure that all issued insecticide was fully accounted for at the end of the day's activity. This reconciliation process enabled the storekeepers to ensure effective monitoring of the daily inventory and trigger an alert in case of any discrepancy. This concerted monitoring of insecticide helped safeguard against any loss of insecticide. A total of 71,794 bottles of Actellic 300CS and 28,161 sachets of SumiShield 50WG remained unused at the end of the 2019 spray campaign. The leftover Actellic 300CS will expire in October and November 2020, and the SumiShield 50WG will expire in June 2021.

5. ENVIRONMENTAL COMPLIANCE

In accordance with the Supplemental Environmental Assessment: 2014 – 2019, Amendment #2 of 2019, the PMI VectorLink Uganda Project used both Actellic 300CS (organophosphate class) and clothianidin (neonicotinoid class) in 13 and 2 project districts, respectively. The project put a strong monitoring system in place to ensure that the IRS operations adhered to environmental compliance (EC) requirements, to protect spray actors, beneficiaries, and the environment in compliance with the Best Management Practices (BMP) (Annex C).

5.1 PRE-SEASON EC ASSESSMENTS

The project, in collaboration with the DHT, conducted two pre-season EC assessments (PSECAs) for all operations sites in the 15 project districts. The project did these assessments using checklists on the Open Data Kit (ODK) platform installed on smartphones. The initial rounds of PSECAs focused on identifying IRS material needs, suitability of site locations, and rehabilitation and refurbishment needs for storerooms, soak pits, and bath shelters. In both Phase I and Phase II districts, the project conducted initial PSECAs well ahead of the arrival of IRS supplies. The lists of IRS materials needed, based on identified gaps for the 276 operations site stores, were generated and communicated to the store managers and district coordinators. Final PSECAs were conducted one week before the start of the campaign. The EC team confirmed that all gaps identified during the initial rounds of PSECAs were resolved for each site before “greenlighting” the site for operations. These included: availability of material safety data sheets, emergency response procedure sheets, first aid kits, spill kits, danger signs, thermometers, and fire extinguishers. Also assessed were soak pit siting, rehabilitation status of soak pit and wash areas, and availability and privacy of bath shelters for male and female spray personnel.

A total of 276 soak pits (68 new and 208 old) were used for the disposal of insecticide-contaminated effluent; 138 (21% new) soak pits were constructed in the Phase I districts and 138 (28.3% new) in the Phase II districts. The walls of the 276 soak pits were lined with plastic sheets to prevent any percolation of effluent into the environment. In addition, in all 276 soak pits constructed or renovated in 2019, the entire wash area was covered with polyethylene plastic sheets to prevent the wastewater from cleaning sprayers and PPE from seeping into the ground, and to direct it into the soak pit for treatment.

FIGURE 5: DEMONSTRATION OF CONSTRUCTION OF A FIXED SOAK PIT IN BUDAKA DISTRICT



FIGURE 6: A FULLY CONSTRUCTED SOAK PIT BEFORE IRS IN KATETA SITE, SERERE DISTRICT



To ensure adequate and standardized storage facilities, the project renovated the Amolatar and Butebo district stores to bring them up to the BMP recommended standard. The project also equipped all district stores with shelves, pallets, first aid kits, dustbins, and emergency spill kits to ensure health and environmental safety during the spray campaign. The project also equipped all the districts with thermometers to monitor temperatures within the site storerooms. In addition, the National Drug Authority (NDA) inspected all the 15 district stores to ascertain their suitability for storage of IRS equipment and insecticides. The district stores met the NDA's requirement for a storage facility and were certified for the calendar year 2019.

5.2 MOBILE SOAK PIT PILOT

The reduced number of site stores resulting from the merging of sites posed several challenges to the spray teams. To counter this, the project piloted the use of mobile soak pits (MSPs) II in Lira and Serere districts in 2019. Mobile soak pits are portable in nature and can easily be transferred from one point to another as opposed to the traditional soak pits and extend usability to more than one team of spray operators. MSP II's are designed using industry-standard drums of 40L or 60L capacities; layers of sponge particulate filter, granulated activated charcoal (GAC), and nylon screening and temporarily partially buried for use. The traditional MSP, however, is based on a bucket capacity of 20L and is less versatile. When using the MSP II, the spray teams do not have to travel long distances to do end-of-day clean-up. The MSPs have been piloted successfully in a number of IRS countries. From May 24- 31, 2019, the project's Director of Environmental Compliance and Safety (DECS) provided short-term technical assistance to the country's EC team in piloting the use of MSPs in Uganda. Three training sessions on construction, installation, use, demobilization, and storage of the MSP II were held in the districts of Serere, Lira, and Alebtong. A live simulation exercise was held at Wicere village, Ogur sub-county in Lira district, where the MSP II was built and installed. One team of five SOPs was able to perform their end-of-day clean-up at this site.

FIGURE 7: PETER CHANDONAIT, DECS, SUPERVISES END-OF-DAY CLEAN-UP AT A MSP IN LIRA DISTRICT



5.3 HEALTH AND SAFETY OF SPRAY PERSONNEL

To manage insecticide poisoning that may arise from insecticide inhalation, ingestion, or dermal entry during spray operations, the project collaborated with clinicians and laboratory technicians from 279 health centers and 13 hospitals in the 15 IRS districts to identify and respond to any signs and symptoms of insecticide poisoning, and manage incidents of poisoning. PMI VectorLink Uganda equipped a total of 143 health facilities with 1,600 ampoules of atropine using non-PMI funds. Health facilities in Lira and Dokolo districts, where SumiShield was used, were not equipped with atropine sulphate because it is not classified as a first aid measure.

The project conducted medical examination of all spray team members, except security guards, to ensure that only healthy spray team members would handle and use insecticides. All female spray team members received pregnancy tests, and only two tested positive. The project counseled all the women who tested positive for pregnancy about avoiding any possible contact with the insecticide, following which they were reassigned to the community mobilization role.

All 276 site stores and 15 district stores in the 15 project districts received first aid kits to use in the event of an accident or exposure to insecticide during spray operation. In addition, during the spray campaign, the team leaders conducted daily morning health checks for the SOPs before they departed for the field, to assess their physical fitness, any signs and symptoms related to insecticide poisoning, and any other health condition that might have hampered their daily performance in the field. The project also conducted a one-day (March 13, 2019) inspection of 55 transportation vehicles at the Kampala office and Tororo field office before signing contracts. This was intended to ensure that all the vehicles met the PMI BMP health and safety requirements before they were deployed for the spray campaign. During the inspection, some of the gaps identified included lack of first aid kits and fire extinguishers. The EC team in collaboration with the Logistics Coordinator ensured that all the vendors installed these items before being certified and engaged for spray operations.

5.4 MID- AND POST-SEASON ENVIRONMENTAL INSPECTIONS

PMI VectorLink Uganda staff, jointly with the MOH supervisors, DHTs, and sub-county supervisors, were involved in routine supervision, and in mid-spray and post-spray environmental inspections in all 15 project districts. The supervision and environmental inspections were conducted using CommCare supervision and ODK tools installed on smartphones. All project staff and supervisors were charged with identifying areas of weakness, providing correction, and guiding SOPs on the spot. At the end of each day, the district coordinators and the supervision team held a general meeting to review progress, achievements, shortcomings, and constraints found, and forwarded the recommendations to the operations, logistics, and EC departments for further corrective actions. The EC team also reviewed the daily supervisory reports submitted by the field inspectors for immediate follow-up and action. However, in a few cases, the problems reported in the supervisory reports were due to reporting errors. A few times, connectivity issues in the field made it hard to get supervision reports on time.

At the end of the spray campaign, all PPE, including coveralls and spray pumps, was properly cleaned, and stored in the district stores for use in the next campaign. All unused insecticides were retrieved from parish stores and stored safely in the district stores for use in the next campaign. The project team ensured that soak pits were cleaned, covered with a polythene sheet, and locked, and that storerooms were washed and handed over to the owners.

The project reported all incidents as they occurred during the 2019 spray campaign (Table 7). The field team responded promptly to all these incidents, trying to understand the root cause of the incidents and instituting remedial measures. When a SOP was either involved in a minor accident or exposed to insecticide and needed to take time off, that person was compensated for the time away and assigned lighter duties if the situation so demanded. In incidents of pilferage and data falsification, the

perpetrators were immediately dismissed from any further engagement in the IRS campaign and the matter was reported to police for investigation.

TABLE 7: SUMMARY OF SPRAY CAMPAIGN INCIDENTS

Date	Type of Incident	Brief Description
25-Mar-19	Bicycle accident	An SOP lost control of his bicycle while riding to a homestead to spray. He sustained injuries and recovered.
28-Mar-19	Assault	Incitement of community against IRS by rowdy youth leading to assault of SOPs in Pallisa district.
2-Apr-19	Assault	A male SOP was hit with an object by a community member. He sustained a deep cut and recovered.
31-May-19	Bicycle accident	The strap of a female SOP's haversack got entangled in her bicycle spokes leading to a fall. She sustained some soft tissue injuries and recovered.
7-Jun-19	Snake attack	A snake spat into the face of a storekeeper in Otuke district. He was admitted at a nearby health center and treated for snake venom.
11-Jun-19	Insecticide pilferage	A SOP stole insecticide in Lira. She was arrested by police and the insecticide recovered.
25-Jun-19	Data falsification	SOPs in one operation site in Lira district recorded rooms in sprayed houses as separate structures in their cards. The SOPs and team leaders from the site will be paid half of the number of days worked and will not participate in future spray campaigns.

5.5 POST-SEASON DEMOBILIZATION AND WASTE DISPOSAL

5.5.1 CLOSURE OF SITE STORES AND SOAK PITS

The project conducted post-IRS assessment and supervision at all 276 operations sites (soak pits) and site stores based on the standard smartphone checklists, to ensure that all the operations sites were cleaned appropriately, shut down, and handed back to both private and district-owned facilities. These inspections were done to ensure that there were no concerns regarding environmental health or safety after the spray campaign. The EC team immediately rectified any gaps identified during these assessments, such as uncovered soak pits.

5.5.2 SOLID WASTE DISPOSAL

The project collected and segregated all solid wastes generated from the spray campaign in Phase I and II districts. The EC team collected all empty insecticide bottles/ sachets, and reconciled the numbers using ledger books and stock cards. All empty insecticide bottles and used polythene sheets were recycled at Gentex Enterprises, while uncontaminated paper cartons was delivered to Pulp and Paper Mills Ltd. in Jinja district, and all contaminated waste paper material (material safety data sheets, insecticide sachets, insecticide-impregnated papers), used nose masks, and insecticide cardboards was incinerated at Green Label Service Limited incinerator in Iganga. The project

FIGURE 8: PREPARATION OF SOLID WASTE FOR DISPOSITION



has kept records of the recycling and disposal certificates issued for these three categories of waste, in compliance with the National Environment Act Cap 153 and the National Environment (Waste Management) Amended Regulations 2006 (Annex D). Table 8 shows the different categories of waste generated and their respective management mechanisms.

TABLE 8: DIFFERENT CATEGORIES OF WASTE GENERATED DURING 2019 SPRAY CAMPAIGN, AND PLANNED MANAGEMENT MECHANISM

Type of Waste	Quantity	Disposal Site	Disposing Company	Planned Management Mechanism
Actellic bottles	449,606 bottles	Luwero district	Gentex Enterprises Ltd	Recycling: production of electric cable conduits and pipes
SumiShield empty sachets	91,553 sachets	Iganga district	Green Label Services Ltd.	Incineration
Damaged helmets	635 Kgs	Luwero district	Gentex Enterprises Ltd	Recycling: production of electric cable conduits and pipes
Damaged face shields	302.5 kgs	Luwero district	Gentex Enterprises Ltd	Recycling: production of electric cable conduits and pipes
Other assorted plastics (damaged basins, barrels, measuring jugs, and jerry cans)	23.4 kgs	Luwero district	Gentex Enterprises Ltd	Recycling: production of electric cable conduits and pipes
Alkaline batteries	7 kgs	Iganga district	Green Label Services Ltd	Destruction and landfilling
Used nose masks	2,587 kgs	Iganga district	Green Label Services Limited	Incineration
Contaminated bicycle cushions	856 Kgs	Iganga district	Green label Services Limited	Incineration
HDPE polythene sheets	2,721 kgs	Luwero district	Gentex Enterprise Limited	Recycling
LDPE polythene sheets	1,906 kgs	Luwero district	Gentex Enterprise Limited	Recycling
Damaged hand gloves, aprons	523 kgs	Iganga district	Green Label Services	Destruction and landfilling
Damaged gumboots	302 kgs	Iganga district	Green Label Services	Recycling
Empty paper cartons	28,470 kgs	Jinja	Pulp and Paper Mills Ltd	recycling

6. MID-SPRAY AND POST-SEASON SPRAY ACTIVITIES

6.1 MID-SPRAY REVIEW MEETING

As part of continuous efforts for effective IRS implementation and quality improvement, the project organized mid-spray review meetings for both Phase I and Phase II districts, bringing together some MOH/NMCD supervisors and district and sub-county staff that supported the project. These meetings were an effort to learn, identify collaboration opportunities, track performance, and deal with emerging challenges in the target districts. The key areas that were reviewed included IRS spray performance, IRS operations, logistics management, EC, the epidemiological situation in the different districts, and partner collaboration. These discussions triggered several key learnings and recommendations regarding achieving IRS spray quality, while observing IRS best practices.

6.2 POST-SPRAY REVIEW MEETING

On July 18, 2019, the project held a one-day IRS learning review meeting in Tororo district to provide insight on the effectiveness of the 2019 spray round and overall performance. The objective of this meeting was to review progress, achievements, and challenges, in addition to examining what aspects of IRS implementation worked well, what did not work well, and how effectively this activity is contributing towards the project's objectives.

A total of 77 people participated in the IRS review meeting including 36 project staff, 10 CDFU representatives, 3 MOH officials, 15 district malaria/IRS focal persons, and 13 district health officers. Key lessons from this review meeting will help guide the next spray planning, and focus on the emerging issues and implementation gaps (Annex E).

During the review meeting, the team focused on recruitment, training, IRS, logistics, EC, IEC/SBCC, M&E, entomology, and the district perspective on IRS.

Some of the key lessons and recommendations made during the meeting include;

- Continue to strengthen quality of IRS intervention through improved technical skills and supervision
- Review the timing of IRS to enhance intervention impact
- Enhance capacity of districts to collect entomological surveillance data for decision making
- Review the number of operational sites to enhance operation efficiency.
- Review mechanism for improving quality of epidemiology data and its timely use at district level.

7. ENTOMOLOGY

PMI VectorLink Uganda conducts routine entomological monitoring in selected sites to provide data for decision-making. Wall cone bio-assays are used for IRS quality assurance and decay rate monitoring, while bionomic (longitudinal) studies are conducted using pyrethrum spray catches (PSCs) and human landing collections (HLCs) to assess vector density and species composition and behavior in selected study sites. Insecticide susceptibility monitoring is conducted using the WHO tube and CDC bottle bio-assay tests in selected sentinel sites. Data generated is used to guide decisions such as the type of insecticide and selection of target areas for IRS. They also help to assess the quality and impact of the vector control intervention. The project implemented the following entomology activities in collaboration with the MOH and districts:

- IRS quality assurance and decay rate monitoring in one sentinel site in each of the current eight IRS districts of Bugiri, Butaleja, Kibuku, and Tororo (Phase I districts) and Dokolo, Lira, Otuke, and Serere (Phase II districts);
- Pre-IRS pyrethrum spray catches (PSCs) to assess indoor resting vector density and species composition one month prior to IRS and one month after IRS to assess impact of IRS in one selected site in each of the IRS districts of Bugiri, Tororo, Lira, and Otuke in eastern and northern Uganda

7.1 IRS QUALITY ASSAYS AND INSECTICIDE DECAY RATE MONITORING

The MOH teams and PMI VectorLink Uganda staff conducted cone bioassay tests as a quality check in one sentinel site in each of the eight current IRS districts within one week of spraying and decay rate in four sites (Bugiri, Tororo, Lira, and Otuke districts). Spraying in Bugiri, Tororo, and Otuke districts was done using Actellic 300CS, while spraying in Lira was done using SumiShield.

The tests were performed in three houses per site purposefully selected to represent different wall types (plastered and painted, plain brick and mud wall surfaces) commonly found in the area, and structures sprayed by different SOPs. A total of 24 houses were sampled in the eight sites in the eight IRS districts. The tests were carried out using known susceptible *Anopheles gambiae* s.s. (Kisumu strain) mosquitoes reared at the three insectaries based at the MOH Vector Control Division, Gulu University, and Tororo Hospital. Larvae were reared to adults; 2–3-day-old sugar-fed female adults were exposed to the sprayed walls in the selected houses.

Three test cones and one control cone were used. The test cones were placed at three different heights (top, middle and bottom) on sprayed wall surfaces, while the control cones were fixed on surfaces of unsprayed houses and surfaces of a similar substrate. Batches of 10 two- to five-day-old non-blood-fed female *An. 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 using an aspirator to insecticide-free paper cups supplied with sugar solution. The paper cups with exposed mosquitoes were then placed in a cardboard box covered with a damp towel. Knockdown was observed and recorded at 30 and 60 minutes, and mortality was recorded 24 hours post exposure. A mosquito was considered alive if it could fly.

The results for the spray quality bioassays (conducted within one week after spraying) showed 100% test mosquito mortality in all the eight spray districts where the test was done. The cone bioassay test results indicated that Actellic 300CS remained effective with 100% test mortality rates on all three

surfaces at three months after spraying in Bugiri and Tororo districts and at one month after spraying in Otuke district. Similarly, SumiShield remained effective with 100% test mortality rates on all three surfaces at one month after spraying in Lira district (Table 9). The high *An. gambiae* s.s. mortality rates recorded on all the different wall surfaces showed that the quality of spraying was satisfactory in all the IRS districts. The project will continue cone wall bioassay monitoring until mortalities drop below the 80% threshold for two consecutive months.

TABLE 9: WALL BIO-ASSAY RESULTS FOR THE 2019 SPRAY CAMPAIGN, IN FOUR INSECTICIDE DECAY RATE MONITORING SITES

Time Post IRS	% Mortality of <i>An. gambiae</i> s.s. (Kisumu strain)												Overall Mean
	Bugiri (Actellic)				Otuke (Actellic)				Tororo(Actellic)				
	Painted	Plain Brick	Mud	Mean	Painted	Plain Brick	Mud	Mean	Painted	Plain Brick	Mud	Mean	
7 days	100 (30/30)	100 (30/30)	100 (30/30)	100	100 (30/30)	100 (30/30)	100 (30/30)	100	100 (30/30)	100 (30/30)	100 (30/30)	100	100
1 Month	100 (30/30)	100 (30/30)	100 (30/30)	100	100 (30/30)	100 (30/30)	100 (30/30)	100	100 (30/30)	100 (30/30)	100 (30/30)	100	100
2 Months	100 (30/30)	100 (30/30)	100 (30/30)	100	100 (30/30)	100 (30/30)	100 (30/30)	100	100 (30/30)	100 (30/30)	100 (30/30)	100	100
3 Months	100 (30/30)	100 (30/30)	100 (30/30)	100	TBD	TBD	TBD	TBD	100 (30/30)	100 (30/30)	100 (30/30)	100	100
4 Months	100 (30/30)	100 (30/30)	100 (30/30)	100	TBD	TBD	TBD	TBD	100 (30/30)	100 (30/30)	100 (30/30)	100	100

Note: Figures in parenthesis indicate number of mosquitoes that died out of the total number tested

Time	% Mortality of <i>An. gambiae</i> s.s. (Kisumu strain)				
	Lira (SumiShield)				
	Diagnostic Time	Painted	Plain Brick	Mud	Mean
7 Days	24 hours	100 (30/30)	100 (30/30)	100 (30/30)	100
1 Month	24 hours	83 (25/30)	77 (23/30)	80 (24/30)	80
	48 hours	93 (28/30)	83 (25/30)	93 (28/30)	90
	72 hours	100 (30/30)	100 (30/30)	100 (30/30)	100
2 Months	24 hours	93 (28/30)	87 (26/30)	87 (26/30)	89
	48 hours	93 (28/30)	97 (29/30)	97 (29/30)	96
	72 hours	97 (29/30)	100 (30/30)	97 (29/30)	98
	96 hours	100 (30/30)	100 (30/30)	100 (30/30)	100

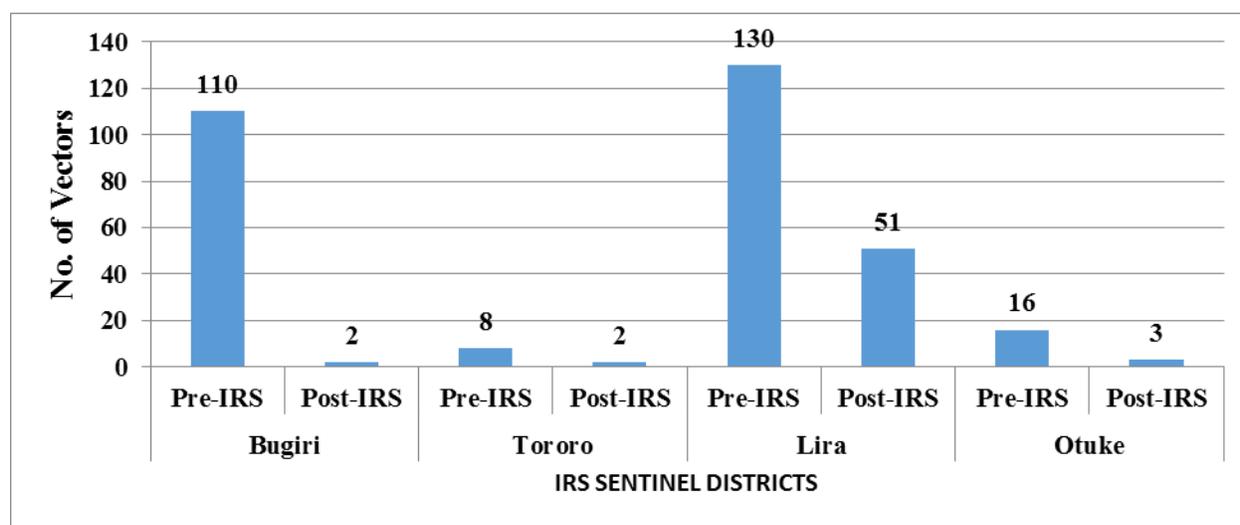
Note: Figures in parenthesis indicate number of mosquitoes that died out of the total number tested

7.2 PRE- AND POST-IRS PYRETHRUM SPRAY CATCHES

Between March and July 2019, the MOH teams with support of PMI VectorLink Uganda staff conducted 80 pre-IRS PSCs and 80 post-IRS PSCs in four selected sentinel sites in the current two Phase I IRS districts of Bugiri and Tororo and two Phase II IRS districts of Lira and Otuke to assess the current indoor resting malaria vector densities prior to IRS and to assess the impact of IRS respectively in these districts. The PSC studies were performed in 20 sprayed houses, mainly grass-thatched mud and wattle houses per site in the four IRS districts. Killit (commercial nomenclature) aerosol was used to knock down the mosquitoes. It contains the pyrethroids d-Tetramethrin 0.135% w/w, d-Allethrin 0.06% w/w and cypermethrin 0.46% w/w. Collection sheets were laid in the house and sprayed with the aerosol. The room was closed for 5-10 minutes after spraying, and the knocked-down mosquitoes were collected into a labelled petri dishes. The samples were identified morphologically and preserved in 1.5 ml Eppendorf tubes with a hole pierced in it and kept in a plastic container containing silica gel for further identification.

A total of 59 female vectors (58 *An. gambiae* s.l. and 1 *An. Funestus* s.l.) were collected during the post-IRS PSCs compared to 266 female vectors (264 *An. gambiae* s.l. and 2 *An. funestus* s.l.) were collected during the pre-IRS PSCs (Figure 9).

FIGURE 9 : COMPARISON OF FEMALE ANOPHELES CAUGHT PRE-IRS AND POST-IRS PSCS IN FOUR IRS DISTRICTS, 2019



During pre-IRS PSCs in the four sentinel study districts of Bugiri, Tororo, Lira, and Otuke, a total of 10 unfed female *An. gambiae* s.l. were collected and dissected. Seven (70.0%) of the *An. gambiae* s.l. species dissected were parous, indicating that most of the mosquitoes collected had lived at least through one gonotrophic cycle. However, during post-IRS PSCs in the same four sentinel study districts, a total of 11 unfed female *An. gambiae* s.l. were collected and dissected. One (9.1%) of 11 post-IRS collected *An. gambiae* s.l. that were dissected were parous, indicating that most of the mosquitoes collected were young and had not completed one gonotrophic cycle and therefore would not have transmitted malaria (Table 10). Though the data shows that IRS tended to affect mosquito longevity and the overall age structure of the vector population, the sample size (n=11) was rather small to make any conclusive inference.

TABLE 10: RESULTS OF DISSECTIONS OF FEMALE MALARIA VECTORS FOR PARITY AT ONE MONTH PRE-IRS AND ONE MONTH POST-IRS IN BUGIRI, TORORO, LIRA, AND OTUKE DISTRICTS, 2019

Study	<i>An. gambiae</i> s.l.				<i>An. funestus</i> s.l.			
	Total female dissected	Parity			Total female dissected	Parity		
		NP	P	%		NP	P	%
Pre-IRS	10	3	7	70.0	0	-	-	-
Post-IRS	11	10	1	9.1	0	-	-	-

Key: NP = Nulliparous (never taken a blood meal); P = Parous (taken a blood meal); % = Percentage parous

8. MONITORING AND EVALUATION

8.1 THE M&E APPROACH OF THE 2019

The IRS campaign closely followed the processes outlined in the 2019 PMI VectorLink Uganda work plan. It focused on incorporating the lessons learned in year one among which included using a standardized data management system (VectorLink Collect), which helped review and analyze the data in a systematic manner, figure out where the key issues are and address them and also helped strengthen the overall M&E system.

The key objectives of IRS Uganda M&E activities were:

- Update the existing M&E plan to include all reporting needs and requirements
- Emphasize accuracy of both the data collection and the data entry process, through comprehensive trainings and supervision at all levels
- Streamline and standardize data flow to minimize errors and facilitate timely reporting
- Communicate IRS data and information to stakeholders in a timely and clear manner
- Ensure IRS data security and storage for future reference through establishment and enforcement of proper protocols
- Ensure IRS data security and storage for future reference through establishment and enforcement of a proper storage facility.

8.2 DATA MANAGEMENT AND PROCESSING

8.2.1 DATA COLLECTION

The PMI VectorLink Project, Uganda, used data collection tools that were developed to ensure the collection of all PMI requested indicators. In addition to the routine data recording checks built into the data collection process, the supervisory staff used the data quality assurance tools detailed in Annex F.

8.2.2 VECTORLINK COLLECT DATABASE

In 2019, PMI VectorLink Uganda transitioned from the MS Access database to the new VectorLink Collect database. The VectorLink Collect database was developed using the District Health Information Software 2 (DHIS-2) system for mobilization and spray data entry, cleaning, and reporting. The new system has multiple advantages, including the ability to have real-time view of data entry progress, development of powerful dashboards, and pivot tables to track performance and remote interaction with the system from any location. The project granted access to the stakeholders in the MOH, the NMCD, PMI Mission office, and the PMI VectorLink project staff.

Before the start of the campaign, the M&E and operations teams worked together to gather the needed metadata that would enable roll-out of the database (i.e., geographical information to village level, personnel codes which uniquely identify the seasonal staff in the program, and spray targets to sub-location level). These were then set up in the system prior to the start of the campaign to enable entry and reporting.

VectorLink Collect database has four main event programs that reflect the mobilization and spray hardcopy data collection forms. These include spray details, spray totals, mobilization details, and mobilization totals. The details represented each observation on the spray and/ or mobilization data form as a row and the totals represented the summation of the contents of each observation per row.

The database had additional built-in tools to enhance reporting:

- Desktop Event Capture: An offline data entry platform with in-built validation checks to ensure accurate data entry even in places with no internet connectivity. It was installed in every data entry clerk's (DEC's) machine, pointing to the live server where data was synced at the end of each day. DEC's were not supposed to log out of the system until the end of the campaign.
- Duplicate Finder: An application run after the data entry to identify any duplicated IRS numbers that were not as a result of revisits in the field (i.e., true duplicates of IRS numbers either from data entry errors or errors from the field).
- Mop up Tool: A tool used to mark any revisited structures in the system as reported in the daily SOP form, to retain the "updated" event in the database to prevent double counting of eligible structures.
- Variance Reports: A custom, HTML report within the VectorLink Collect identified data inconsistencies resulting from mismatches between the details and the totals programs for both spray and mobilization.
- Data cleaning was a progressive exercise, with DEC's at each data center dedicated to this role. All forms that were identified to have errors were returned to the field. Duplication of IRS numbers was the most common error identified, mainly due to SOP error as they recorded the numbers. To resolve these errors, after confirmation with the hardcopy forms, the field teams went back to the structures for verification. For cases where the correct IRS numbers were retrieved, the corrections were made in the database. Some of the spray data duplicates were the result of revisited structures not indicated as revisits in the Daily Spray Operator forms; once identified, 'revisit' was indicated on the form and an edit was made in the system. In addition, there was a misinterpretation of the definition of a structure by a number of SOP's when the same IRS number was allocated to multiple structures in the same household thus creating duplicate IRS numbers in the database.
- The VectorLink Collect database worked well for spray data reporting. In rare instances, power outages resulted in locally stored, offline data being lost when the desktop machines shut off in the middle of data entry. After thorough investigation, it was discovered that the few affected computers had confounding software/hardware issues that likely contributed to the data loss. On these occasions, data had to be re-entered. Overall, the M&E team ensured all the data entry machines had internet connectivity with increased bandwidth and a power back-up generator throughout the campaign to ensure consistent, reliable data entry and reporting throughout the 2019 IRS campaign.
- The project trained 60 DEC's, one M&E specialist from the MOH/NMCD, eight district biostatisticians, and 15 M&E assistants on the use of this database. The participation of NMCD district staff helped ensure skills transfer, ownership, and use of spray data by stakeholders in planning surveillance-related activities in these districts.

8.2.3 DATA ENTRY, TRACKING, STORAGE, AND SECURITY

Data entry was conducted at four data centers, in Lira, Mbale, Soroti, and Tororo. Based on network availability at the various data centers, the DEC's used a combination of web-based and offline desktop-based data entry, both of which linked to the central DHIS2 database, for final storage and reporting.

To ensure the secure storage of all data collected by PMI VectorLink Uganda, all completed paper forms were filed by geographical area and date and transferred to the Tororo field office. Electronic was secured by back-up PMI VectorLink database servers, cloud-hosted by BAO Systems.

8.2.4 DATA QUALITY ASSURANCE

During the district level TOTs, the M&E team emphasized definitions of key IRS terms and reporting indicators, compliance with M&E protocols, and proper data collection. They also trained field staff and supervisors on supervisory responsibilities and data security. The M&E team engaged in supervising fieldwork during spray operations. While observing data collection and entry in the field, the team identified issues and was able to correct errors on the spot. The data recording problems included how to complete the IRS card, how to write IRS numbers, how to compute the total number of people in a structure and those protected, and when and how to give IRS numbers. In addition, errors observed after reviewing the cards were discussed during the first week of the spray, and these were given more attention, which resulted in improvements in the observed gaps over the course of the campaign. Also, the results were also compared with the mobile phone application data to ensure that the results were in harmony.

Data quality assurance tools including the DCV, DOS Form, and Data Entry Verification Form helped improve supervision and ultimately the quality of data collection and data entry during the 2019 spray campaigns. See Annex F for a summary of the data quality forms and Annex G for the overall monitoring and evaluation plan.

9. RESULTS

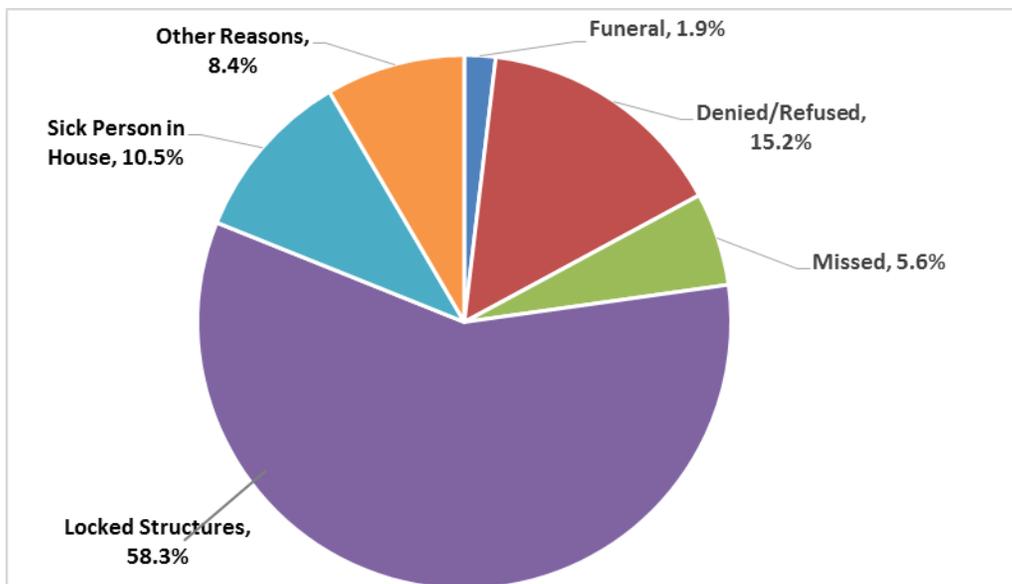
9.1 TOTAL NUMBER OF STRUCTURES AND POPULATION CAPTURED IN 2019 SPRAY CAMPAIGNS

9.1.1 STRUCTURES FOUND

The SOPs found a total of 1,393,562 eligible structures in Phases I and II of the 2019 spray campaign. Of the structures found, 1,291,569 were sprayed, resulting in an overall spray coverage rate of 92.7%. All districts exceeded the minimum required coverage rate of 85% except for Lira district, which had an 84% coverage rate. District-level data are presented in Table II. Detailed spray data by sub-county is shown in Annex H.

A total of 101,993 structures were not sprayed for different reasons as shown in Figure 10. These included locked structures which accounted for 58.3%, refusals by household owners (15.2%), presence of a sick person in the house (10.5%), other reasons including instances where the eligible structure is also used as a food store (8.4%), houses missed (5.6%) and finally presence of a funeral in the homestead (1.9%).

FIGURE 10: REASONS FOR STRUCTURES NOT BEING SPRAYED



9.1.2 POPULATION PROTECTED

IRS provided protection to a total of 4,479,157 people, including 119,077 pregnant women and 862,536 children under 5 years of age (Annex H). Table III shows a breakdown of population protected by district.

TABLE II: DISTRICT SUMMARY OF PHASE I AND II CAMPAIGN 2019 SPRAY RESULTS

Spray campaign	District	Structures Found	Population Found	Structures Sprayed	Sprayed Structures				% Population Protected
					Spray Coverage (%)	Population Protected	Pregnant Women Protected	Children <5 years old Protected	
Phase I	Budaka	62,586	253,195	56,115	89.7	236,476	6,636	51,096	93.4
	Bugiri	129,553	486,572	117,578	90.8	458,308	14,429	96,649	94.2
	Butaleja	69,143	294,092	67,367	97.4	289,702	8,874	63,631	98.5
	Butebo	40,813	155,123	39,227	96.1	152,102	5,240	31,138	98.1
	Kibuku	65,770	259,444	60,132	91.4	246,923	8,058	52,162	95.2
	Namutumba	89,304	370,954	86,679	97.1	364,866	11,806	72,825	98.4
	Pallisa	94,569	356,892	88,223	93.3	339,790	10,768	68,097	95.2
	Tororo	178,351	636,213	164,320	92.1	601,186	14,590	111,114	94.5
	Total		730,089	2,812,485	679,641	93.1	2,689,353	80,401	546,712
Phase II	Alebtong	97,235	262,930	92,402	95.0	253,548	4,931	44,100	96.4
	Amolatar	67,055	182,696	63,158	94.2	174,160	3,529	31,520	95.3
	Dokolo	80,472	208,345	75,219	93.5	198,440	3,807	32,889	95.2
	Kaberaido	88,809	253,761	84,158	94.8	243,508	4,821	45,339	96.0
	Lira	172,558	519,377	144,891	84.0	446,315	10,672	66,123	85.9
	Otuke	42,842	120,298	42,120	98.3	118,828	2,367	22,656	98.8
	Serere	114,502	365,899	109,980	96.1	355,005	8,549	73,197	97.0
	Total		663,473	1,913,306	611,928	92.2	1,789,804	38,676	315,824
Grand Total		1,393,562	4,725,791	1,291,569	92.7	4,479,157	119,077	862,536	94.8

9.2 USE OF MOSQUITO NETS

Across the 15 districts, households reported having 1,648,816 nets, which is lower than the 2,123,656 mosquito nets that were reported last year at the time the SOPs visited during the March–April and May–June 2019 spray campaign. Additionally, 599,606 children under 5 years of age were reported as having slept under a mosquito net the previous night (Annex I) representing 36.4% of the population with nets and 69.5% of all children under 5 years protected by IRS. The results on nets reveal a community challenge in regard to availability and usage with a net coverage of one net for every three people which is below the national target of 1:2 and over 30% of children under 5 years were reported to have no mosquito nets.

9.3 INSECTICIDE CONSUMPTION AND SPRAY OPERATOR PERFORMANCE INDICATORS

SOPs used 449,604 bottles of Actellic 300CS and 91,553 sachets of SumiShield 50WG during the 2019 spray campaign. On average, SOPs sprayed 9.6 structures per day, and 2.4 structures were sprayed per bottle/sachet of insecticide (Annex J).

10. GENDER

PMI VectorLink Uganda recognizes gender equality and female empowerment as development goals in their own right, as well as approaches to achieving its vector control goals. The project identifies and then addresses inequalities between men and women across spray operations. As in previous IRS campaigns, approaches employed for achieving an impact included:

- Explicitly including gender issues in all trainings from TOT through cascade trainings.
- Working directly with local authorities and women's groups to increase the percentage of women the project hires. Staff shared information on the importance of hiring female SOPs, and presented data that show that women are as effective as their male counterparts in spraying the targeted structures per day. The project also emphasized placing qualified women into supervisory roles and ensured that women had a chance to serve as storekeepers, site supervisors, team leaders, and parish supervisors.
- Continuing promotion of a respectful working environment through disseminating information on the project's sexual harassment policy to all employees and stakeholders.
- Revising training and mobilization documents to include more pictures and information about women in a range of IRS roles.
- Ensuring that recruitment, mobilization, and training include women and respect women's time constraints (when possible).
- Ensuring that women who are pregnant or lactating are assigned to roles without exposure to insecticide like community mobilization and site stores security guards positions. In 2019, two women were found pregnant and reassigned to a mobilization role that did not expose them to insecticide.
- Encouraging women in leadership positions to encourage other women to join the spray activities.
- Providing sex-disaggregated data for all indicators, as appropriate.
- Continuing to reserve some positions for women whose minimal academic background precludes their serving in positions that require literacy and arithmetic; for example, most positions for day-time security guards were reserved for women.
- Provision of sanitary napkins has continued to be one of the greatest motivator to women joining the program.

During the 2019 IRS campaign, women represented 31.6% of all seasonal staff which is 0.5% less than women representation for the 2018 spray campaign. The project continues to experience challenges related to gender norms in the IRS intervention areas, especially with regard to husbands having to give permission for women to be employed for IRS activities. Additionally, there is a widespread perception that IRS is an activity for men, which acts as a barrier to hiring more women for IRS. Limited access to transport required during spray campaign and inability to ride a bicycle due to fear of breaching cultural norms also limits women's participation, especially in urban areas and the eastern IRS districts. There is a need to explore the safe use of motorcycle transport, which currently is the most convenient and available means of transport. Restrictions on women owning a phone or a phone line is another limitation to women joining the program as the current payment method is mobile money. The project will continue to engage the communities to eliminate these bottlenecks.

Table 5 provides details on female participation during the 2019 IRS campaign. The project continues to find ways to hire more women for different activities, especially for the washer role, which seems appealing to women candidates. Additionally, approximately one in four guards this year were women, an important success in a role usually dominated by men. The project will share lessons learned on engaging women in security functions with other PMI VectorLink country teams. In future years, the project will adapt its recruitment practices to move toward more egalitarian hiring across all cadres.

III. MOH CAPACITY BUILDING

PMI VectorLink Uganda worked to build the capacity of MOH staff through various training initiatives that helped enhance their competency in effective implementation and supervision of IRS. The project trained MOH staff on the key aspects of entomological monitoring, EC, M&E, and IRS planning and implementation. The project conducted a training of master trainers (refer to Table 2) to enhance their capacity in IRS planning and implementation as well as facilitation skills. In order to enhance spray quality, all IRS training initiatives paid special attention to spray techniques and supervision.

The spray operations training conducted as part of TOT in 2019 further enhanced the capacity of the DHT and sub-county supervisors in IRS planning and implementation. The trained personnel in turn facilitated the training of SOPs and other actors at the district level. Detailed training information is included in section 2.4.3.

The project conducted District Environment Officer and Health Inspector refresher training to strengthen EC monitoring and safety standards in IRS implementation. The training was attended by a total of 35 participants (29 male and 6 female) aimed at equipping the officers with skills to ensure adherence to health and safety precautions during the campaign as well as proper liquid and solid waste management.

At the national level, the project in collaboration with the NMCD facilitated the development of an entomological surveillance framework that will guide all entomological monitoring work in the country. The development of the framework was done in close partnership with other malaria implementing partners as well as the World Health Organization (WHO).

12. CHALLENGES, LESSONS LEARNED, AND RECOMMENDATIONS

12.1 CHALLENGES

- Closure of the Government of Uganda financial year that coincided with the implementation for Phase II campaign activities affected the level of participation and engagement of the district health teams, especially the biostatisticians who are instrumental in supporting data quality enhancement.
- The introduction of smartphones as a supervisory tool, and errors in filling in the checklists were noted during the campaign. The incorrect reporting often shifted supervisors' attention to areas that were actually of less concern. Enhanced training on smartphone use will be important in bridging this gap.
- Some team leaders did not participate in all key IRS activities including the end-of-day clean-up and demonstrating proper spray techniques, which compromised the quality of IRS. In some areas where this occurred, the sites experienced a lower IUR compared with the other sites.
- Some incidents were encountered during the Phase II spray campaign, including one involving data falsification by the spray team members in Barapwo site in Lira district, who recorded rooms as structures in order to meet their spray targets. This is less than the six incidents compared to the 2018 spray campaign and the project will continue engaging stakeholders and as well come up with innovative measures to minimize such occurrences. Measures to improve such occurrences will include closer supervision, enhancing data collection validation, further reviewing hiring procedures for team leaders, and training.
- In an attempt to improve operational efficiency through improved supervision, operations sites were merged, leading to a reduction from 462 in 2018 to 276 during the 2019 campaign. In some cases this posed hardship to vehicle movement due to a poor road network; it required SOPs to walk long distances to the target villages. This reduction was achieved by merging sites that were geographically near to each and had fewer target structures. The project will review how to improve this during the next spray campaign.
- The project encountered pockets of resistance, especially in urban and peri-urban centers and especially in Lira district. Resistance arose from the general inconvenience associated with moving household items to make room for spraying. Lira district has a large urban population which is also mobile and hence there is low compliance as the homeowners are either reluctant to spray their houses as they are unwilling to have their household items removed or often the houses are closed and the SOPs have to keep coming back in order to spray the houses.
- The supervisors had some difficulty in completing the online supervisory forms as they were focused on enhancing IRS compliance in resistant communities, and the supervision targets were deemed too high which needs to be reviewed keeping in mind the work load of the supervisors.

12.2 LESSONS LEARNED AND RECOMMENDATIONS

- The tailored boot camp on IRS management conducted prior to the 2019 spray campaign helped enhance the skills of stakeholders who were involved in the implementation of IRS. The boot camp

addressed some of the gaps of the previous campaign as well as supervision roles and responsibilities, insecticide supply chain management, supervision tools usage, and data capture and reporting.

- The cascade trainings at the sub-county level were effective in that they were packaged for every cadre. The segmenting of different cadres and targeted content for each cadre made it easier for the participants to be trained on the subject matter. This led to enhanced knowledge transfer and performance of the different cadres of spray personnel.
- IPC and dialogue have consistently been used to overcome resistance to IRS in the target communities. Leaders at all levels were engaged to support the uptake of IRS services, which resulted in a successful spray season.
- Sites with over 25 SOPs posed supervisor challenges, making it hard to monitor the SOPs closely. It also made it challenging to do the mandatory DOS while in the field. Consequently, there is need to review the number of operations sites in such situations.
- To improve real-time reporting, delays in data delivery to data centers must be resolved. This will require field supervisors to collect spray cards from parish stores on a daily basis and deliver them to the district coordinator during the routine evening progress review meetings.

ANNEX A: NATIONAL AND DISTRICT STAFF TRAINED

Categories of Persons Trained	Training on IRS Delivery								Other Trainings												Total (M/F)	Grand Total			
	TOT		Spray Operations		Pump Technician Training		Poison Management		National Training on Updated Data Capture and Reporting		EC, Washing, Fire Safety and Operations site Security		Store Management and Safety		SBCC, Mobilization and Enumeration		Transport Safety and Security		Training of Master Trainers						
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
*MOH Supervisors	9	1	9	1	0	0	9	1	0	0	9	1	9	1	9	1	9	1	9	1	9	1	9	1	10
*National Trainers	11	9	11	9	0	0	11	10	0	0	11	10	11	10	11	10	11	10	11	10	11	10	11	10	21
*District malaria focal persons	14	1	14	1	0	0	14	1	0	0	14	1	14	1	14	1	14	1	14	1	14	1	14	1	15
*IRS Technical staff	12	7	12	7	0	0	12	7	0	0	12	7	12	7	12	7	12	7	12	7	12	7	12	7	19
Project /M&E Assistants	6	9	0	0	0	0	0	0	0	0	6	9	0	0	0	0	0	0	0	0	0	0	6	9	15
M&E Assistants	2	6	0	-	-	-	-	-	-	-	2	6	-	-	-	0	0	0	0	0	0	0	2	6	8
Data Entry Clerks	0	0	0	0	0	0	0	0	0	0	31	29	0	0	0	0	0	0	0	0	0	0	31	29	60
Clinicians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parish Mobilizers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	644	174	0	0	0	0	644	174	818	
Site Supervisors	222	54	222	54	0	0	222	54	0	0	222	54	222	54	222	54	222	54	222	54	0	0	222	54	276
Storekeepers	204	72	204	72	204	72	204	72	0	0	204	72	204	72	204	72	204	72	0	0	0	0	204	72	276
*Parish supervisors	129	56	129	56	0	0	129	56	0	0	129	56	129	56	129	56	129	56	0	0	0	0	129	56	185
Team Leaders	0	0	912	326	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	912	326	1238

Categories of Persons Trained	Training on IRS Delivery								Other Trainings												Total (M/F)		Grand Total				
	TOT		Spray Operations		Pump Technician Training		Poison Management		National Training on Updated Data Capture and Reporting		EC, Washing, Fire Safety and Operations site Security		Store Management and Safety		SBCC, Mobilization and Enumeration		Transport Safety and Security		Training of Master Trainers								
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total		
Spray Operators	0	0	3,886	1,642	0	0	3,886	1,642	0	0	3,886	1,642	3,886	1,642	0	0	3,886	1,642	0	0	0	0	3,886	1,642	5,528		
Washers																									0	0	0
Drivers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pump Mechanics	0	0	0	0	107	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	107	4	111	
Total	609	215	5,399	2,168	311	76	4,487	1,843	-	-	4,526	1,887	4,487	1,843	601	201	5,131	2,017	268	73	46	19	6,189	2,391	8,580		

*Participants trained across all project intervention areas.

ANNEX B: 2019 IRS PROCUREMENT

TABLE A-1: PPE AND OTHER SUPPLIES PROCURED

No	Description	Quantities	Unit of Measure
1	Gum boots (pair)	3,324	pairs
2	Socks, cotton (pair)	10,761	pairs
3	Hand Towel	635	pieces
4	Nylon rope (15 M)	770	pieces
5	Basin (20-litre) / Bucket (10-litre)	186	pieces
6	Basin (40-litre)	570	pieces
7	Jug (2-litre)	13	pieces
8	Measuring jugs (0.5ml)	3,019	pieces
9	Clear bags	3,011	pieces
10	Polythene sheet (3 metres totalling 13,758 metres)	219	rolls
11	Polythene sheet (1 metres totalling 5,286 metres)	82	rolls
12	Polythene sheet (6 metres totalling 2,958 metres)	60	rolls
13	Polythene sheet (8 metres totalling 5,189 metres) soak pits	82	rolls
14	Polythene sheet (10 metres totalling 340 metres) Pick-up/Trucks	6	rolls
15	Calculator, pocket size	74	pieces
16	Tool kit (adjuster, plier & double sided screw driver)	325	sets
17	Oil dispenser	304	pieces
18	Padlocks	283	pieces
19	Nestling Drums/ Bucket (60-litre)	162	pieces
20	Fire extinguishers 2kg for parish stores	229	pieces
21	Fire extinguishers 6kg for District stores	3	pieces
22	Long Scrubbing brushes	203	pieces
23	Short brushes	216	pieces
24	Dust pans	452	pieces
25	Thermometers	211	pieces
26	Tooth brushes	5,403	pieces
27	Ladders metallic for PMI stores	17	pieces
28	Washing soap (bar of 5 pcs)	10,334	bars
29	Filter cloth (A4 size)	6,888	pieces
30	Lubricating oil (0.5-litre)	394	bottles
31	Batteries D cell (pair)	2,729	pairs
32	Liquid soap (20-litre jerry can)	1,477	pieces
33	Grease(0.5kg)	17	pieces

No	Description	Quantities	Unit of Measure
34	Araldite (red & white)	1,025	pairs
35	Empty sacks	7,200	pieces
36	40-litre Barrels	20	pieces
37	Exercise Books (48pgs) (pcs)	10,818	pieces
38	Colored Chalk (box of 150 pcs)	2,883	boxes
39	A4 Paper Cartons	100	cartons
40	A3 Paper cartons	10	cartons
41	Spiral Note Books	2,604	pieces
42	Blue Pens (packets)	193	packets
43	Red Pens (packets)	12	packets
44	Flip Charts	511	pieces
45	Masking Tape	501	pieces
46	Markers (packet of 12pcs)	148	packets
47	A4 Envelopes (packet of 50)	40	packets
48	A3 Envelopes (packet of 50)	20	packets
49	A6 Envelopes (packet of 50)	20	packets
50	A5-Medium size Envelopes (packet of 50)	15	packets
51	Printer Cartridge/Toner	10	pieces
52	Box files	490	pieces
53	Paracetamol (pack of 100 tabs)	1,153	pack of 100 tabs
54	Hydrocortisone cream	1,421	pieces
55	Eye wash (Gentamycin eye drops)	1,279	pieces
56	Clotrimazole antibiotic cream	1,444	pieces
57	Crepe Bandage	1,557	pieces
58	Adhesive Tape	724	pieces
59	Super Plasters	701	packet of 100 strips
60	Gauze rolls	604	pieces
61	Alcohol wipes	484	pack of 100
62	Sanitary pads	8,319	packet
63	HCG Test strips	6,300	pieces
64	Extension Cables	45	pieces
65	Smartphone Screen protectors	200	pieces
66	Smartphone Jackets	200	pieces
67	Mifi modems	8	pieces
68	Haversacks (tarpaulin bags)	2,719	pieces
69	Laptops for data entry	32	laptops
70	Smartphones + Jackets	65	pieces
71	Lenovo Laptops for staff	3	pieces
72	Dell Laptops for CDFU	3	pieces
73	Samsung Tablets for CDFU	4	pieces
74	Wall hanging fans	3	pieces

No	Description	Quantities	Unit of Measure
75	Power Stabilizers	3	pieces
76	Metallic filling cabinet for data entry docs	1	piece
77	Rechargeable drill for preparing soak pits	1	unit
78	Nylon mesh for soak pits	40	meters
79	Sponge for soak pits	7	mattresses
80	AAA Batteries	14316	pieces
Printed Materials			
1	Daily Checkroll (A4, back to back, landscape)	6,414	Photocopies
2	Daily Distribution form (A4, one sided landscape)	6,444	Photocopies
3	Daily Insecticide Monitoring (A4, one sided landscape)	16,820	Photocopies
4	Delivery notebook	910	Photocopies
5	DCV Forms (A4, one-sided, landscape)	2,780	Photocopies
6	DOS & Team Leaders summary form (DOS will be on page 2/back page) (A4, back to back, landscape)	28,449	Photocopies
7	Evaluation for Spray Operators and Team Leaders (A4, one sided, portrait)	3,445	Photocopies
8	Evaluation for Storekeepers & Site Supervisors	305	Photocopies
9	Form B (A4, one sided, landscape)	5,019	Photocopies
10	Household cards (A4, back to back, portrait)	3,765	Photocopies
11	Insecticide tracking log	1,026	Photocopies
12	Ledger (A3, back to back, portrait)	1,170	Photocopies
13	Loss forms	910	Photocopies
14	Marking Guide for Pre and Post Tests (A5, back to back, Portrait)	280	Photocopies
15	Morning Health check (A4, one sided landscape)	11,274	Photocopies
16	Participants agreements (A4, back to back, portrait)	10,089	Photocopies
17	Performance sheet	1,026	Photocopies
18	Pictorials (A4, one sided, portrait)	687	Photocopies
19	Post-test for Storekeepers & Site Supervisors	305	Photocopies
20	Post-test for Spray Operators & Team Leaders (A4, back to back, portrait)	3,445	Photocopies
21	Pre-test for Storekeepers & Site Supervisors	305	Photocopies
22	Pre-test for Spray Operators & Team leaders (A4, back to back, portrait)	3,445	Photocopies
23	Receipt note	910	Photocopies
24	Spray Operator Forms (A4, back to back, landscape)	4,227	Photocopies
25	Stack cards (A4, One sided, portrait)	4,645	Photocopies
26	Support Supervision Visitors' book (A3, back to back, landscape)	695	Photocopies
27	Temperature charts (A4, one sided, portrait)	1,605	Photocopies
28	Visitors' book	606	Photocopies
29	Work plan (A3, back to back, landscape)	1,721	Photocopies

No	Description	Quantities	Unit of Measure
30	Insecticide tracking log printed on A4 portrait duplicate self-carbonated	1,990	Books
31	Delivery note books for districts and central stores A3 size with hard covers front and back	34	Books
32	Delivery note books for other items A3 size with hard covers front and back	17	Books
33	Delivery note books for spare parts A3 size with hard covers front and back	17	Books
34	Good received note books A3 size, with hard covers front and back	34	Books
35	Store ledgers A3 Size with hard front and back cover	72	Books
36	Stack cards, printed on white manila, printed on both sides	34	Bundles
37	Store Performance sheet A2 size printed on Manilla	461	Pcs
38	Work plan A2 size printed on manila	461	Pcs
39	IRS House hold cards front and back printed	850,000	Pcs
40	Mobilization form front and back printed on manilla	73,612	Pcs
41	Spray Operator front and back printed on manila	239,667	Pcs
42	Performance Tracking Sheet	300	pieces
43	Material Safety Data Sheets for SumiShield	300	books
44	Sexual Harassment Posters	300	posters
45	TOT Handout books	50	books

ANNEX C: ENVIRONMENTAL MITIGATION AND MONITORING REPORT

TABLE B-1: ENVIRONMENTAL MITIGATION AND MONITORING REPORT

Mitigation Measure	Status of Mitigation Measures	Issues Relating to Required Conditions	Remarks
Pre-contract vehicle inspection and certification of vehicles used for project staff and pesticide and transportation	<ul style="list-style-type: none"> • All drivers of transportation vehicles were trained on safety precautions to undertake while transporting insecticides and project staff during spray campaign. They were issued with training certificates and made to sign Abt vehicle usage policy. • A total of 55 vehicles were inspected and issued with vehicle inspection certificates. 9 were trucks for transportation of insecticide and 46 were passenger vehicles. • The vehicle drivers submitted their phone numbers during the training. They received appropriate PPE including respiratory masks and coveralls, and spill response procedures. • All insecticide transportation trucks were provided the spill response kit and polythene sheets to lay down on the vehicle floor before loading the insecticide. • PMI VectorLink Uganda ensured that all hired vehicles had fire extinguishers, first aid kit, and spill response kit. 	<ul style="list-style-type: none"> • The gaps identified were first aid kit and fire extinguishers in both trucks and passenger vehicles. 	<ul style="list-style-type: none"> • The EC team and the logistics coordinator ensured all vendors install these items to meet the criteria specified in the BMP before passing the vehicles that initially lacked a first aid kit and fire extinguisher. • To ensure that all vendors supply vehicles to standards, the bid document included the requirement of first aid kits and fire extinguishers prior to signing of the contract agreement. • Provision of spill response kit for trucks has been made mandatory in all IRS spray rounds.

Mitigation Measure	Status of Mitigation Measures	Issues Relating to Required Conditions	Remarks
Store identification, siting of soak pit on high grounds, above floodplains, and away from sensitive receptors	<ul style="list-style-type: none"> • All the 276 parish stores and soak pits were sited 30 meters away from schools and residences, and more than 100 meters from water sources. • All soak pits were built to standard design (2m x 1m x 1 m deep), the walls lined with polythene sheets with all five contents installed (sawdust, charcoal, bigger stones, smaller stones, and gravel as the top layer), to avoid percolation of effluent and allow ample time for treatment of effluent respectively. • All wash areas were sloped toward a soak pit and covered with polythene sheets to avoid seepage, and to gather and discharge all the wastewater generated from the wash area into the soak pit. 		<ul style="list-style-type: none"> • All sites were able to transition to the standard design of soak pit, laid out in the BMP.
Medical examination of the spray team for fitness to handle and use insecticide during spray campaign	<ul style="list-style-type: none"> • All female recruits were screened for pregnancy. Of 3,042 females tested, only two were found pregnant. • In addition, all spray team personnel were given a health fitness test. The process was carried out by trained clinicians and laboratory personnel. These personnel also attended training on insecticide poison management in IRS. 	<ul style="list-style-type: none"> • The equipment available to the examiners is insufficient for comprehensive medical examinations of the spray team. • The number of clinicians and laboratory personnel is insufficient to manage the large number of spray team members in a timely manner. 	<ul style="list-style-type: none"> • More laboratory personnel need to be trained to improve on the quality of the medical examination process. Each should handle at least 15 spray personnel per day of screening.

Mitigation Measure	Status of Mitigation Measures	Issues Relating to Required Conditions	Remarks
Preparedness to handle cases of insecticide exposures during spray campaign	<ul style="list-style-type: none"> • 143 health facilities in the categories of Health Center (HC) IIIs, HC IVs, and Government referral Hospitals in the 13 project districts were equipped with 1,600 ampoules of atropine. • All 276 site stores were equipped with fully stocked first aid kits. 	<ul style="list-style-type: none"> • Dokolo and Lira stores (where IRS used SumiShield) were not stocked with atropine because it is not classified as a first aid measure. 	<ul style="list-style-type: none"> • Sumitomo needs to indicate an appropriate antidote for SumiShield that the project can adopt for use.
Training of spray team on proper storage of insecticides, mixing and use of insecticide to ensure that there is no community and environmental contamination due to improper insecticide storage and handling	<ul style="list-style-type: none"> • 276 storekeepers for secured parishes stores were trained on insecticide storage, handling, good housekeeping, emergency response, how to handle insecticide spillage, and promote health and safety of SOPs. • All stores received danger warning signs, emergency response procedures, spill response procedures, and SOPs' received health and safety instructions. • Use of PPE was incorporated into all training provided in 2019. SOPs received PPE and a pair of neck cover protection. • Training on the mixing of insecticide (Actellic 300CS and SumiShield 50WG) was done at district-level TOT and during cascade training at sub-county level. Training discussed mistakes in mixing of insecticides that can compromise proper insecticides use. • At all parish stores, the supervision team ensured that all wastewater and remaining insecticides from barrels 1, 3, 5, and 7 were taken back to the field the next morning. 	<ul style="list-style-type: none"> • There were 55 and 40 cases in Phase I and II, respectively, out of 2,398 Homeowner Preparation Supervisory reports indicating SOPs were not wearing full PPE. • 345 cases recorded out of 1,372 Storekeeper Performance Supervisory reports storekeeper performance supervisory report indicated that fire extinguishers and thermometers were missing. • 13 cases of SOPs not using insecticide left over from previous day and wastewater were recorded out of 470 SOP early morning mobilizations conducted 	<ul style="list-style-type: none"> • SOPs need to be appropriately trained on proper PPE and flashlights use of flashlights. • Old boots and coveralls need to be changed for new ones with every round of IRS. • The team leaders and parish supervisors should ensure that all leftover insecticide and wastewater are taken back to the field. This will be re-emphasized during TOT and to the supervisors.

Mitigation Measure	Status of Mitigation Measures	Issues Relating to Required Conditions	Remarks
Team leaders conducting the physical inspection of spray operators to ensure that they are healthy, provided with breakfast, and wearing PPE before departure to the field	<ul style="list-style-type: none"> The team leaders were supplied with the Spray Operator Early Morning Health checklist to conduct health checks on SOPs. For 2019 campaign, the project ensured that all SOPs were provided with breakfast before donning PPE and departing to the field, to avoid SOPs being tempted to eat while spraying insecticide. 	<ul style="list-style-type: none"> 32 cases of team leaders not conducting the physical inspection of SOPs every morning was recorded out of 470 Early Mobilization Supervisory reports. 	<ul style="list-style-type: none"> In 2020, storekeepers and team leaders will be required to ensure that they fill the morning health checks for all SOPs before they set out to the field.
SOPs giving messages to homeowners to remove all items before spraying, close the door for at least 2 hours, and open the door for 30 minutes to allow fresh air in, then sweep from the door inward and collect the dead mosquitoes and other insects and dump them into a pit latrine. Continue to sleep under mosquito nets and wash itchy skin and go to health clinic if they experience any symptoms of insecticide exposure	<ul style="list-style-type: none"> SOPs sent out the key messages to homeowners during the spray in Phase I and Phase II. During the spray campaign, for all reported cases of non-compliance (failing to remove items from the houses), the team leaders, parish supervisors, and SOPs ensured that all immovable items were covered completely with plastic sheets before spraying. 	<ul style="list-style-type: none"> It was noted in other places during the direct interviews with homeowners that the SOPs were not giving the right information. 23 cases of residents not being informed of the potential exposure protocol were recorded out of 470 homeowner supervisory reports, and 413 cases of household items not being removed from the area before spraying the eaves were recorded. 	<ul style="list-style-type: none"> In the next campaign, all SOPs, project staff, and supervisors involved in the spray campaign should ensure that the key messages are given to every household before spraying. Involvement of mobilizers, district, sub-county, and community leaders in the operation improves the level of community participation.
Provision of adequate facilities and supplies for end-of-day clean-up	<ul style="list-style-type: none"> For each site store in Phase I and II, 2 long overalls hanging ropes, 7 barrels, and 2 basins were supplied to hold leftover insecticide, wastewater, wash strainers, soak control flow valves (CFVs) and nozzles during and after the triple rinsing process respectively. 	<ul style="list-style-type: none"> 5 cases of wastewater not being collected in the drum, out of 119 end-of-day clean-up supervisory reports were recorded. 	<ul style="list-style-type: none"> Team leaders and parish supervisors will have to strengthen the end-of-day clean-up process in the next campaign.

Mitigation Measure	Status of Mitigation Measures	Issues Relating to Required Conditions	Remarks
	<p>Purging of the hose, lance, CFV, and nozzle with each rinse was incorporated into the progressive rinsing procedure. This rinsing procedure was demonstrated at all levels of TOT and was practiced during the spray campaign.</p>	<ul style="list-style-type: none"> The challenge after this change was that the level of compliance was low as the SOPs found the procedure tiresome and time-consuming. 	<ul style="list-style-type: none"> All the supervisors involved have continuously emphasized the purging of the hose, lance, CFV, and nozzle. This must continue in next year's training and supervision.
<p>Identification of solid waste handling firms</p>	<ul style="list-style-type: none"> The two-year memorandum of understanding (MOU)s that were signed with 3 companies – Gentex Enterprises Ltd to recycle all HPDE and LDPE plastics, Pulp and Paper Mills Ltd to recycle all the insecticide cardboard and other paper waste, and Green Label Services Ltd to incinerate all used nose masks, bicycle cushions and other contaminated, combustible waste IRS waste materials – are still in effect. 		<ul style="list-style-type: none"> The project EC officer will be involved in the supervision of the recycling and disposal process by the waste firms to ensure high-level compliance.
<p>Management of IRS wastes</p>	<ul style="list-style-type: none"> All wastes generated by the project during the spray campaign and collected and segregated at the parish store have been transferred to the two main wastes stores in Bugiri and Dokolo. The process of quantification, packaging, and transportation to the recycling and disposal firms is ongoing. 		<ul style="list-style-type: none"> The task of recycling and disposal will be accomplished by the waste recycling firms according to the signed MOUs.

Mitigation Measure	Status of Mitigation Measures	Issues Relating to Required Conditions	Remarks
Pump service, maintenance, and calibration	<ul style="list-style-type: none"> • All pumps were checked and repaired at the district stores prior to the campaign to ensure no leaking pump is put in the parish store for the spray exercise. Each parish store was provided a spare pump. • In addition to pump technicians, SOPs, supervisors, and team leaders were trained on pump maintenance. • The team leaders and SOPs did a daily check of their pumps to ensure no leakage and conducted pump maintenance every rest day (Sunday) during the spray campaign. • The parts of pumps that were found to be faulty during the campaign were replaced. 	<ul style="list-style-type: none"> • 70 cases out of 1,194 SOP performance inspections conducted revealed pump leakage. • The most commonly encountered challenge in the pumps was the rapid wearing of the black ring in the CFV. 	<ul style="list-style-type: none"> • Old pumps that often broke down should be replaced in the next campaign. • The high level of rapid pump maintenance exhibited in 2019 campaign should be maintained or even exceeded where possible. • More stock of black rings for CFVs should be procured.
Choice of sites for disposal of wastewater including MSP sites, according to PMI BMPs	<ul style="list-style-type: none"> • Though the sites selected for soak pit construction met the BMP requirement, one site, in Malaba Town Council, became non-compliant after heavy precipitation for a good number of days. The amount of precipitation made the water table rise and the soak pit was shut down and relocated before the start of the spray campaign. 		<ul style="list-style-type: none"> • During siting of soak pits, areas where the water table increases with a heavy precipitation event should be strictly avoided.

Mitigation Measure	Status of Mitigation Measures	Issues Relating to Required Conditions	Remarks
IEC campaigns to inform homeowners of their responsibilities for health and safety during the spray campaign	<ul style="list-style-type: none"> • The project produced IRS community roll posters and frequently asked questions and answers. • The project conducted 15 district leaders' sensitization, 65 sub-county leaders as well as local council I chairs. • 30 mid-level representatives were oriented on the IRS project. • IPC (door-to-door) and dialogue engagements with the most resistant community members was conducted in all 15 project districts to increase compliance during the spray campaign 	<ul style="list-style-type: none"> • Religious sects that were resistant to IRS, including the Kanyiriri group in Pallisa and Kibuku. • Groups of organic farmers in Bata and Okwalongwen sub-counties in Dokolo district resisted IRS due to the fear of losing markets for their produce. 	<ul style="list-style-type: none"> • The project identified and engaged highly influential leaders of the Kanyiriri group in door-to-door community mobilization. • The project engaged the leaders of organic farmers to mobilize the farmers, and one of the organic leaders was brought on board as a guest speaker for a radio talk show, which aired on Dokolo FM.
Maintain records of all insecticide issuance, deliveries, receipts, and the return of empty sachets/bottles	<ul style="list-style-type: none"> • Records of all pesticide issued, delivered, returned, and returned empties are kept on stock cards with a back-up in a ledger. 	<ul style="list-style-type: none"> • One SOP in Namutumba district lost a bottle of insecticide during Phase I; the bottle was not recovered. 	<ul style="list-style-type: none"> • Storekeepers and team leaders should ensure that each SOP signs for every insecticide bottle issued and fills in empty bottles.

ANNEX D: IRS WASTE RECYCLING AND DISPOSAL 2019



Green Label Services Ltd

Plot 14 Turnell Drive Kamwokya, P.O.Box 40303 Kampala Uganda
 Tel: +256 414 531135, +256 772 454843, +256 772423092, +256 772 406884
 Fax: +256 414531135
 Email: green.2000.label@gmail.com, akmsunguzi@hotmail.com
 Website: www.greenlabelservicesug.com

ID No. GLSLEHS/CoD/01

CERTIFICATE OF DESTRUCTION

Serial No: **00769**

Owner: **ABT ASSOCIATES**

Date of Arrival: **12-8-2019**

DESCRIPTION OF ITEMS	QUANTITY	METHOD OF DESTRUCTION	GENERATOR
Used nose masks, Gloves, circuits, gum boots, cushions, face shields.	5826 KGS	HIGH TEMPERATURE INCENERATION	ABT ASSOCIATES

I hereby certify that I destroyed the items by:

HIGH TEMPERATURE INCENERATION

DATE	NAME	DESIGNATION	SIGNATURE
12/08/2019	DR. GRACE MUGUME	DIRECTOR	<i>[Signature]</i>



I hereby certify that I witnessed the destruction of the above goods by the mentioned individuals.

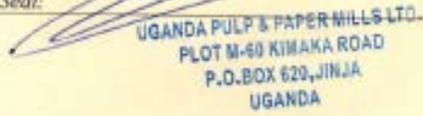
DATE	NAME	DESIGNATION	SIGNATURE
12/08/19	Jimmy Onen	ECO	<i>[Signature]</i>
12/08/2019	Ardaka Charles A.	District Environment Officer Nakasongola Dist	<i>[Signature]</i>
12/08/2019	MUGUMYA IWAAN	CEHS Manager	<i>[Signature]</i>



UGANDA PULP & PAPER MILLS LTD.

Plot M-60, Kimaka Road, P.O.Box 946, Jinja, Uganda. Telephone: +256-434-124175 / 76 / 77
Fax+256-434-124178, E-mail: uppltononoka@gmail.com

RECYCING CERTIFICATE

Part I: Generator Information <i>Abt Associates Inc., The USAID/PMI Vector Link Project Uganda, Plot 20 Masaba Road, Tororo, P.O. Box 37443, Kampala, Uganda, Tel: +256 (0) 392177264/0393260265.</i>			
Part II: Origin <i>Bugiri and Dokolo Waste Stores</i>			
Part III: Waste Types and Quantification			
Date	Transferred from:	Narration(type)	Quantity (kg)
25.07.2019	BUGIRI	EMPTIED WASTE CARTONS	5370
01.08.2019	BUGIRI	EMPTIED WASTE CARTONS	6000
02.08.2019	BUGIRI	EMPTIED WASTE CARTONS	4610
03.08.2019	BUGIRI	EMPTIED WASTE CARTONS	1100
05.08.2019	DOKOLO	EMPTIED WASTE CARTONS	5250
10.08.2019	DOKOLO	EMPTIED WASTE CARTONS	3620
23.08.2019	DOKOLO	EMPTIED WASTE CARTONS	2520
TOTAL			28470
ALL RECYCLED INTO PAPER			
Part IV: For Official Use Only <i>I certify that the information contained in or accompanying this document is true, accurate, and complete as to identification of the materials received from the generator, and the processing of the waste was done in accordance with the National Environment Act, Cap 153, and the National Environment (Waste Management) Regulations 2006.</i>			
Name:.....KIBUUKA EDWARD.....Title.....ADMIN MANAGER.....			
Signature:..... Date.....10 TH SEPTEMBER 2019.			
Seal: 			

UGANDA PULP & PAPER MILLS LTD.
PLOT M-60 KIMAKA ROAD
P.O. BOX 620, JINJA
UGANDA

Gentex Enterprises Ltd.

Manufacturers of UPVC, HDPE, PP-R Pipes and Water Tanks.

Shreejee Bapa Swami Bapa

GENTEX

August 21st, 2019

ABT Associates / Vectorlink
USAID/Uganda IRS project
Plot 86, Luthuli Avenue - Bugolobi
P. O. Box : 37443
Kampala - Uganda

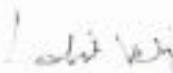
Dear Sir / Madam,

RE : RECYCLING MATERIALS

We hereby confirm the following materials brought to us for recycling;

Date	Particular	Qty in Kgs
19-07-19	Used plastic bottles	4,204
23-07-19	Used plastic bottles	10,249
26-07-19	Used plastic bottles	4,733
30-07-19	Used plastic bottles	10,337
02-08-19	Used plastic bottles	6,220
02-08-19	Damaged helmets	942
02-08-19	Jerkins used	496
02-08-19	HDPE used plastic	513
02-08-19	LDPE used plastic	320
06-08-19	Used plastic bottles	7,686
09-08-19	Used plastic bottles	927
09-08-19	Damaged helmets	371
09-08-19	Jerkins used	91
09-08-19	LDPE used plastic	165
Total Kgs		47,254

Your Faithfully,
Gentex Enterprises Ltd


Lalit Gorsia
Director



ANNEX E: 2019 POST-IRS EVALUATION MEETING PARTICIPANTS

TABLE C-1: 2019 POST-IRS EVALUATION MEETING PARTICIPANTS

Areas	Professional category	Sex		
		M	F	Total
Project districts	Malaria focal person	13	2	15
MOH	NMCD	2	1	3
District Local Government	District health officer District Health Officer	12	1	13
CDFU	Project team	6	4	10
Project staff	Technical staff	25	7	32
	Support staff	4	0	4
Total		62	15	77

ANNEX F: DATA COLLECTION AND QUALITY ASSURANCE TOOLS

TABLE D-1: DATA COLLECTION & QUALITY ASSURANCE TOOLS

Data Collection Tool	Purpose
Training Participants Registration Form	Used by lead trainer at training workshops to capture category and number of people trained, disaggregating by participants' sex.
Daily Spray Operator Form	Used by spray operators during spray operations to capture data on: structures found, structures sprayed and not sprayed, population protected and not protected, mosquito net usage, and insecticide used. This tool also captures meta-data including: geography, spray actors' names and codes, household names, structures type, sex of respondent, household IRS number, etc.
Daily insecticide tracking log form	Used by storekeepers and team leaders for daily distribution and monitoring of insecticide stock and usage.
Daily spray performance summary form	Used by storekeepers to summarize the daily data from each spray team to assess performance on a daily basis.
Data Quality Assurance Tool	Purpose
Data Collection Verification (DCV) Form	To check the accuracy of data collected in the field, i.e., ensure that the data written on the Daily Spray Operator Forms match the information reported by households and/or the data recorded on the IRS Cards disseminated to households.
Data Entry Site Supervision Checklist	To check the application of data entry and documentation protocols and provide on-the-spot support to data entry clerks (DECs)
Direct Observed Spraying (DOS)	Ensure spray quality, specifically insecticide mixing and spray technique, but also including personal, household and environmental safety, and ensure any gaps identified are immediately corrected.

ANNEX G: MONITORING AND EVALUATION PLAN

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
Objective I: Implementation of Malaria Vector Control (VC) Interventions													
I.1	Successfully execute IRS and other malaria vector control programs												
I.1.1	Annual country work plan developed and submitted on time	Project records Annually		I	I	I	I						
I.1.2	Number of eligible structures targeted for spraying	Project records Annually		PMI	940,017	1,008,109	1,008,109	1,017,149					
				DFID	347,680	361,196	361,196	376,413					
I.1.3	Number of eligible structures sprayed with IRS	Project records Annually		PMI	799,014	950,939	950,939	934,512					
				DFID	295,528	341,370	341,370	357,057					
I.1.4	Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (spray coverage)	Project records Annually		85%		PMI	94.3	85%	91.9				
						DFID	94.5	94.9					

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 5								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
I.1.5	Number of people protected by IRS	Project records Annually	Sex	PMI	3,419,524	3,504,041	3,632,388	3,490,673												
			Pregnant women		M: 1,651,665 W: 1,767,859 Preg. women: 85,510 Children <5: 677,933	M: 1,709,390 W: 1,794,651 Preg. women: 99,619 Children <5: 716,548	M: 1,829,533 W: 1,802,855 Preg. women: 99,619 Children <5: 716,548	M: 1,737,896 W: 1,752,777 Preg. women: 99,622 Children <5: 686,032												
			Children <5	DFID	930,990 M: 455,254 W: 475,736 Preg. women: 17,994 Children <5: 168,515	932,115 M: 456,136 W: 475,79 Preg. women: 21,971 Children <5: 175,842	974,330 M: 456,136 W: 475,79 Preg. women: 21,971 Children <5: 175,842	988,484 M: 492,114 W: 496,370 Preg. women: 19,455 Children <5: 176,504												
I.1.6	EOSR submitted within 45 days after the end of spray (including completing MEP and EMMR)	Project Annually		I		I	I	I												
I.1.7	Post-spray Data Quality Audit conducted within 90 days of spray completion	Data Collection Forms, annually		N/A		N/A	I	I												

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 5								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
I.1.8	Number of Insecticide Treated Nets (ITNs) distributed, by channel	Project records Annually	Channel	N/A	N/A	N/A	N/A													
I.1.9	Conducted at least one process assessment of the quality of ITN distribution planning, the quality of household registration, and/or ITN distribution implementation during a mass ITN distribution campaign	Project records Annually	Channel	N/A	N/A	N/A	N/A													
I.1.10	Operational routine monitoring systems for continuous ITN distribution established and disaggregated by channel	Project records Annually	Channel	N/A	N/A	N/A	N/A													
I.1.11	ITN durability monitoring data collection completed on time as planned in a given project year	Project records Annually		N/A	N/A	N/A	N/A													

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 5								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
I.2	Provide technical assistance and planning support for IRS and other integrated malaria vector control activities																			
I.2.1	Number of VC project training workshops targeting NMCP and other host country staff	Project training records Annually	Technical area Job function	1	13	1	1													
I.2.2	Number of NMCP and other vector control host country staff accessing DHIS2	DHIS2 logs Annually	Job function	N/A	N/A	N/A	N/A													
I.3	Ensure safe and judicious use of insecticides and other malaria vector control products																			
I.3.1	Number of vector control personnel trained in environmental compliance and personal safety standards in vector control implementation	Project training records Annually	Sex (# and %) Job function	10,656 M: 6,820, 64% W: 3,836, 36%	8,463 M: 6,080, 71.8% W: 2,383, 28.2%	8,463 M: 6,080, 71.8% W: 2,383, 28.2%	8,580 M: 6,189, 72.1% W: 2,391, 27.9% Parish mobilizers 818 M:644, W: 174, Parish supervisors 185 M:129, W: 56, Pump Mechanics 111 M: 107, W:4, Site supervisors 276 M: 222, W: 54, Spray operators 5,528 M:3,886,													

3) Boot camp.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																	
				Year 1		Year 2		Year 3		Year 4		Year 5									
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result								
							W:1,642, Store keepers 276 M: 204 W: 72, Team leaders 1,238 M:912 W: 326, Data clerks 60 M:31, W:29, project Assistants 15 M: 6 W: 9, M&E Assistants 8 M: 2 W:6, MOH 10 M:9 W:1, National trainers 21 M:11 W:10, Malaria focal persons 15 M: 14, W: 1, IRS Technical														
I.3.2	Number of health workers receiving insecticide poisoning case management training	Project training records Annually	Sex (# and %)	51 M: 41, 80% W: 10, 20%	64 M: 43, 67.2% W: 21, 32.8%	75 M: 50, 66.7% W: 25, 33.3%	0														
I.3.3	Number of adverse reactions to pesticide exposure documented	Incident Report Forms Annually	Type of exposure	0	0	0	0	0													
I.4	Strengthen capacity of NMCPs, vector control personnel, and other institutions to implement and manage IRS and other vector control activities																				

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results											
				Year 1		Year 2		Year 3		Year 4		Year 5			
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result		
I.4.1	Total number of people trained to support VC in targeted areas ⁴	Project training records Annually	Sex (# and %) VC intervention type	10,656 M: 6,820, 64% W: 3,836, 36% IRS	8,463 M: 6,080, 71.8% W: 2,383, 28.2% IRS	8,463 M: 6,080, 71.8% W: 2,383, 28.2% IRS	8,580 M: 6,189, 72.1% W: 2,391, 27.9% IRS Parish mobilizers 818 M:644, W: 174, Parish supervisors 185 M:129, W: 56, Pump Mechanics 111 M: 107, W:4, Site supervisors 276 M: 222, W: 54, SOPs 5,528 M:3,886, W:1,642, Store keepers 276 M: 204 W: 72, Team leaders 1,238 M:912 W: 326, Data clerks 60 M:31, W:29, project Assistants 15 M: 6 W: 9, M&E								

⁴ The definition of this indicator was changed since the first submission of the MEP to include only SOPs, TLs, and Supervisors, hence the discrepancy between the target and results for Y1.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results													
				Year 1		Year 2		Year 3		Year 4		Year 5					
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result				
							Assistants 8 M: 2 W:6, MOH 10 M:9 W:1, National trainers 21 M:11 W:10, Malaria focal persons 15 M: 14, W: 1, IRS Technical staff 19 M: 12 W: 7										
I.4.2	Number of people trained during IRS TOT	Project training records Annually	Sex (# and %)	1,126 M: 901, 20% W: 225, 20%	1,136 M: 888, 78.2% W: 248, 21.8%	1,136 M: 888, 78.2% W: 248, 21.8%	663 M: 533, 80.4% W: 130, 19.6% Store keepers 276 M: 204 W:72 Site supervisors 276 M: 222 W: 54 and pump mechanics 111 M: 107 W: 4										
I.4.3	Total number of people hired to support VC in target districts	Project records Annually	Sex (# and %) Job function VC intervention type	10,278 M: 6,578, 64% W: 3,700, 36% IRS	10,877 M: 7,388, 67.9% W: 3,489, 32.1% IRS	10,877 M: 7,388, 67.9% W: 3,489, 32.1% IRS	9,635 M: 6,587, 68.4 % W: 3,048, 31.6% Parish mobilizers 818 M:644, W: 174, Parish										

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results												
				Year 1		Year 2		Year 3		Year 4		Year 5				
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result			
						zers 818 M:644 , W: 174, Parish super visors 185 M:129 , W: 56, Pump Mecha Store nics 111 M: 107, W:4, Site super visors 276 M: 222, W: 54, SOPs 5,528 M:3,8 86, W:1,6 42, Store keepe rs 276 M: 204 W: 72, Team leader s 1,238 M:912 W: 326,	supervisors 185 M:129, W: 56, Pump Mechanics 111 M: 107, W:4, Site supervisors 276 M: 222, W: 54, SOPs 5,528 M:3,886, W:1,642, Store keepers 276 M: 204 W: 72, Team leaders 1,238 M:912 W: 326, Data clerks 60 M:31, W:29, project Assistants 15 M: 6 W: 9, M&E Assistants 8 M: 2 W:6, Security Guards 546 M: 388, W: 158, Wash persons 574, M: 56, W:518 107 W: 4IRS									

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 5								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
						Data clerks 60 M:31, W:29, project Assistants 15 M: 6 W: 9, M&E Assistants 8 M: 2 W:6, Security Guards 546 M: 388, W: 158, Wash persons 574, M: 56, W:518 IRS														
I.4.4	Number of government/district officials who acted as supervisors during VC campaigns	Project records Annually	VC intervention type	1,040 M: 647, 20% W: 393, 20% IRS	915 M: 712, 77.8 % W: 203, 22.2% IRS	915 M: 712, 77.8 % W: 203, 22.2% IRS	486 M: 389 , 80.0 % W: 97 , 20.0 % DHT 165, M: 127, W: 38, MOH: 45, M:40, W:5, Site supervisors 276, M:													

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 5								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
							222, W:54 IRS													
I.5	Promote gender equality in all facets of planning and implementation																			
I.5.1	Number of women hired to support VC campaigns	Project records Annually	Returning female seasonal workers hired in a more senior capacity	3,767, 100%	% 3,408; 90.5%	3,408, 90.5%	3,048, 31.6%	Parish mobilizers W: 174, Parish supervisors W: 56, Pump Mechanics W:4, Site supervisors W: 54, SOPs W:1,642, Store keepers, W: 72, Team leaders W: 326, Data clerks W:29, project Assistants W: 9, M&E Assistants												

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 5								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
						W:6, Security Guards W: 158, Wash persons W:518														
I.5.2	Number and percentage of women hired in supervisory roles in target areas for vector control activities	Project records Annually	VC intervention type Job function	573, 30% IRS	451, 23.0% IRS TLs: 303, 23.9% Subcounty supervisors: 39, 19.7% Parish supervisors: 107, 22.5% Project assistants: 2, 28.6%	451, 23.0% IRS TLs: 303, 23.9% Subcounty supervisors: 39, 19.7% Parish supervisors: 107, 22.5% Project assistants: 2, 28.6%	436, 25.7% IRS TLs: 326, 26.3% Site supervisors: 54, 19.6% Parish supervisors: 56, 30.3%													
I.5.3	Number and percentage of staff (permanent and seasonal) who have completed gender awareness training	Project training records Annually	Sex Job function	45, 100%	45, 100%	45, 100%	45, 100%													

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 5								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
I.5.4	Number and percentage of women in senior leadership roles in VectorLink country offices	Project records Annually	Sex (# and %)	1, 17%	2, 28.6%	2, 28.6%	2, 28.6%													
I.6	Implement and support social behavioral change communication and mobilization activities																			
I.6.1	Number of radio spots and talk shows aired	Project records Annually	VC intervention type	56 talk shows and 280 spots IRS	60 talk shows and 280 spots IRS	500 radio shows, 1,500 radio spots IRS	30 Radio talk shows, 600 Radio spots, 75 Radio announcements IRS													
I.6.2	Number of print materials disseminated	Project records Annually	VC intervention type	7,090 print materials IRS	7,090 print materials IRS	9,000 posters, 1,500 leaflets IRS	7,267 posters, 1,500 leaflets IRS													
I.6.3	Number of people reached with vector control and/or SBCC messages via door-to-door messaging	Project records Annually	VC intervention type Sex	2,175,257	11,810 IRS M: 5,647 F: 6,163	2,175,257	1,328,692 Integrated Malaria Control Messages M: 663,039 F: 665,653													
I.6.4	Number and percentage of people who feel that the proposed action (sleeping under an ITN/accepting IRS) will reduce their risk of malaria	Project records Annually		N/A	N/A	N/A	N/A													

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 5								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
I.6.5	Number and percentage of people with a favorable attitude toward the practice/product (i.e., ITNs, IRS)	Project records Annually	VC intervention type	N/A	N/A	N/A	N/A													
I.6.6	Number and percentage of people who believe that the majority of their friends and community members practice the behavior	Project records Annually	VC intervention type	N/A	N/A	N/A	N/A													
I.7	Environmental compliance																			
I.7.1	SEA (with EMMPs) or Letter Report submitted at least 60 days prior to the start of vector control campaigns	Project records Annually		I, 100%	I, 100%	I, 100%	I, 100%													
I.7.2	Number and percentage of permanent and mobile soak pits inspected and approved prior to IRS campaigns	Project records Annually	Soak pit type	462, 100%	462, 100%	370, 100%	279, 100% 276, 100% permanent soak pits and 3 100% mobile soak pits													
I.7.3	Number and percentage of storehouses inspected and approved prior to IRS campaigns	Project records Annually	Storehouse type	462, 100%	462, 100%	370, 100%	276, 100%													

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 5								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
1.7.4	Number and percentage of fixed soak pits that are compliant with PMI's Best Management Practices	Project records Annually		462, 100%	462, 100%	370, 100%	292, 100% District 15 1 Central Warehouse 276 at parish store													
2. Entomological and Epidemiological Data to Drive Decision-Making																				
2.1	Vector control activities monitored via entomological and epidemiological data																			
2.1.1	Number and percentage of project-supported entomological sentinel sites established to monitor vector bionomics and behavior (vector species, distribution, seasonality, feeding time, and location)	Entomological reports Annually	VC intervention type	5, 100% IRS	55 100% IRS	6, 100% IRS	6, 100% IRS													
2.1.2	Number and percentage of entomological monitoring sentinel sites measuring all five basic PMI entomological monitoring indicators (i.e., species composition, abundance, and seasonality of malaria vector,	Entomological reports Annually	VC intervention	1, 100% IRS	1, 100% IRS	36 100% IRS	3, 100% IRS													

5 Bugiri, Otuke, and Tororo (current IRS districts); Apac (previous IRS project district, sprayed in February–March 2017 by the MOH); and Soroti (a non-IRS district)

6 Bugiri, Lira, and Tororo.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 5								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
	insecticide susceptibility and resistance intensity; mechanism of resistance; quality assurance and residual efficacy monitoring of IRS programs; or vector behavior: feeding time and location)																			
2.1.3	Number and percentage of entomological monitoring sentinel sites measuring at least one advanced PMI indicator (i.e., identification of mosquito infectivity; parity rates; or blood-meal analysis)	Entomological reports Annually	VC intervention	5, 100% IRS	5, 100% IRS	6, 100% IRS	6, 100% IRS													
2.1.4	Number and percentage of insecticide resistance testing sites that tested at least one insecticide from the pyrethroid, organophosphate, carbamate, clothianidin, and chlorfenapyr groups	Entomological Reports Annually	Insecticide type	11, 100%	5, 45.5% Pyrethroid, organophosphate, carbamate, clothianidin, chlorfenapyr	167 100%	8													

7 Apac, Arua, Bugiri, Gulu, Hoima, Kamwenge, Kanungu, Katakwi, Kitgum, Lira, Moroto, Nakaseke, Rakai, Soroti, Tororo, and Wakiso. (Apac, Arua, Bugiri, Kanungu, Lira, Moroto, Rakai and Tororo)

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 5								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
2.1.5	Number of wall bioassays conducted within two weeks of spraying to evaluate the quality of IRS	Entomological Reports Annually		1808	194	489	96													
2.1.6	Number and percentage of cone bioassays conducted within two weeks of spraying with greater than 98% test mortality recorded	Entomological Reports Annually		180, 100%	194, 107.8%	4810, 100%	96, 100%													
2.1.7	Number of wall bioassays conducted after the completion of spraying at monthly intervals to evaluate insecticide decay	Entomological Reports Annually	Insecticide type	31211 Actellic 300CS	120 Actellic 300CS	33612	192													

8 12 wall bioassay cones are tested per district for all the current 15 IRS districts. Repeat tests done in Budaka and Namutumba to ascertain quality.

9 12 wall bioassay cones are tested per district for the current IRS districts of Kaberamaido, Lira, Pallisa and Tororo.

10 12 wall bioassay cones are tested per district for the current IRS districts of Kaberamaido, Lira, Pallisa and Tororo.

11 Post-IRS routine monthly monitoring wall bioassay studies for Pallisa would be from June to December = $7 \times 12 = 84$, while post-IRS routine monthly monitoring wall bioassay studies for Kaberamaido, Lira, and Tororo would be from July to December = $3 \times 6 \times 12 = 216$, giving a total of 300 cone tests. VectorLink had expected to start post-IRS routine monthly monitoring wall bioassay studies for Pallisa in June, but instead started in May, now giving a total of 312.

11 = 120 bioassays had been conducted as of 31/08/2018. Routine monthly monitoring wall bioassays are still ongoing. By December 2018, a total of 312 bio-assay were conducted

12 Post-IRS routine monthly monitoring wall bioassay studies for Pallisa and Tororo would be from May to December = $2 \times 8 \times 12 = 192$, while post-IRS routine monthly monitoring wall bioassay studies for Kaberamaido and Lira would be from July to December = $2 \times 6 \times 12 = 144$ giving a total of 336 cone tests.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results											
				Year 1		Year 2		Year 3		Year 4		Year 5			
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result		
2.1.8	Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites	Entomological Reports Annually	Insecticide type	60	60 Pirimiphos methyl: 10 Bendiocarb: 10 Deltamethrin: 10 Alpha cypermethrin: 10 Permethrin: 10 Clothianidin: 5 Chlorfenapyr: 5	60	36 Pirimiphos methyl: 8 Bendiocarb: 7 Deltamethrin: 7 Alpha cypermethrin: 4 Permethrin: 6 Clothianidin: 4 Chlorfenapyr: 0								
2.1.9	Number of countries with an integrated vector control analytics dashboard available for decision making	Project records Annually		N/A	N/A	N/A	N/A								
2.1.10	Number of staff (VectorLink-contracted or non-VectorLink) trained in entomological monitoring	Project training records Annually	Sex (# and %) Job Function	12	12 Entomological monitoring	45	0	0							
2.2	NMCPs develop country-level IRS and other malaria vector control strategies														
2.2.1	Developed an integrated malaria vector control strategy, including a plan for monitoring and managing insecticide resistance supported by the project	Project records Annually		N/A	N/A	N/A	N/A								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 5								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
2.2.2	Completed integrated data and visualization landscaping for vector control decision making complete	Project records Annually		N/A	N/A	N/A	N/A													
2.2.3	Implemented subnational insecticide as part of an IRM strategy	Project records Annually		0	0	0	0													
2.3	Build capacity of NMCPs and local institutions to collect, analyze, and use data for strategic malaria control decision-making																			
2.3.1	Number of individuals trained from NMCPs and national institutions to review and interpret data for integrated vector control decision-making	Project training records Annually	Job function organization	12	12	45	0													
2.3.2	Proportion of targeted individuals who report using new analytical tools and/or skills in their planning, resourcing, implementation, or measurement activities	Capacity Assessments Thrice over project life	Job function Organization	N/A	N/A	N/A	N/A													
3. Procure insecticides for IRS and support the delivery and storage of IRS and other malaria vector control products																				
3.1	Cost-effective procurement mechanism established																			
3.1.1	Number and percentage of insecticide procurements that had a pre-shipment	Procurement records Annually	Insecticide type	1, 100%	1, 100%	1, 100%	2 Actellic I SumiShield I													

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 5								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
	QA/QC test at least 60 days prior to spray campaign																			
3.1.2	Number and percentage of insecticide procurements received on time to allow the initiation of spray operations as scheduled	Procurement records Annually	Insecticide type	I, 100%	I, 100%	I, 100%	I, 100%													
3.1.3	Number and percentage of international equipment procurements, including PPE, received on time to allow the initiation of vector control campaigns as scheduled	Procurement records Annually	VC intervention type	I, 100% IRS	I, 100% IRS	I, 100% IRS	I, 100% IRS													
3.1.4	Number and percentage of local procurements for PPE received on time to allow the initiation of spray operations as scheduled	Procurement records Annually		I, 100%	I, 100%	I, 100%	I, 100%													
3.1.5	PPE procured according to workforce composition	Procurement records Annually		N/A	N/A	N/A	N/A													

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results										
				Year 1		Year 2		Year 3		Year 4		Year 5		
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result	
3.2	Robust inventory management and logistics systems established													
3.2.1	Number and percentage of logistics and warehouse managers trained in vector control supply chain management	Project training records Annually	VC intervention type Sex	462, 100% IRS M: W:	462, 100% IRS M: W:	370, 100% IRS M: W:	276, 100% 72f 204 m IRS IRS M: 204 W:72							
3.2.2	Number and percentage of operations site warehouses where physical inventories can be verified by daily stock records	Inventory and stock records Annually	Insecticide type	462, 100%	462, 100% Actellic 300CS	370, 100% Actellic 228, Sumishield 48 (Lira 26 sites and Dokolo 22 sites)	276, 100% Actellic 228, Sumishield 48 (Lira 26 sites and Dokolo 22 sites)							
3.2.3	Successfully completed spray operations without an insecticide stock-out	Inventory and stock records Annually	Insecticide type	1, 100%	1, 100% Actellic 300CS	1, 100%	11, 100%							
4. Innovation														
4.1	Conduct operational research or monitoring to scale up new tools, methods, and approaches													
4.1.1	Number of operational research studies on promising new tools or new methods/approaches to existing tools that are implemented	Project records Annually	Type of Innovation	0	0	5	0							
4.2	Create and share knowledge through dissemination of best practices and lessons learned													

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 5								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
4.2.1	Number of innovations, best practices, and other data or lessons learned shared with other partners or international institutions for global reporting on the Vector Learning Exchange	Project records Annually	Technical Area	1	0	5	5													
4.2.2	Number of individuals who use the Vector Learning Exchange	Project records Annually	N/A	21	0	21	2													
4.2.3	Number of symposia and/or presentations submitted to and accepted at global conferences	Project records Annually	Technical area	1	1, Entomology	1	1													
4.2.4	Number of success stories written or videos produced and shared on the VectorLink project website	Project records Annually		1	1	1	1													
4.2.5	Number of peer-reviewed journal articles submitted and accepted	Project records Annually	Technical area	1	0	1	1													
4.2.6	Number of critical guidance, standards, or plans that incorporate disseminated findings/best practices	Project records Annually	Technical area	1	0	1	1													

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 5								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
4.3	Develop and deploy cost-savings approaches																			
4.3.1	Number of innovative or novel approaches implemented to achieve cost savings in IRS and integrated malaria vector control programs	Project records Annually	VC intervention type	113	1 IRS	1 IRS	1 IRS													
4.3.2	Number of cost-effectiveness assessments of existing approaches in the implementation of IRS and integrated malaria vector control programs	Project records Annually	VC intervention type	0	0	1 IRS	1 IRS													
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	Project records Annually	Private sector organization	0	0	0	0	0												

13 Engaging other implementing partners to use their existing infrastructure to conduct IRS-related mobilization.

ANNEX H: SUB-COUNTY SUMMARY OF CAMPAIGN 2019 SPRAY RESULTS

District	Sub-county	Structu res Found	Populat ion Found	Structu res sprayed	Sprayed structures					% Populat ion Protect ed
					Spray Covera ge (%)	Insectic ide Usage Rate (IUR)	Populat ion Protect ed	Pregna nt Wome n Protect ed	Childre n <5 years old Protect ed	
Alebtong	Abako	12,359	34,198	11,909	96.4	2.6	33,159	648	5,686	97.0
	Abia	10,614	28,217	10,139	95.5	2.4	27,531	590	4,857	97.6
	Akura	10,128	25,792	9,421	93.0	2.5	24,393	429	3,973	94.6
	Alebtong Town Council (TC)	2,842	8,290	2,627	92.4	2.6	7,819	124	1,134	94.3
	Aloi	12,506	34,189	11,539	92.3	2.5	32,351	537	5,535	94.6
	Amugu	10,794	31,215	10,287	95.3	2.6	30,123	602	5,427	96.5
	Apala	9,005	23,817	8,581	95.3	2.4	23,403	438	3,833	98.3
	Awei	9,571	25,545	9,168	95.8	2.4	24,648	457	4,284	96.5
	Omoro	19,416	51,667	18,731	96.5	2.6	50,121	1,106	9,371	97.0
Alebtong Total		97,235	262,930	92,402	95.0	2.5	253,548	4,931	44,100	96.4
Amolatar	Agikdak	5,196	13,716	4,703	90.5	2.6	12,656	264	2,403	92.3
	Agwingiri	7,507	20,534	7,114	94.8	2.5	19,748	408	3,313	96.2
	Akwon	3,542	9,408	3,253	91.8	2.4	8,795	147	1,679	93.5
	Amaolatar TC	4,881	13,910	4,638	95.0	2.7	13,344	215	2,108	95.9
	Aputi	6,078	17,460	5,804	95.5	2.3	16,798	308	3,178	96.2
	Arwotcek	8,060	20,935	7,587	94.1	2.5	19,969	423	3,761	95.4
	Awelo	6,709	16,007	6,410	95.5	2.6	15,458	305	2,525	96.6
	Etam	6,972	18,689	6,805	97.6	2.6	18,326	390	3,346	98.1
	Muntu	5,521	15,953	5,103	92.4	2.4	14,954	285	2,699	93.7
	Namasale	8,122	22,603	7,935	97.7	2.5	22,256	521	4,276	98.5
	Namasale TC	4,467	13,481	3,806	85.2	2.9	11,856	263	2,232	87.9
Amolatar Total		67,055	182,696	63,158	94.2	2.5	174,160	3,529	31,520	95.3

District	Sub-county	Structures Found	Population Found	Structures sprayed	Sprayed structures					% Population Protected
					Spray Coverage (%)	Insecticide Usage Rate (IUR)	Population Protected	Pregnant Women Protected	Children <5 years old Protected	
Budaka	Budaka	3,785	14,516	3,310	87.5	2.1	13,303	400	2,834	91.6
	Budaka TC	5,555	24,265	4,925	88.7	2.6	22,297	548	4,050	91.9
	Iki-iki	1,133	4,336	870	76.8	2.4	3,544	88	813	81.7
	Iki-iki TC	3,269	13,021	2,762	84.5	2.2	11,758	326	2,499	90.3
	Kabuna	1,752	7,034	1,749	99.8	2.4	7,026	203	1,448	99.9
	Kachomo	5,945	23,243	5,472	92.0	2.4	21,702	664	4,592	93.4
	Kaderuna	3,472	14,431	3,436	99.0	2.7	14,300	449	3,146	99.1
	Kadimukoli	3,349	13,980	2,869	85.7	2.1	12,850	338	2,852	91.9
	Kakoli	1,917	7,623	1,658	86.5	2.7	6,879	227	1,712	90.2
	Kakule	4,048	14,973	3,377	83.4	2.5	13,981	351	3,170	93.4
	Kameruka	4,913	19,015	4,313	87.8	2.0	17,525	486	3,872	92.2
	Kamonkoli	1,213	4,847	954	78.6	2.0	4,316	113	865	89.0
	Kamonkoli TC	2,695	11,207	2,196	81.5	2.1	9,975	247	1,876	89.0
	Katira	3,293	14,142	2,930	89.0	2.5	13,087	370	2,941	92.5
	Lyama	3,140	14,183	3,094	98.5	2.1	14,014	466	3,428	98.8
	Mugiti	3,856	14,374	3,655	94.8	2.3	13,886	322	2,743	96.6
Naboa	3,829	16,012	3,515	91.8	2.8	15,024	431	3,344	93.8	
Nansanga	3,121	12,902	3,046	97.6	2.6	12,706	343	2,776	98.5	
Tademeru	2,301	9,091	1,984	86.2	2.3	8,303	264	2,135	91.3	
Budaka Total		62,586	253,195	56,115	89.7	2.3	236,476	6,636	51,096	93.4
Bugiri	Budhaya	10,605	38,588	10,108	95.3	2.3	37,743	1,534	8,583	97.8
	Bugiri TC	12,763	44,537	11,702	91.7	2.4	41,659	1,363	6,721	93.5
	Bulesa	13,165	46,977	12,207	92.7	2.2	45,085	1,177	8,986	96.0
	Bulidha	10,086	36,044	8,709	86.3	2.2	34,947	1,197	7,615	97.0
	Buluguyi	10,921	43,007	9,423	86.3	2.1	38,633	1,142	8,688	89.8
	Buwunga	14,117	54,367	12,108	85.8	2.1	48,587	1,495	10,578	89.4
	Iwemba	6,644	25,763	6,349	95.6	2.0	25,183	671	5,651	97.7
	Kapyanga	14,372	55,569	13,055	90.8	2.0	52,157	1,258	10,740	93.9
	Muterere	12,893	47,690	12,392	96.1	2.3	46,086	2,105	9,777	96.6

District	Sub-county	Structures Found	Population Found	Structures sprayed	Sprayed structures					% Population Protected
					Spray Coverage (%)	Insecticide Usage Rate (IUR)	Population Protected	Pregnant Women Protected	Children <5 years old Protected	
	Nabukalu	12,335	48,148	11,088	89.9	2.2	46,030	1,424	10,188	95.6
	Nankoma	11,652	45,882	10,437	89.6	2.0	42,198	1,063	9,122	92.0
Bugiri Total		129,553	486,572	117,578	90.8	2.1	458,308	14,429	96,649	94.2
Butaleja	Budumba	5,327	22,742	5,219	98.0	2.3	22,438	649	5,003	98.7
	Busaba	8,974	36,924	8,534	95.1	2.3	35,847	1,385	8,170	97.1
	Busabi	4,893	20,161	4,784	97.8	2.2	19,850	554	3,997	98.5
	Busolwe	4,133	17,566	4,029	97.5	2.7	17,319	413	3,801	98.6
	Busolwe	3,034	12,977	2,930	96.6	2.3	12,609	363	2,570	97.2
	Butaleja	3,896	17,275	3,851	98.8	2.3	17,167	520	3,608	99.4
	Butaleja TC	5,267	22,711	5,262	99.9	2.3	22,694	640	4,682	99.9
	Himutu	4,821	18,959	4,794	99.4	2.5	18,923	593	4,121	99.8
	Kachonga	6,181	28,912	5,924	95.8	2.2	28,096	941	7,090	97.2
	Mazimasa	7,714	33,105	7,459	96.7	2.2	32,675	965	6,890	98.7
	Nawanjofu	6,128	26,815	6,065	99.0	2.1	26,613	798	5,943	99.2
	Naweyo	8,775	35,945	8,516	97.0	2.2	35,471	1,053	7,756	98.7
Butaleja Total		69,143	294,092	67,367	97.4	2.3	289,702	8,874	63,631	98.5
Butebo	Butebo	7,729	30,065	7,581	98.1	2.5	29,826	1,253	6,327	99.2
	Butebo TC	4,151	15,210	4,047	97.5	2.6	15,104	681	3,226	99.3
	Kabwangasi	8,527	37,051	8,228	96.5	2.6	36,434	1,091	7,746	98.3
	Kakoro	7,164	23,614	6,592	92.0	2.3	22,379	635	4,318	94.8
	Kanginima	4,488	13,656	4,131	92.0	2.3	12,927	362	2,176	94.7
	Petete	8,754	35,527	8,648	98.8	2.4	35,432	1,218	7,345	99.7
Butebo Total		40,813	155,123	39,227	96.1	2.4	152,102	5,240	31,138	98.1
Dokolo	Adeknino	3,521	7,871	3,402	96.6	2.4	7,683	141	1,347	97.6
	Adok	14,341	35,982	13,131	91.6	2.8	33,712	705	6,423	93.7
	Agwata	8,198	22,014	7,558	92.2	2.3	21,412	358	3,358	97.3
	Amwoma	6,748	17,789	6,181	91.6	2.2	16,700	304	2,709	93.9
	Bata	8,098	21,771	6,739	83.2	2.3	18,536	394	2,947	85.1
	Dokolo	5,840	16,491	5,618	96.2	2.4	16,072	324	2,949	97.5

District	Sub-county	Structures Found	Population Found	Structures sprayed	Sprayed structures					% Population Protected
					Spray Coverage (%)	Insecticide Usage Rate (IUR)	Population Protected	Pregnant Women Protected	Children <5 years old Protected	
	Dokolo T/C	7,402	19,258	6,864	92.7	2.3	18,055	339	2,726	93.8
	Kangai	6,404	18,377	6,313	98.6	2.3	18,173	371	2,767	98.9
	Kwera	7,010	17,531	6,912	98.6	2.4	17,429	287	2,749	99.4
	Okwalongwen	5,469	13,363	5,096	93.2	2.4	12,818	272	2,034	95.9
	Okwongodul	7,441	17,898	7,405	99.5	2.3	17,850	312	2,880	99.7
Dokolo Total		80,472	208,345	75,219	93.5	2.4	198,440	3,807	32,889	95.2
Kaberamaido	Alwa	9,325	27,158	9,034	96.9	2.4	26,550	392	4,511	97.8
	Anyara	10,850	28,718	10,390	95.8	2.6	27,731	636	5,527	96.6
	Apapai	4,519	12,249	4,408	97.5	2.7	11,982	248	2,285	97.8
	Aperkira	5,260	15,778	5,158	98.1	2.4	15,525	255	3,053	98.4
	Bululu	9,277	27,194	9,073	97.8	2.6	26,739	601	5,151	98.3
	Kaberamaido	8,635	22,281	8,582	99.4	2.5	22,169	401	3,587	99.5
	Kaberamaido TC	2,027	7,098	1,971	97.2	3.1	6,976	131	948	98.3
	Kakure	3,939	11,989	3,557	90.3	2.5	11,070	236	2,256	92.3
	Kalaki	6,921	20,767	6,007	86.8	2.4	18,772	396	3,622	90.4
	Kobulubulu	8,387	24,592	7,595	90.6	2.3	22,907	486	4,311	93.1
	Ochero	9,458	26,954	9,282	98.1	2.6	26,563	554	5,137	98.5
Otuboi	10,211	28,983	9,101	89.1	2.6	26,524	485	4,951	91.5	
Kaberamaido Total		88,809	253,761	84,158	94.8	2.5	243,508	4,821	45,339	96.0
Kibuku	Bulangira	7,055	26,339	6,279	89.0	2.4	24,444	642	5,121	92.8
	Buseta	6,466	24,739	5,505	85.1	2.6	22,898	723	5,022	92.6
	Kabweri	5,334	20,503	4,940	92.6	2.6	19,575	566	4,012	95.5
	Kadama	6,318	26,158	5,989	94.8	2.1	25,130	952	5,291	96.1
	Kagumu	7,212	28,206	6,608	91.6	2.3	26,822	797	5,828	95.1
	Kasasira	8,306	35,436	7,719	92.9	2.4	34,163	1,404	7,695	96.4
	Kibuku	4,213	16,584	3,890	92.3	2.5	15,845	505	3,205	95.5
	Kibuku TC	3,388	12,970	3,161	93.3	2.5	12,272	378	2,526	94.6
	Kirika	7,304	27,808	7,021	96.1	2.5	27,165	882	5,393	97.7
Tirinyi	10,174	40,701	9,020	88.7	2.4	38,609	1,209	8,069	94.9	

District	Sub-county	Structures Found	Population Found	Structures sprayed	Sprayed structures					% Population Protected
					Spray Coverage (%)	Insecticide Usage Rate (IUR)	Population Protected	Pregnant Women Protected	Children <5 years old Protected	
Kibuku Total		65,770	259,444	60,132	91.4	2.4	246,923	8,058	52,162	95.2
Lira	Adekokwok	11,721	37,499	9,145	78.0	2.5	30,683	474	4,067	81.8
	Adyel Division	13,332	50,580	10,307	77.3	2.2	40,354	1,527	5,524	79.8
	Agali	10,126	27,586	7,532	74.4	2.3	21,137	381	3,636	76.6
	Agweng	16,067	41,644	15,574	96.9	2.5	40,609	874	7,003	97.5
	Amach	17,875	45,918	13,536	75.7	2.8	35,844	585	5,042	78.1
	Aromo	18,372	49,556	16,507	89.8	2.4	45,233	1,041	8,182	91.3
	Barr	16,269	43,186	13,865	85.2	2.6	37,668	606	5,931	87.2
	Central Division	5,857	30,417	5,310	90.7	3.0	28,889	759	2,346	95.0
	Lira	14,557	45,536	11,094	76.2	2.2	34,856	984	4,703	76.5
	Ngetta	13,418	35,944	12,181	90.8	2.8	32,936	493	4,520	91.6
	Ogur	15,484	43,156	14,435	93.2	2.8	40,982	640	7,086	95.0
	Ojwina	13,124	45,049	10,299	78.5	1.9	37,053	1,484	5,534	82.3
Railways Division	6,356	23,306	5,106	80.3	2.1	20,071	824	2,549	86.1	
Lira Total		172,558	519,377	144,891	84.0	2.4	446,315	10,672	66,123	85.9
Namutumba	Bugobi	8,546	35,042	8,223	96.2	2.2	34,336	1,187	7,266	98.0
	Bulange	8,598	36,797	8,563	99.6	2.4	36,715	1,180	7,309	99.8
	Ivukula	8,705	35,811	7,921	91.0	2.1	34,575	999	7,062	96.5
	Kagulu	3,033	12,285	2,965	97.8	2.5	12,160	333	2,454	99.0
	Kibaale	6,174	26,616	6,137	99.4	2.4	26,508	877	5,324	99.6
	Kiwanyi	4,458	19,434	4,422	99.2	2.2	19,366	702	3,691	99.7
	Kizuba	7,028	28,582	6,576	93.6	2.2	27,410	843	5,974	95.9
	Magada	4,383	19,325	4,360	99.5	2.5	19,223	567	3,969	99.5
	Mazuba	3,368	16,757	3,325	98.7	2.1	16,637	518	3,754	99.3
	Nabweyo	6,660	27,334	6,607	99.2	2.3	27,188	1,096	5,668	99.5
	Namutumba	6,462	25,236	6,439	99.6	2.4	25,167	758	4,871	99.7
	Namutumba TC	8,468	32,446	8,294	97.9	2.5	31,883	1,125	5,682	98.3
Nangonde	5,500	21,988	5,167	93.9	2.4	21,071	686	4,052	95.8	

District	Sub-county	Structures Found	Population Found	Structures sprayed	Sprayed structures					% Population Protected
					Spray Coverage (%)	Insecticide Usage Rate (IUR)	Population Protected	Pregnant Women Protected	Children <5 years old Protected	
	Nawaikona	3,835	16,307	3,717	96.9	2.2	15,966	436	2,813	97.9
	Nsinze	4,086	16,994	3,963	97.0	2.3	16,661	499	2,936	98.0
Namutumba Total		89,304	370,954	86,679	97.1	2.3	364,866	11,806	72,825	98.4
Otuke	Adwari	3,914	10,592	3,872	98.9	2.7	10,514	171	2,016	99.3
	Alango	6,544	17,818	6,228	95.2	2.9	17,200	231	2,462	96.5
	Ogor	6,246	17,512	6,200	99.3	3.1	17,406	381	3,499	99.4
	Ogwete	5,616	17,526	5,612	99.9	2.8	17,514	432	4,054	99.9
	Okwang	9,098	24,770	8,922	98.1	2.7	24,404	468	4,631	98.5
	Olilim	5,526	15,958	5,494	99.4	2.8	15,889	389	3,245	99.6
	Orum	3,732	10,009	3,669	98.3	2.7	9,869	194	1,792	98.6
	Otuke TC	2,166	6,113	2,123	98.0	2.6	6,032	101	957	98.7
Otuke Total		42,842	120,298	42,120	98.3	2.8	118,828	2,367	22,656	98.8
Pallisa	Agule	6,493	26,151	6,241	96.1	2.4	25,445	800	5,353	97.3
	Akisim	3,983	15,282	3,388	85.1	2.0	13,708	351	2,761	89.7
	Aponong	8,570	34,595	7,938	92.6	2.1	32,987	959	7,197	95.4
	Chelekura	3,829	16,201	3,625	94.7	2.3	15,692	460	2,949	96.9
	Gogonyo	10,091	37,673	9,667	95.8	2.7	36,403	1,258	7,985	96.6
	Kameke	7,263	25,485	7,079	97.5	2.7	24,934	913	4,730	97.8
	Kamuge	6,227	25,392	5,338	85.7	2.1	23,110	665	4,897	91.0
	Kasodo	5,623	20,153	5,250	93.4	2.7	19,089	477	3,467	94.7
	Kibale	4,867	17,376	4,789	98.4	2.4	17,196	524	3,659	99.0
	Olok	4,821	19,591	4,683	97.1	2.0	19,234	500	4,085	98.2
	Opwateta	5,572	20,341	5,422	97.3	2.5	19,866	708	4,281	97.7
	Pallisa	5,798	21,805	5,426	93.6	2.4	20,654	836	4,159	94.7
	Pallisa TC	12,252	43,744	10,940	89.3	2.5	40,568	1,102	5,992	92.7
Puti-Puti	9,180	33,103	8,437	91.9	2.4	30,904	1,215	6,582	93.4	
Pallisa Total		94,569	356,892	88,223	93.3	2.3	339,790	10,768	68,097	95.2
Serere	Atira	8,318	25,036	7,975	95.9	2.5	24,316	503	4,579	97.1
	Bugondo	14,416	43,632	14,163	98.2	2.3	43,045	974	8,825	98.7

District	Sub-county	Structures Found	Population Found	Structures sprayed	Sprayed structures					% Population Protected
					Spray Coverage (%)	Insecticide Usage Rate (IUR)	Population Protected	Pregnant Women Protected	Children <5 years old Protected	
Serere	Kadungulu	12,245	40,423	11,951	97.6	2.3	39,815	1,105	9,235	98.5
	Kasilo TC	1,528	5,008	1,479	96.8	2.3	4,879	118	841	97.4
	Kateta	20,881	70,060	20,093	96.2	2.7	68,055	1,750	15,073	97.1
	Kyere	19,439	61,275	18,651	95.9	2.4	59,254	1,352	12,122	96.7
	Labori	7,780	26,136	7,310	94.0	2.6	25,000	752	5,850	95.7
	Olio	11,101	34,222	10,531	94.9	2.6	32,892	626	6,191	96.1
	Pingire	14,543	46,096	13,722	94.4	2.5	44,044	1,193	9,013	95.5
	Serere TC	4,251	14,011	4,105	96.6	2.4	13,705	176	1,468	97.8
Serere Total		114,502	365,899	109,980	96.1	2.5	355,005	8,549	73,197	97.0
Tororo	Eastern Division	6,123	27,925	5,942	97.0	2.6	27,130	1,071	3,960	97.2
	Iyolwa	7,682	28,877	7,308	95.1	2.4	28,311	711	5,641	98.0
	Kirewa	10,312	36,806	9,715	94.2	2.6	35,323	918	6,610	96.0
	Kisoko	5,735	21,978	5,561	97.0	2.3	21,553	461	3,810	98.1
	Kwapa	9,839	31,254	8,778	89.2	2.3	28,206	584	4,698	90.2
	Magola	7,161	24,246	6,506	90.9	2.3	22,893	556	4,047	94.4
	Malaba	5,929	20,004	4,722	79.6	2.6	16,920	411	2,777	84.6
	Mella	6,507	21,395	5,983	91.9	2.5	20,136	350	3,551	94.1
	Merikit	9,121	34,186	8,069	88.5	2.3	31,488	634	5,652	92.1
	Molo	6,663	21,679	5,697	85.5	2.6	19,760	397	3,341	91.1
	Mukuju	11,329	39,050	10,763	95.0	2.2	37,603	722	7,138	96.3
	Mulanda	13,306	48,673	12,774	96.0	2.3	47,074	1,292	9,564	96.7
	Nabuyoga	10,124	37,311	9,231	91.2	2.3	35,641	875	7,621	95.5
	Nagongera	8,732	31,493	7,752	88.8	2.0	28,623	670	5,694	90.9
	Nagongera TC	4,309	14,922	4,177	96.9	2.4	14,557	346	2,847	97.6
	Osukuru	16,410	53,485	14,247	86.8	2.5	47,971	964	8,773	89.7
	Paya	10,846	39,347	10,168	93.7	2.3	38,050	1,072	7,742	96.7
Petta	5,774	20,271	5,182	89.7	2.2	18,800	418	3,616	92.7	
Rubongi	12,381	44,699	11,769	95.1	2.6	42,831	1,131	7,435	95.8	
Sopsop	4,473	16,385	4,423	98.9	3.0	16,242	422	3,410	99.1	

District	Sub-county	Structures Found	Population Found	Structures sprayed	Sprayed structures					% Population Protected
					Spray Coverage (%)	Insecticide Usage Rate (IUR)	Population Protected	Pregnant Women Protected	Children <5 years old Protected	
	Western Division	5,595	22,227	5,553	99.2	3.9	22,074	585	3,187	99.3
Tororo Total		178,351	636,213	164,320	92.1	2.5	601,186	14,590	111,114	94.5
Grand Total		1,393,562	4,725,791	1,291,569	92.7	2.4	4,479,157	119,077	862,536	

ANNEX I: NUMBER AND USE OF MOSQUITO NETS IN 2019 SPRAY CAMPAIGN

District	Sub-county	Total # of Mosquito Nets Found	Average # Nets/ Sleeping Structure	# of Children <5 Sleeping Under Mosquito Nets	% < 5 Sleeping under Net
Alebtong	Abako	7,498	0.6	2,663	35.5
	Abia	6,139	0.6	1,996	32.5
	Akura	6,368	0.7	2,042	32.1
	Alebtong TC	2,064	0.8	616	29.8
	Aloi	10,029	0.9	3,239	32.3
	Amugu	5,753	0.6	2,205	38.3
	Apala	6,265	0.7	2,028	32.4
	Awei	7,152	0.8	2,431	34.0
	Omoro	15,106	0.8	5,907	39.1
Alebtong Total		66,374	0.7	23,127	34.8
Amolatar	Agikdak	4,920	1.0	1,779	36.2
	Agwingiri	8,264	1.2	2,381	28.8
	Akwon	4,087	1.3	1,342	32.8
	Amaolatar TC	4,447	1.0	1,380	31.0
	Aputi	7,453	1.3	2,443	32.8
	Arwotcek	9,476	1.2	3,057	32.3
	Awelo	7,187	1.1	2,010	28.0
	Etam	8,278	1.2	2,676	32.3
	Muntu	5,323	1.0	1,834	34.5
	Namasale	8,983	1.1	3,147	35.0
	Namasale TC	3,072	0.8	1,123	36.6
Amolatar Total		71,490	1.1	23,172	32.4

District	Sub-county	Total # of Mosquito Nets Found	Average # Nets/ Sleeping Structure	# of Children <5 Sleeping Under Mosquito Nets	% < 5 Sleeping under Net
Budaka	Budaka	5,167	1.6	2,162	41.8
	Budaka TC	10,926	2.2	3,261	29.8
	Iki-iki	1,665	1.9	650	39.0
	Iki-iki TC	5,086	1.8	1,823	35.8
	Kabuna	2,380	1.4	1,005	42.2
	Kachomo	9,535	1.7	3,698	38.8
	Kaderuna	4,962	1.4	2,309	46.5
	Kadimukoli	4,265	1.5	1,963	46.0
	Kakoli	2,620	1.6	1,251	47.7
	Kakule	4,864	1.4	2,348	48.3
	Kameruka	5,587	1.3	2,576	46.1
	Kamonkoli	1,436	1.5	490	34.1
	Kamonkoli TC	3,740	1.7	1,079	28.9
	Katira	4,772	1.6	2,175	45.6
	Lyama	4,445	1.4	2,416	54.4
	Mugiti	4,952	1.4	1,939	39.2
	Naboa	5,882	1.7	2,328	39.6
	Nansanga	4,521	1.5	1,991	44.0
Tademeru	3,223	1.6	1,699	52.7	
Budaka Total		90,028	1.6	37,163	41.3
Bugiri	Budhaya	12,091	1.2	6,003	49.6
	Bugiri TC	20,506	1.8	5,685	27.7
	Bulesa	14,418	1.2	5,910	41.0
	Bulidha	10,016	1.2	4,861	48.5
	Buluguyi	11,321	1.2	5,661	50.0
	Buwunga	17,643	1.5	7,232	41.0
	Iwemba	8,274	1.3	3,765	45.5
	Kapyanga	17,535	1.3	7,251	41.4
	Muterere	15,527	1.3	6,204	40.0
	Nabukalu	14,095	1.3	6,992	49.6
	Nankoma	14,885	1.4	6,503	43.7

District	Sub-county	Total # of Mosquito Nets Found	Average # Nets/ Sleeping Structure	# of Children <5 Sleeping Under Mosquito Nets	% < 5 Sleeping under Net
Bugiri Total		156,311	1.3	66,067	42.3
Butaleja	Budumba	7,258	1.4	3,519	48.5
	Busaba	11,776	1.4	5,159	43.8
	Busabi	3,951	0.8	1,722	43.6
	Busolwe	3,907	1.0	1,840	47.1
	Busolwe	3,839	1.3	1,449	37.7
	Butaleja	4,160	1.1	1,823	43.8
	Butaleja TC	7,256	1.4	3,025	41.7
	Himutu	5,305	1.1	2,486	46.9
	Kachonga	7,444	1.3	4,231	56.8
	Mazimasa	10,992	1.5	5,178	47.1
	Nawanjofu	5,001	0.8	2,427	48.5
	Naweyo	10,006	1.2	4,847	48.4
Butaleja Total		80,895	1.2	37,706	46.6
Butebo	Butebo	8,487	1.1	4,046	47.7
	Butebo TC	5,343	1.3	2,305	43.1
	Kabwangasi	11,696	1.4	4,380	37.4
	Kakoro	6,884	1.0	2,773	40.3
	Kanginima	2,493	0.6	954	38.3
	Petete	11,369	1.3	4,824	42.4
Butebo Total		46,272	1.2	19,282	41.7
Dokolo	Adeknino	3,288	1.0	773	23.5
	Adok	12,291	0.9	3,834	31.2
	Agwata	10,817	1.4	2,587	23.9
	Amwoma	6,461	1.0	1,642	25.4
	Bata	6,704	1.0	1,916	28.6
	Dokolo	5,374	1.0	1,911	35.6
	Dokolo T/C	6,008	0.9	1,587	26.4
	Kangai	7,046	1.1	1,795	25.5
	Kwera	8,145	1.2	1,743	21.4
	Okwalongwen	3,570	0.7	826	23.1

District	Sub-county	Total # of Mosquito Nets Found	Average # Nets/ Sleeping Structure	# of Children <5 Sleeping Under Mosquito Nets	% < 5 Sleeping under Net
	Okwongodul	8,340	1.1	2,009	24.1
Dokolo Total		78,044	1.0	20,623	26.4
Kaberamaido	Alwa	9,406	1.0	3,018	32.1
	Anyara	9,130	0.9	3,527	38.6
	Apapai	4,612	1.0	1,736	37.6
	Aperkira	6,957	1.3	2,487	35.7
	Bululu	12,966	1.4	4,205	32.4
	Kaberamaido	7,613	0.9	2,267	29.8
	Kaberamaido TC	2,426	1.2	524	21.6
	Kakure	4,433	1.2	1,614	36.4
	Kalaki	8,086	1.3	2,933	36.3
	Kobulubulu	9,710	1.3	3,272	33.7
	Ochero	11,421	1.2	3,934	34.4
	Otuboi	9,611	1.1	3,428	35.7
Kaberamaido Total		96,371	1.1	32,945	34.2
Kibuku	Bulangira	8,605	1.4	3,485	40.5
	Buseta	8,202	1.5	3,314	40.4
	Kabweri	7,373	1.5	2,607	35.4
	Kadama	9,782	1.6	4,256	43.5
	Kagumu	8,944	1.4	3,883	43.4
	Kasasira	12,460	1.6	5,580	44.8
	Kibuku	5,676	1.5	2,384	42.0
	Kibuku TC	4,874	1.5	1,927	39.5
	Kirika	11,686	1.7	4,099	35.1
	Tirinyi	12,637	1.4	5,054	40.0
Kibuku Total		90,239	1.5	36,589	40.5
Lira	Adekokwok	14,828	1.6	3,215	21.7
	Adyel Division	20,329	2.0	4,974	24.5
	Agali	7,895	1.0	2,485	31.5
	Agweng	10,788	0.7	3,813	35.3
	Amach	15,121	1.1	3,559	23.5

District	Sub-county	Total # of Mosquito Nets Found	Average # Nets/ Sleeping Structure	# of Children <5 Sleeping Under Mosquito Nets	% < 5 Sleeping under Net
	Aromo	12,980	0.8	5,095	39.3
	Barr	12,743	0.9	3,621	28.4
	Central Division	14,997	2.8	1,813	12.1
	Lira	14,583	1.3	3,277	22.5
	Ngetta	9,901	0.8	2,415	24.4
	Ogur	12,191	0.8	4,421	36.3
	Ojwina	13,860	1.3	4,128	29.8
	Railways Division	10,310	2.0	1,927	18.7
Lira Total		170,526	1.2	44,743	26.2
Namutumba	Bugobi	11,791	1.4	4,575	38.8
	Bulange	13,049	1.5	4,975	38.1
	Ivukula	14,409	1.8	5,745	39.9
	Kagulu	4,851	1.6	1,610	33.2
	Kibaale	8,022	1.3	2,946	36.7
	Kiwanyi	5,925	1.3	2,194	37.0
	Kizuba	7,717	1.2	3,135	40.6
	Magada	6,534	1.5	2,553	39.1
	Mazuba	5,767	1.7	2,530	43.9
	Nabweyo	8,917	1.3	3,217	36.1
	Namutumba	7,924	1.2	3,272	41.3
	Namutumba TC	9,124	1.1	2,778	30.4
	Nangonde	7,900	1.5	2,779	35.2
	Nawaikona	6,563	1.8	1,666	25.4
	Nsinze	6,569	1.7	1,798	27.4
Namutumba Total		125,062	1.4	45,773	36.6
Otuke	Adwari	4,160	1.1	1,518	36.5
	Alango	6,754	1.1	1,698	25.1
	Ogor	,837	0.9	2,237	38.3
	Ogwete	3,770	0.7	1,983	52.6
	Okwang	8,581	1.0	3,147	36.7
	Olilim	4,811	0.9	2,027	42.1

District	Sub-county	Total # of Mosquito Nets Found	Average # Nets/ Sleeping Structure	# of Children <5 Sleeping Under Mosquito Nets	% < 5 Sleeping under Net
	Orum	3,333	0.9	1,110	33.3
	Otuke TC	2,339	1.1	644	27.5
Otuke Total		39,585	0.9	14,364	36.3
Pallisa	Agule	11,946	1.9	4,552	38.1
	Akisim	4,942	1.5	1,934	39.1
	Apopong	13,343	1.7	5,651	42.4
	Chelekura	8,428	2.3	2,696	32.0
	Gogonyo	15,965	1.7	6,692	41.9
	Kameke	11,158	1.6	3,863	34.6
	Kamuge	8,155	1.5	3,528	43.3
	Kasodo	7,690	1.5	2,342	30.5
	Kibale	7,747	1.6	2,933	37.9
	Olok	8,645	1.8	3,494	40.4
	Opwateta	8,041	1.5	3,483	43.3
	Pallisa	7,944	1.5	3,235	40.7
	Pallisa TC	17,606	1.6	4,424	25.1
	Puti-Puti	10,593	1.3	4,629	43.7
Pallisa Total		142,203	1.6	53,456	37.6
Serere	Atira	10,601	1.3	3,275	30.9
	Bugondo	19,699	1.4	7,240	36.8
	Kadungulu	18,727	1.6	8,074	43.1
	Kasilo TC	2,249	1.5	697	31.0
	Kateta	1,834	1.6	13,315	41.8
	Kyere	27,238	1.5	9,898	36.3
	Labori	8,572	1.2	3,921	45.7
	Olio	14,470	1.4	4,851	33.5
	Pingire	19,465	1.4	7,129	36.6
	Serere TC	7,572	1.8	1,079	14.2
Serere Total		160,427	1.5	59,479	37.1

District	Sub-county	Total # of Mosquito Nets Found	Average # Nets/ Sleeping Structure	# of Children <5 Sleeping Under Mosquito Nets	% < 5 Sleeping under Net
Tororo	Eastern Division	15,096	2.5	3,071	20.3
	Iyolwa	11,166	1.5	4,694	42.0
	Kirewa	10,004	1.0	4,431	44.3
	Kisoko	8,098	1.5	2,994	37.0
	Kwapa	13,887	1.6	4,172	30.0
	Magola	9,499	1.5	3,312	34.9
	Malaba	6,674	1.4	2,100	31.5
	Mella	8,643	1.4	2,770	32.0
	Merikit	11,676	1.4	4,149	35.5
	Molo	8,423	1.5	2,696	32.0
	Mukuju	15,801	1.5	5,651	35.8
	Mulanda	17,198	1.3	7,208	41.9
	Nabuyoga	11,890	1.3	5,440	45.8
	Nagongera	10,552	1.4	4,453	42.2
	Nagongera TC	5,542	1.3	2,332	42.1
	Osukuru	19,373	1.4	6,904	35.6
	Paya	12,312	1.2	5,408	43.9
	Petta	8,003	1.5	3,190	39.9
	Rubongi	15,682	1.3	5,283	33.7
	Sopsop	5,671	1.3	2,545	44.9
Western Division	9,799	1.8	2,314	23.6	
Tororo Total		234,989	1.4	85,117	36.2
Grand Total		1,648,816	1.3	599,606	36.4

ANNEX J: INSECTICIDE USE AND SPRAY OPERATOR PERFORMANCE

District	Sub-county	Spray Operator Performance	Bottle Use and Distribution	
		Average # of Unit Structures per Spray Operator per Day	Average # of Bottles per Spray Operator per Day	Average # of Structures Sprayed per Bottle
Alebtong	Abako	9.9	3.8	2.6
	Abia	11.1	4.7	2.4
	Akura	10.3	4.1	2.5
	Alebtong TC	9.1	3.5	2.6
	Aloi	9.8	3.9	2.5
	Amugu	9.7	3.5	2.6
	Apala	10.2	4.3	2.4
	Awei	9.1	3.7	2.4
	Omoro	11.6	4.4	2.6
Alebtong Total		10.3	4.1	2.5
Amolatar	Agikdak	11.5	4.5	2.6
	Agwingiri	9.9	4.1	2.5
	Akwon	9.7	3.8	2.4
	Amaolatar TC	11.4	4.2	2.7
	Aputi	10.1	4.4	2.3
	Arwotcek	10.9	4.5	2.5
	Awelo	11.6	4.3	2.6
	Etam	10.5	4.1	2.6
	Muntu	9.7	3.8	2.4
	Namasale	9.7	3.9	2.5
	Namasale TC	9.3	3.4	2.9
Amolatar Total		10.4	4.1	2.5

District	Sub-county	Spray Operator Performance	Bottle Use and Distribution	
		Average # of Unit Structures per Spray Operator per Day	Average # of Bottles per Spray Operator per Day	Average # of Structures Sprayed per Bottle
Budaka	Budaka	9.2	4.4	2.1
	Budaka TC	6.8	2.7	2.6
	Iki-iki	5.6	3.6	2.4
	Iki-iki TC	5.6	3.6	2.2
	Kabuna	10.4	3.9	2.4
	Kachomo	10.4	4.3	2.4
	Kaderuna	10.4	2.6	2.7
	Kadimukoli	3.9	1.8	2.1
	Kakoli	5.6	3.6	2.7
	Kakule	9.4	3.7	2.5
	Kameruka	9.5	4.7	2.0
	Kamonkoli	4.1	2.0	2.0
	Kamonkoli TC	4.1	2.0	2.1
	Katira	7.6	3.1	2.5
	Lyama	8.8	4.1	2.1
	Mugiti	10.2	4.5	2.3
	Naboa	9.8	3.6	2.8
	Nansanga	10.6	4.1	2.6
Tademeru	8.8	4.1	2.3	
Budaka Total		9.0	3.9	2.3
Bugiri	Budhaya	9.9	4.6	2.3
	Bugiri TC	8.2	3.5	2.4
	Bulesa	9.0	4.3	2.2
	Bulidha	8.5	4.0	2.2
	Buluguyi	8.8	4.3	2.1
	Buwunga	13.8	6.9	2.1
	Iwemba	9.1	4.7	2.0
	Kapyanga	8.4	4.4	2.0

District	Sub-county	Spray Operator Performance	Bottle Use and Distribution	
		Average # of Unit Structures per Spray Operator per Day	Average # of Bottles per Spray Operator per Day	Average # of Structures Sprayed per Bottle
	Muterere	10.1	4.6	2.3
	Nabukalu	8.9	4.3	2.2
	Nankoma	8.9	4.8	2.0
Bugiri Total		10.9	5.3	2.1
Butaleja	Budumba	7.7	3.6	2.3
	Busaba	8.8	3.9	2.3
	Busabi	7.4	3.5	2.2
	Busolwe	8.5	3.3	2.7
	Busolwe	6.5	3.0	2.3
	Butaleja	7.7	3.5	2.3
	Butaleja TC	8.1	3.7	2.3
	Himutu	8.0	3.4	2.5
	Kachonga	6.1	3.0	2.2
	Mazimasa	11.1	5.1	2.2
	Nawanjofu	9.7	5.0	2.1
Naweyo	13.1	6.1	2.2	
Butaleja Total		8.5	3.9	2.3
Butebo	Butebo	8.0	3.4	2.5
	Butebo TC	8.1	3.3	2.6
	Kabwangasi	9.1	3.7	2.6
	Kakoro	9.4	4.3	2.3
	Kanginima	9.2	4.2	2.3
	Petete	9.9	4.3	2.4
Butebo Total		9.0	3.9	2.4
Dokolo	Adeknino	3.9	1.6	2.4
	Adok	18.2	7.0	2.8
	Agwata	9.8	3.6	2.3
	Amwoma	11.2	6.6	2.2

District	Sub-county	Spray Operator Performance	Bottle Use and Distribution	
		Average # of Unit Structures per Spray Operator per Day	Average # of Bottles per Spray Operator per Day	Average # of Structures Sprayed per Bottle
	Bata	10.8	4.7	2.3
	Dokolo	9.8	4.2	2.4
	Dokolo T/C	9.9	4.4	2.3
	Kangai	11.4	4.9	2.3
	Kwera	10.7	4.5	2.4
	Okwalongwen	10.6	4.6	2.4
	Okwongodul	13.4	6.0	2.3
Dokolo Total		10.7	4.6	2.4
Kaberamaido	Alwa	10.5	4.1	2.4
	Anyara	9.8	3.7	2.6
	Apapai	10.2	3.6	2.7
	Aperkira	10.2	4.1	2.4
	Bululu	11.1	4.2	2.6
	Kaberamaido	10.7	4.0	2.5
	Kaberamaido TC	10.7	4.0	3.1
	Kakure	7.4	3.0	2.5
	Kalaki	9.3	3.8	2.4
	Kobulubulu	10.2	4.3	2.3
	Ochero	10.7	3.8	2.6
Otuboi	9.2	3.5	2.6	
Kaberamaido Total		10.0	3.8	2.5
Kibuku	Bulangira	9.3	4.2	2.4
	Buseta	10.0	4.1	2.6
	Kabweri	10.4	4.1	2.6
	Kadama	9.6	4.7	2.1
	Kagumu	8.0	3.7	2.3
	Kasasira	9.4	4.0	2.4
	Kibuku	9.7	4.0	2.5

District	Sub-county	Spray Operator Performance	Bottle Use and Distribution	
		Average # of Unit Structures per Spray Operator per Day	Average # of Bottles per Spray Operator per Day	Average # of Structures Sprayed per Bottle
	Kibuku TC	9.7	4.2	2.5
	Kirika	8.5	3.6	2.5
	Tirinyi	15.7	7.0	2.4
Kibuku Total		9.1	4.0	2.4
Lira	Adekokwok	9.1	3.5	2.5
	Adyel Division	8.6	3.7	2.2
	Agali	10.5	4.3	2.3
	Agweng	12.2	4.8	2.5
	Amach	10.4	3.5	2.8
	Aromo	10.0	4.2	2.4
	Barr	9.5	3.7	2.6
	Central Division	13.0	4.5	3.0
	Lira	11.9	5.0	2.2
	Ngetta	11.3	4.0	2.8
	Ogur	10.4	3.8	2.8
	Ojwina	5.7	3.0	1.9
Railways Division	7.6	3.2	2.1	
Lira Total		9.7	3.9	2.4
Namutumba	Bugobi	9.7	4.2	2.2
	Bulange	9.7	2.1	2.4
	Ivukula	7.4	3.4	2.1
	Kagulu	5.9	2.5	2.5
	Kibaale	18.9	4.2	2.4
	Kiwanyi	6.6	3.2	2.2
	Kizuba	10.1	4.7	2.2
	Magada	12.3	5.2	2.5
	Mazuba	12.3	5.2	2.1
	Nabweyo	18.9	4.3	2.3

District	Sub-county	Spray Operator Performance	Bottle Use and Distribution	
		Average # of Unit Structures per Spray Operator per Day	Average # of Bottles per Spray Operator per Day	Average # of Structures Sprayed per Bottle
	Namutumba	6.8	3.0	2.4
	Namutumba TC	9.2	3.9	2.5
	Nangonde	7.4	3.4	2.4
	Nawaikona	9.6	5.4	2.2
	Nsinze	9.6	5.4	2.3
Namutumba Total		9.3	4.3	2.3
Otuke	Adwari	9.0	3.4	2.7
	Alango	9.6	3.3	2.9
	Ogor	10.3	3.4	3.1
	Ogwete	6.2	2.2	2.8
	Okwang	16.9	6.2	2.7
	Olilim	9.5	3.4	2.8
	Orum	9.0	3.5	2.7
	Otuke TC	8.8	3.4	2.6
Otuke Total		9.7	3.5	2.8
Pallisa	Agule	8.3	3.6	2.4
	Akisim	12.3	6.4	2.0
	Apopong	8.8	4.4	2.1
	Chelekura	8.1	3.7	2.3
	Gogonyo	9.9	3.9	2.7
	Kameke	10.9	4.2	2.7
	Kamuge	8.2	4.1	2.1
	Kasodo	9.5	3.7	2.7
	Kibale	8.3	3.6	2.4
	Olok	8.5	4.6	2.0
	Opwateta	10.3	4.4	2.5
	Pallisa	8.0	3.5	2.4
	Pallisa TC	9.3	4.0	2.5

District	Sub-county	Spray Operator Performance	Bottle Use and Distribution	
		Average # of Unit Structures per Spray Operator per Day	Average # of Bottles per Spray Operator per Day	Average # of Structures Sprayed per Bottle
	Puti-Puti	10.5	4.7	2.4
Pallisa Total		9.3	4.1	2.3
Serere	Atira	9.8	3.9	2.5
	Bugondo	10.4	4.4	2.3
	Kadungulu	10.0	4.3	2.3
	Kasilo TC	10.3	4.5	2.3
	Kateta	10.2	3.6	2.7
	Kyere	10.5	4.4	2.4
	Labori	10.5	4.1	2.6
	Olio	10.4	4.0	2.6
	Pingire	9.9	3.9	2.5
	Serere TC	10.7	4.4	2.4
Serere Total		10.2	4.1	2.5
Tororo	Eastern Division	8.5	3.4	2.6
	Iyolwa	10.4	4.8	2.4
	Kirewa	9.7	3.9	2.6
	Kisoko	9.7	4.4	2.3
	Kwapa	11.3	5.1	2.3
	Magola	9.3	4.3	2.3
	Malaba	8.6	3.5	2.6
	Mella	8.9	3.8	2.5
	Merikit	9.5	4.4	2.3
	Molo	9.1	3.8	2.6
	Mukuju	9.8	4.8	2.2
	Mulanda	14.2	6.6	2.3
	Nabuyoga	9.5	4.3	2.3
	Nagongera	14.8	7.0	2.0
	Nagongera TC	5.8	2.4	2.4

District	Sub-county	Spray Operator Performance	Bottle Use and Distribution	
		Average # of Unit Structures per Spray Operator per Day	Average # of Bottles per Spray Operator per Day	Average # of Structures Sprayed per Bottle
	Osukuru	9.2	3.9	2.5
	Paya	9.9	4.5	2.3
	Petta	9.4	4.5	2.2
	Rubongi	10.9	4.4	2.6
	Sopsop	9.3	3.2	3.0
	Western Division	10.1	2.8	3.9
Tororo Total		9.7	4.2	2.5
Grand Total		9.6	4.0	2.4