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THE PMI VECTORLINK PROJECT UGANDA

2018 END OF SPRAY REPORT

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Abt Associates | 6130 Executive Boulevard | Rockville, Maryland 20852
T. +1 301.347.5922 | F. 301.913.9061 | abtassociates.com

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ACRONYMS

BMP	Best Management Practices
CDFU	Communication for Development Foundation Uganda
DCV	Data collection and verification
CFV	Control Flow Valve
DFID	Department for International Development
DHE	District Health Educators
DHT	District Health Team
DEO	District Environment Officer
DOS	Directly observed spraying
EC	Environmental compliance
FAQs	Frequently asked questions
GOU	Government of Uganda
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
NDA	National Drug Authority
NMCP	National Malaria Control Program
ODK	Open Data Kit
PMI	President's Malaria Initiative
PMT	Performance monitoring tracker
PPE	Personal protective equipment
PSECA	Pre-season environmental compliance assessment
RSL	Race to the Starting Line
SBCC	Social and behavior change communication
SMS	Short message service
TC	Town Council
TOT	Training of trainers

USAID
WHO

United States Agency for International Development
World Health Organization

EXECUTIVE SUMMARY

In 2018, the United States Agency for International Development/President's Malaria Initiative (USAID/PMI) VectorLink Uganda project successfully conducted a two-phased indoor residual spraying (IRS) campaign in 15 districts in Uganda using Actellic 300CS (an organophosphate), with each phase lasting 25 operational days. USAID/PMI funds supported spraying for 10 of these districts, while the United Kingdom's Department for International Development (DFID) funds supported spraying in the other five. The project sprayed the eight Phase I districts, Alebtong, Amolatar, Budaka, Butaleja, Butebo, Dokolo, Namutumba and Pallisa, on April 9–May 12, 2018, and the seven Phase II districts, Bugiri, Kaberamaido, Kibuku, Lira, Serere, Otuke and Tororo, on June 11–July 14, 2018. Spraying in two sub counties of Amach and Agali in Lira district was conducted from September 3 – 18 2018. The plan was to give room for organic farmers to harvest and sell their produce. During this campaign, the project targeted 1,287,697 structures for IRS. The project collaborated with the district and national Ministry of Health (MOH) staff in providing supportive supervision during the trainings and spray campaign.

The following are project achievements and key highlights of the 2018 spray campaign (Table 1 shows the details of the spray campaign):

- The project sprayed a total of 1,292,309 structures out of 1,369,305 structures found by spray operators in the 15 IRS target districts, accounting for a coverage rate of 94.4%.
- The project protected 4,436,156 people, including 892,390 (20.1 percent children under five years old and 121,590 (2.7 %) pregnant women.
- The project trained 8,463 individuals, using U.S. government funds, to support vector control activities in the 15 districts. Of these, 6,256 (4,384 males and 1,872 females) were spray operators, 1,267 were team leaders (964 males and 303 females), and 940 were supervisors (732 males and 208 females). Overall, 28.2% (n= 2,383) of all trained IRS personnel with U.S. government funds for the 2018 spray round were female.
- The project used a total of 554,568 bottles of Actellic 300CS to spray 1,292,309 structures in 15 IRS districts, with a utilization ratio of approximately 11:2.3 (bottles to structures sprayed), leaving a balance of 32,724 bottles at the end of the spray round.
- The project will incinerate all IRS insecticide-contaminated wastes, including used masks, at Green Label Ltd, a private incineration plant in Iganga district. Green Label Ltd. will also handle damaged gloves and worn-out boots. Other solid wastes, including empty bottles and assorted plastics, will be recycled at Gentex Enterprise Ltd, while paper cartons will be recycled at Pulp and Paper Mills Ltd.
- The project conducted wall bioassays within one week of spraying to assess the quality of spraying in the target districts, and these recorded 100% mortalities for susceptible *An. gambiae* s.s. The average mortality at one and two months post spray was 100%. This implies that the quality of spraying was satisfactory.

TABLE 1: 2018 IRS CAMPAIGN SUMMARY RESULTS

	DFID	PMI
Insecticide used	Organophosphate (Actellic 300 CS)	
Number of districts covered by PMI/DFID-supported IRS	5	10
Number of structures found by spray operators	361,196	1,008,109
Number of structures sprayed	341,370	950,939
2018 spray coverage	94.5	94.3
Population that PMI/DFID-supported IRS protected		
Total Pop:	932,115	3,504,041
Children < 5:	175,842	716,548
Pregnant Women:	21,971	99,619
Length of campaign (total days)	25 days	25 days
Number of people trained with U.S/DFID government funds to support vector control activities	2,187 (201 supervisors, 335 team leaders, and 1,651 spray operators)	6,276 (739 supervisors, 932 team leaders, and 4,605 spray operators)
Dates of PMI and DFID-supported IRS campaign	April 9–May 12, 2018: DFID 3 districts; PMI – 5 districts June 11 – July 14, 2018: DFID 2 districts; PMI – 5 districts Sept 3 – 18, 2018: PMI – 2 sub-counties Lira district	

I. INTRODUCTION

I.1 COUNTRY BACKGROUND

Uganda has the sixth highest number of annual deaths from malaria in Africa, as well as some of the highest reported malaria transmission rates in the world, with approximately 16 million cases reported in 2013, and over 10,500 deaths annually. In addition, malaria has an indirect impact on the economy and development in general. The socioeconomic impact of malaria includes out-of-pocket expenditures for consultation fees, drugs, and transport to and subsistence at a distant health facility. These costs are estimated to be between USD 0.41 and USD 3.88 per person per month (equivalent to USD 1.88 and USD 26 per household). Household expenditure for malaria treatment also places a large burden on the Ugandan population, consuming a larger proportion of the incomes in the poorest households. Further, malaria has a significant negative impact on the economy of Uganda due to loss of workdays because of sickness, decreased productivity, and decreased school attendance. A single episode of malaria costs a family on average USD 9, or 3% of their annual income. Workers suffering from malaria may be unable to work for an estimated 5–20 days per episode.

As a result, the MOH through the National Malaria Control Program (NMCP) 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 NMCP 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/NMCP's goal is to control and prevent malaria morbidity and mortality so as to minimize social ill effects and economic losses attributable to malaria.

PMI supports the NMCP guidance on 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, DFID and private sector. This partnership is based on three fundamental principles: one strategic plan under which all partners will work and contribute; one coordination mechanism to ensure maximum synergy and avoidance of duplications; and one monitoring and evaluation (M&E) plan to measure progress and assess the impact.

I.2 PROJECT BACKGROUND

In September 2017, Abt was awarded the PMI VectorLink Project to support the implementation of IRS and other vector control activities. Under this new contract, Abt will expand entomological monitoring to guide programs focused on insecticide-treated mosquito nets and IRS. The project will also continue to assist PMI in reducing the burden of malaria in Africa through IRS and capacity building in 22 countries, including Uganda, which is buying into this central mechanism for the first time.

In Uganda, the project will be 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 (GOU) 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

The PMI VectorLink Uganda Project 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. VectorLink based the district selection on the malaria burden in these districts, which was determined in collaboration with the MOH/NMCP and USAID/PMI Uganda.

Figure 1 illustrates the IRS districts; the DFID-supported districts include Alebtong, Amolatar, Dokolo, Kaberamaido and Otuke, while the PMI-supported districts include 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 2018

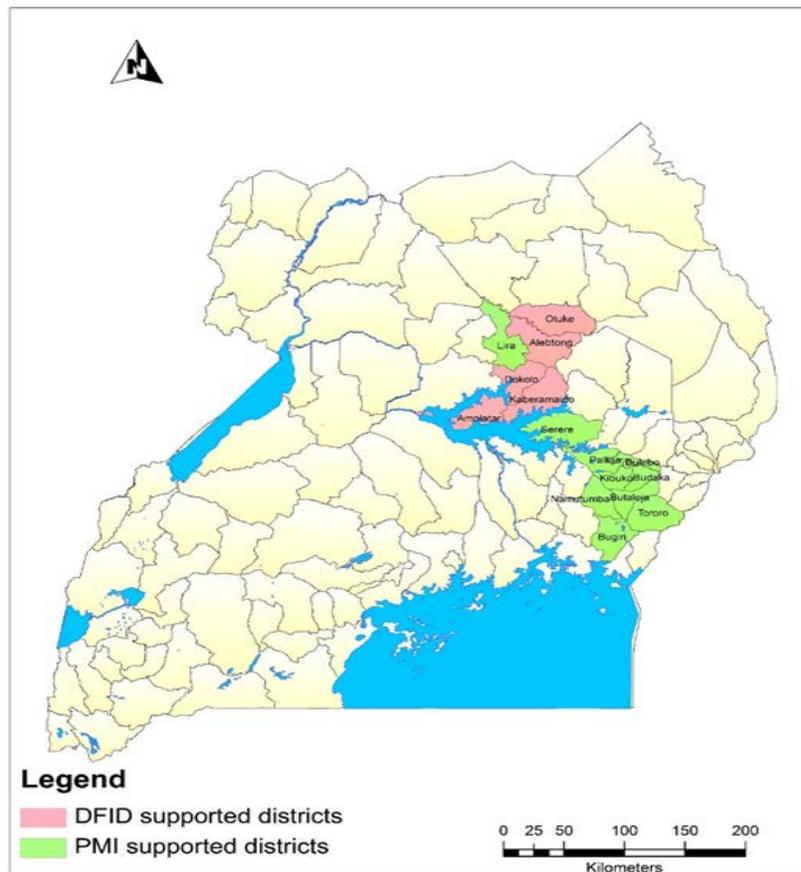


TABLE 2: 2018 IRS TARGETS BY DISTRICT

Funding	Districts	Number of Target Structures	Total Population Targeted
DFID	Alebtong	91,760	230,739
	Amolatar	61,447	163,851
	Dokolo	69,702	187,906
	Kaberamaido	84,118	240,897
	Otuke	40,653	107,597
	Subtotal	347,680	930,990
PMI	Budaka	62,211	241,018
	Bugiri	131,815	468,751
	Butaleja	73,326	305,526
	Butebo*	33,180	124,517
	Kibuku	62,465	235,744
	Lira	134,561	451,986
	Namutumba	93,415	384,352
	Pallisa	86,167	319,262
	Serere	103,038	308,628
	Tororo	159,839	579,740
	Subtotal	940,017	3,419,524
Grand total		1,287,697	4,350,514

*Butebo district was carved out of Pallisa district in 2017.

2.2 INSECTICIDE SELECTION

The project used Actellic 300CS, an organophosphate, for the 2018 spray campaign in all 15 districts. The selection of Actellic 300CS was based on data obtained from insecticide susceptibility tests conducted from 2012 to 2017, which showed that the main malaria vector, *An. gambiae* s.l., was susceptible to this insecticide 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. The IRS schedule listed dates for recruitment, procurement, advocacy, micro-planning meetings, and the launch of the IRS campaign. Other dates listed include those for logistics arrangements, material distribution, and environmental compliance (EC) assessments.

Because of the massive scale of the Uganda spray campaign, the project sprayed the target districts in two phases, with each phase lasting 25 operational days. The project decided to keep the phased approach for the 2018 spray campaign, in line with the previous IRS project, given the sheer magnitude of the Uganda project and the familiarity of the national, district and sub-county stakeholders with this approach. Further, the budget implications of spraying all the districts all at once need to be carefully reviewed before making any shifts in this approach. The Phase I districts included: Alebtong, Amolatar, Budaka, Butaleja, Butebo, Dokolo, Namutumba and Pallisa; while the Phase II districts included: Bugiri,

Kaberamaido, Kibuku, Lira, Serere, Otuke and Tororo. PMI Uganda expects the timing of the spray campaigns to provide protection over the two key transmission periods in both northern and eastern districts based on meteorological data and the two peak malaria transmission periods for Uganda.

2.4 DISTRICT-LEVEL CONSULTATIONS AND SENSITIZATION MEETINGS

In preparation for the spray campaign, the project's field team in collaboration with the MOH/NMCP 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 following agenda items:

- Inform stakeholders at the district level about the project's objectives, goals, and planned activities.
- Assess previous IRS campaign challenges and lessons learned, and make recommendations to improve performance during the 2018 campaign.
- Share and review the 2018 IRS operation plan, and recommend improvements.
- Share how to engage and solicit community participation and involvement of local leaders, particularly sub-county leaders, before, during, and after the spray campaign.
- Evaluate the effectiveness of methods used in information, education and communication (IEC) social and behavior change communication (SBCC) before and during the campaign.
- Outline the role and involvement of community leaders, and local council (LC) Is, during the IRS campaign, especially with regard to supervision.
- Obtain collective administrative and political will, commitment, and collaboration to implement the spray campaign.

After the district planning and review meetings at each district's headquarters, the district health teams (DHTs) and the project staff sensitized the leaders of their respective sub-counties. These leaders went back to their communities to communicate the IRS messages to parish and village leaders, who then went on to sensitize their 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 (DEOs), District Supply Officers, and District Health Officers. These six district officers constitute the DHT during the campaign. During micro planning, the team discussed the following:

- IRS activity schedule
- Recruitment of temporary IRS staff
- Districts' roles and responsibilities to provide stores in all district operational 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

- Community mobilization plan for IRS, with emphasis on village leaders working with parish mobilizers. The team agreed that daily feedback was 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 one parish mobilizer for each parish store to lead the daily community mobilization activities at the village level. The project shared recruitment guidelines including roles and responsibilities of the different spray actors prior to the recruitment exercise.

2.4.3 TRAINING OF SPRAY TEAMS (CASCADE TRAINING)

In 2018, 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 3 shows the different trainings conducted by the project. The details about the trainings are included in Annex E. The main objective of all the trainings was to improve the skills and performance of spray operators, thus enhancing the quality of IRS activities. Table 4 shows the gender breakdown of participants at these trainings.

TABLE 3: IRS TRAININGS CONDUCTED IN 2018 TO IMPROVE SPRAY QUALITY

Training	Dates	Participants Trained	Key Topic Areas Covered
National training of IRS master trainers (boot camp)	March 12–16, 2018	<ul style="list-style-type: none"> • 6 NMCP/MOH • 15 malaria focal persons • 15 district malaria trainers • 26 VectorLink project staff 	IRS planning, implementation, supervision, community mobilization, environmental management, spray techniques, logistics quantification and warehouse management
TOT	<ul style="list-style-type: none"> • March 19–23, 2018, Phase I districts • May 22–26, 2018, Phase II districts 	1,136 participants: Sub-county supervisors (198), storekeepers (462) and parish supervisors (476)	IRS planning, implementation, supervision, mobilization, EC, and spray techniques
Training of team leaders	<ul style="list-style-type: none"> • April 2–6, 2018, Phase I districts • June 4–8, 2018, Phase II districts 	1,267 team leaders	Spray techniques, pump maintenance, safe handling of insecticides and environmental safety issues in IRS, community mobilization, supervision techniques and DOS
Training of Spray Operators	<ul style="list-style-type: none"> • April 2–6, 2018, Phase I districts • June 4–8, 2018, Phase II districts 	6,256 spray operators	Spray techniques, pump maintenance, safe handling of insecticides and environmental safety issues in IRS, community mobilization
Wash Persons	<ul style="list-style-type: none"> • April 2–6, 2018, Phase I districts • June 4–8, 2018, Phase II districts 	759 wash persons	Personal and environmental safety issue

Training	Dates	Participants Trained	Key Topic Areas Covered
Training of parish Mobilizers	<ul style="list-style-type: none"> April 2–6, 2018, Phase I districts June 4–8, 2018, Phase II districts 	472 parish mobilizers	Community mobilization including IRS key messages – before, during, and after and community engagement
Training of storekeepers	<ul style="list-style-type: none"> April 2–6, 2018, Phase I districts June 4–8, 2018, Phase II districts 	462 storekeepers	Store management and inventory tracking, use of mHealth tools
Clinicians/laboratory personnel/insecticide poison management	February 18, 2018	64 clinicians and laboratory technicians	Management of emergencies and insecticide poisoning on IRS
Data clerks	<ul style="list-style-type: none"> April 5–6, 2018, Phase I districts June 7–8, 2018, Phase II districts 	56 data clerks	IRS data collection and management, integrity, and security; IRS data entry and practice

TABLE 4: NUMBER OF PEOPLE TRAINED WITH U.S. GOVERNMENT/DFID FUNDS TO SUPPORT VECTOR CONTROL ACTIVITIES

Category	DFID- Supported Districts		PMI- Supported Districts		Total
	Male	Female	Male	Female	
Spray operators	1,244	407	3,140	1,465	6,256
Team leaders	266	69	698	234	1,267
Parish supervisors	118	23	251	84	476
Sub-county supervisors	43	10	116	29	198
District supervisors	5	0	112	37	154
MOH supervisors	1	1	86	24	112
Total	1,677	510	4,403	1,873	8,463

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 January 2018 to develop the logistics and procurement plan that considered:

- Spray data based on 2017 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 PMI VectorLink Uganda team performed a detailed analysis to determine the total number of spray pumps and amount of PPE, insecticide and other IRS materials needed. The central warehouse in Lira served as the hub for storage of other IRS commodities before distribution to the target districts. The Actellic 300CS insecticide was delivered by Arysta directly to each district store.

2.6 LOGISTICS AND STOCK MANAGEMENT

In January 2018, 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.

The balance of 56,494 bottles that remained at the end of the 2017 spray campaign were all transferred to the AIRS Tanzania Project. VectorLink Uganda procured 587,292 bottles of Actellic 300CS for the 2018 IRS campaign and distributed 260,808 bottles to the Phase I district stores, followed by 326,484 bottles of Actellic 300CS for the Phase II districts. The balance at the end of the 2018 spray campaign is 32,724 bottles. The receipt of other locally procured supplies in the Lira central warehouse started by mid-March 2018. These included but were not limited to: liquid soap, washing soap, stationery, gumboots, tool kits, first aid supplies and megaphones. The project also received internationally procured nose masks, gloves, coveralls, spray pumps and other assorted items (please refer to Table 5). These supplies were then distributed to 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 ran from March 26 to April 7, 2018, followed by May 28 to June 9, 2018 in the Phase II districts.

To ensure proper tracking of the insecticide bottles and cartons, VectorLink Uganda decided to serially number them; this involved physically writing the tracking serial numbers on all bottles and cartons of the insecticide.

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 A shows the detailed list of the items procured for the 2018 spray campaign.

TABLE 5: PPE AND OTHER SUPPLIES RECEIVED AT THE CENTRAL WAREHOUSE IN LIRA DISTRICT

Item Description	Totals	Units
International Procurement		
Actellic 300CS	587,292	Bottles
Hudson X-pert sprayers	585	Units
Aprons	588	Pieces
Long gloves	302	Pairs
Short gloves	3,528	Pairs
Coveralls	1,100	Pieces
Gumboots	204	Pairs
Respirators	5,112	Cartons
Face shields	3,100	Pieces

Item Description	Totals	Units
Local Procurement		
HDPE polythene sheets	256	Rolls
Neck covers	7,500	Pieces
Thermometers	270	Pieces
Megaphones	467	Units

FIGURE 2: OFFLOADING AND VERIFICATION OF X-PERT SPRAYERS AT THE CENTRAL WAREHOUSE IN LIRA DISTRICT



To ensure proper logistics management, VectorLink Uganda’s logistics team provided supportive supervision to the parish store keepers to ensure that they adhered to the required storekeeping procedures. Some challenges noted included the proper recording of materials’ movements in and out of some stores, proper calculation of insecticide balances (number of bottles) required to complete the spraying of remaining households, and how to correctly measure the liquid soap. The district store managers were constantly on the move, addressing gaps that were identified in their respective districts throughout the spray periods.

2.7 HUMAN RESOURCE REQUIREMENTS

The PMI VectorLink Uganda project used the number of structures found during the last spray campaign of the Uganda IRS Project – Phase II 2017 in the 15 PMI-supported districts as a baseline to determine the number of seasonal workers needed for 2018 IRS activities. Unlike in previous IRS campaigns, where the rotational team leader approach was used, to improve supportive supervision for this spray campaign the project recruited and deployed one team leader for every five spray operators for the entire spray campaign. The project also established another layer of supervision structure at the parish level, by recruiting and deploying one parish supervisor per operation site. 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. Spray operators were recruited as seasonal staff from their respective communities targeted for IRS in 2018. Table 6 shows the number of staff hired for each cadre during the 2018 campaign, disaggregated by sex. The proportion of women hired for each cadre is indicated in the last column. During this spray campaign, the women hired to work at supervisory levels, such as parish supervisors, sub county supervisors, team leaders, and project assistants, accounted for 21.7% of all supervisors. This was lower than in 2017, in which women composed 37.2% of all staff hired into supervisory positions. This difference was largely the result of women’s participation in harvesting activities in 2018 in most districts, after the government’s supply of agriculture inputs to households through the ‘Operation Wealth Creation’ project.

TABLE 6: SEASONAL STAFF HIRED BY CATEGORY

Category	Female	Male	Total	% Female
Mobilizers	104	368	472	22.0
Team leaders	303	964	1,267	23.9
Sub-county supervisors	39	159	198	19.7
Spray operators	1,872	4,384	6,256	29.9
Data clerks	23	33	56	41.1
Parish supervisors	107	369	476	22.5
Washers	716	43	759	94.3
Store keepers	102	360	462	22.1
Guards	221	703	924	23.9
Project assistants	2	5	7	28.6
Total	3,489	7,388	10,877	32.1

3. INFORMATION, EDUCATION AND COMMUNICATION

3.1 INTRODUCTION

IEC/SBCC activities are vital for IRS implementation to ensure a successful spray campaign by promoting community acceptance of the intervention. Abt's partner in Uganda, Communication for Development Foundation Uganda (CDFU), is providing expertise and taking the lead in the implementation of IEC/SBCC activities in the field. Interpersonal communication (IPC) and dissemination of integrated malaria prevention messages were the cornerstone of the project's SBCC activities. The key objectives of all IEC/SBCC activities were to:

- Inform the community about benefits of IRS while refuting common prevalent myths about IRS especially that IRS leads to proliferation of bedbugs.
- Promote understanding and acceptance of IRS by educating the community about the purpose of the IRS campaign.
- Inform and educate householders about the details of preparing their homes for spraying, and post-spray safety requirements.
- Ensure beneficiaries understand the benefits of IRS in resistant communities, especially those of organic farmers in Lira and Dokolo districts.
- Dispel key concerns related to the strong smell of Actellic 300 CS.
- Sensitize communities about integrated malaria prevention interventions including IRS.

The project achieved the following during the 2018 spray campaign:

- Sensitized 625 district leaders (422 males and 203 females) in the 15 districts, in close collaboration with the DHEs.
- Sensitized 3,858 sub-county leaders (2,656 males and 1,202 females), and 5,347 LCI chairpersons (4,251 males and 1,096 females) to become IRS champions.
- Distributed 6,990 IRS role posters for passing key messages to the households, and 100 leaflets of frequently asked questions (FAQs) to the 15 districts. These helped provide greater clarity regarding areas that were of concern to community members. The role poster, which is pictorial, helps inform and educate householders about the details of preparing their homes for spraying and post-spray safety requirements.
- Held 60 radio talk shows, and aired 280 radio spot messages and 140 radio announcements in the 15 districts to enhance awareness about IRS.
- Conducted 822 dialogues across the 15 districts to pass on key messages about IRS to the communities.

- Oriented 30 media participants from all 15 districts about IRS and how to answer questions on air regarding IRS.

Table 7 provides a summary of people reached through the different mobilization channels employed in the 2018 spray campaign.

TABLE 7: SUMMARY OF PEOPLE REACHED THROUGH DIFFERENT CHANNELS

Method	Number	People Reached		Total
		Male	Female	
Community dialogues	835	11,494	9,210	20,704
Radio talk show call-ins	60	194	43	237
IPC-door to door	10,804	5,647	6,163	11,810
Total		17,335	15,416	32,751

3.2 DISTRICT, SUB-COUNTY AND LCI LEADERS SENSITIZATION

CDFU spearheaded the sensitization of all key stakeholders in the 15 districts in collaboration with the MOH and project staff. 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. The SBCC team together with the DHEs conducted the orientation of the sub-county task force and the LCI chairpersons in all 15 districts. During the spray exercise, the LCIs were involved in IPC/door-to-door sensitization of their communities, which contributed significantly to increased IRS acceptance among households.

FIGURE 3: COMMUNITY DIALOGUE MEETING WITH MOTHERS UNION GROUP IN KIBUKU DISTRICT



3.3 COMMUNITY DIALOGUES

The project's SBCC team, DHEs and DHT members conducted 822 community dialogues during the spray campaign. During the dialogues, community members asked questions about IRS, the answers to which allayed some of their fears about spraying. 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 some religious sects in a few sub-counties of Bugiri, Kaberamaido and Tororo, and organic farmers in Dokolo and Lira.

3.4 IRS PRINT MATERIALS

The project printed and disseminated 6,990 IRS posters and 100 FAQ leaflets in the 15 districts. These were distributed to LCI chairpersons for sensitization of the communities in their respective districts. VectorLink Uganda also distributed these materials to the health facilities, and at busy trading centers and market places.

3.5 RADIO TALK SHOWS, SPOT MESSAGES AND ANNOUNCEMENTS

The project together with the DHEs and in consultation with the DHT and district IRS taskforce in the 15 districts 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 the community members and inform them about IRS; respond in depth to concerns from the community in relation to the insecticide; and communicate what is expected of households during pre-spray and during 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 help bolster mobilization activities in the communities.

4. IMPLEMENTATION OF SPRAY ACTIVITIES

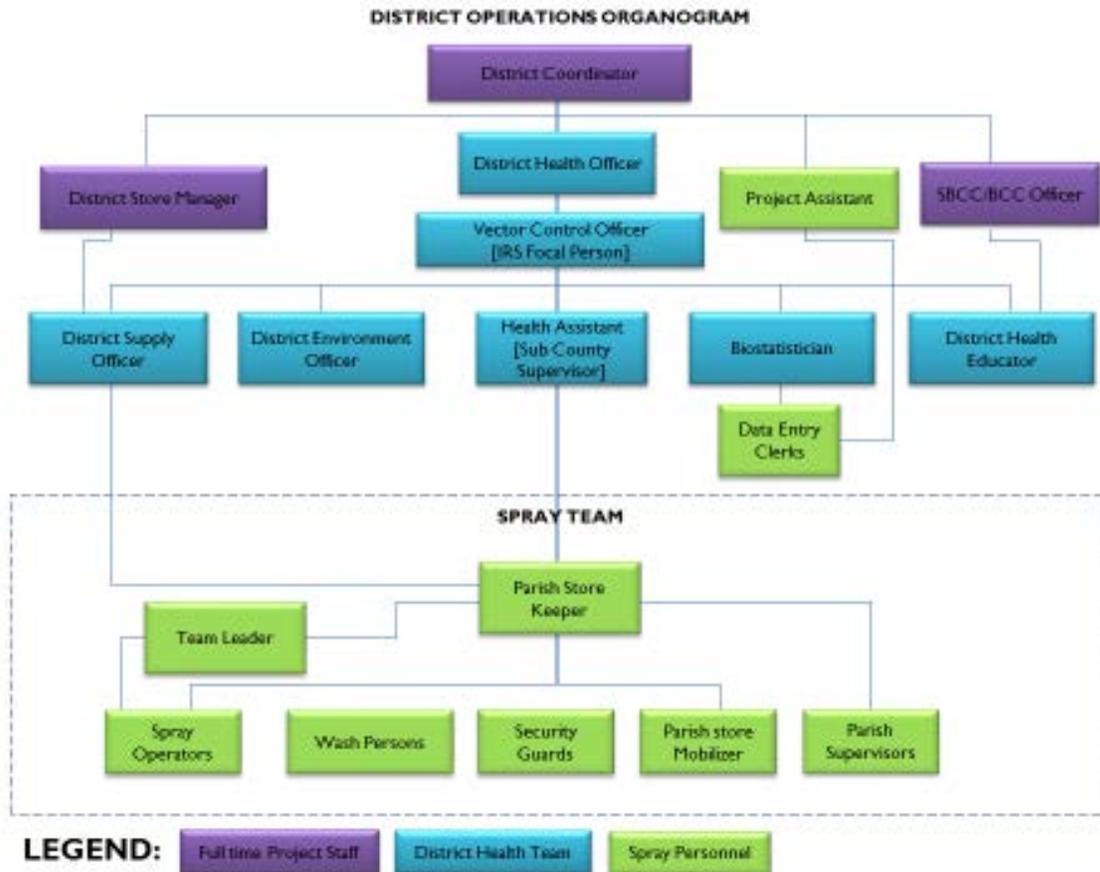
4.1 COMPOSITION AND MANAGEMENT OF IRS ACTIVITIES

The project implemented all IRS activities in close collaboration with the NMCP/MOH and district local government. Together with the NMCP/MOH, the project provided all the technical and logistical support required for the operation in the 15 districts.

The field team included VectorLink Uganda project staff (seven district coordinators and seven store managers) and seven IEC/SBCC coordinators (seconded by CDFU) who were resident 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 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 demonstrated in Figure 4 below.

At the operational level, the project operated 462 parish stores in the 15 districts. The team at each operation site included the store keeper, parish supervisor, parish mobilizer, team leaders, spray operators, wash persons and security guards. The parish store keeper was in charge of the site organization, logistics flow control, and recording the number of days worked by each team member. On spray days, the store keeper issued insecticide, PPE, and equipment to the spray operators through their respective team leaders. While in the field, the spray operators also reported the insecticide quantities used, the insecticide balance and the record of houses sprayed in the spray cards to the LCI chairperson. The LCI was responsible for verifying the information and then stamping the spray card to ensure that the data captured was correct.

FIGURE 4: DISTRICT OPERATIONS ORGANOGRAM



4.1.1 IRS SUPERVISION

IRS supervision was conducted by project staff in close collaboration with the NMCP staff, 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

The VectorLink Uganda Project worked in partnership with Dimagi LLC to use the CommCare mobile health (mHealth) system for the 2018 IRS campaign. Using the system, VectorLink Uganda 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 SMS.

The mHealth reporting tools for data collection and verification (DCV), used throughout the campaign, included:

- **Supervisory Tools**

The supervisory application tool was for use 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 master trainers (boot camp) and the TOT

trainings. The mobile phone application contained multiple forms covering key supervisory functions, including morning mobilization, storekeeper performance, household preparation, spray operator 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 communities, and need for additional items at the parish stores, such as gloves and pump spare parts. In total, the VectorLink Uganda supervision team completed 30,292 home owner preparation and spray operator performance forms and 16,257 DCVs (see Table 8).

- **DCV**

The MOH supervisors, DHT, sub-county supervisors, parish supervisors and team leaders used the DCV mobile tool and paper forms to collect household-level information on the spray status in randomly sampled households. The project assistants verified the collected information by comparing it with the spray operator data forms. After filtering households' data from the data forms, it was compared with DCV form findings using household head as a unique identifier and; 95.3% matched head of household, structures and rooms found, and spray status while 4.7% (within the 5% error margin) were unmatched. One of the key discrepancies noticed was the non-recording of unsprayed structures by the spray operators on the daily spray forms. The DCV was housed in the same CommCare platform as the supervisory forms.

- **Performance Monitoring Tracker (PMT)**

During training, the store keepers 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 store keepers 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 VectorLink Uganda team used the report to monitor parish stores with low spray coverage, fluctuating progress, and increased insecticide consumption.

- **Job Aid Messages**

Supervisors, spray operators, team leaders, and store keepers also received SMS messages throughout the IRS campaign to remind them about key topics including spray operators' daily structure targets, the importance of donning PPE, pump agitation before spraying, and avoiding eating while on duty. On some occasions, VectorLink Uganda sent emergency messages to the parish store keepers 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 interventions to homeowners, and the need to ensure meeting of daily target of 10 structures per spray operator. 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 (DOS)

In addition to using the mHealth supervisory tools, the project assistants entered the DOS data into an Excel file during the 2018 spray campaign. The data was captured by supervisors when they directly observed spray operators' insecticide mixing and spray techniques. The gaps identified were corrected on the spot. The information collected complemented PMT reports and mHealth supervisory feedback by focusing 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 5–7 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 form to oversee and improve spray operators’ performance and spray quality. Team leaders conducted supervisory visits throughout the spray campaign to observe spray operators’ performance and record whether or not the spray operators 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 spray operators’ performance and take corrective action to address any errors and ensure better quality of spray operations. Table 8 shows performance using the different supervision tools used during this campaign.

4.2 SUPERVISION FINDINGS

The supervisors carried out daily data verification using the DCV forms. This helped verify the data the spray operators collected and compare this data with spray cards data. The findings from the analysis of the data collected over the 25 operation days of the campaign informed both mop-up activity and strategies to monitor any possible data falsification amongst the spray teams. One of the challenges that the project faced with regard to the DCV forms was that there was a gap between the target and the actual number of forms submitted by supervisors. In spite of the project’s efforts to strengthen supervision by revising the supervisory structure, there are still challenges with supervisors upholding responsibility for their assigned tasks. The project is discussing ways to enhance compliance by the supervisors for the 2019 spray campaign.

The DOS produced some interesting findings. Throughout the campaign, cumulative DOS findings indicated that leaking spray pumps were among the biggest challenges the teams faced. As a result, most of these leaking pumps were replaced with new pumps, and the others were repaired to fix the leaking parts.

TABLE 8: SRAY SUPERVISION PERFORMANCE 2018

Supervision Forms	Target	Completed	% of target submitted
Spray Operator Morning Mobilization	241,875	1,378	0.6
Storekeeper Performance	241,875	1,434	0.6
End of Day Cleanup	241,875	1,124	0.5
Homeowner Preparation and Spray Operator Performance	107,500	30,292	28.2
DCV - Data Collection Verification	107,500	16,257	15.1
All Forms	940,625	50,494	5.4

4.2.1 INSECTICIDE DISTRIBUTION AND MANAGEMENT

In 2018, 587,292 bottles of Actellic 300CS 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 to ensure that all issued bottles were 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 32,724 bottles of Actellic 300CS remained unused at the end of the 2018 spray campaign; these will expire in October and November 2019. Empty bottles have been collected from all 15 districts and are being delivered to the waste stores in Bugiri and Dokolo for the EC team to hand them over to selected recyclers. The waste includes insecticide cartons and other wastes.

5. ENVIRONMENTAL COMPLIANCE

In accordance with the Supplemental Environmental Assessment amended and approved in 2014, which runs through 2019, and the Letter Report prepared for the year 2018, the PMI VectorLink Uganda Project used Actellic 300CS (organophosphate class) for spraying in all the 15 project districts. In accordance with PMI best management practices (BMP) requirements, the project put a strong monitoring system in place to ensure that the IRS operation adhered to EC requirements, to protect spray actors, beneficiaries, and the environment.

5.1 PRE-SEASON EC ASSESSMENTS

The project, in collaboration with the DHT and sub-county supervisors, 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 rounds of PSECA well ahead of the arrival of IRS supplies. The lists of IRS materials needed, based on identified gaps for the 462 parish stores, were generated and communicated to the store managers and the 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 soak pit citing, rehabilitation status of soak pit and wash areas, availability of bath shelters for male and female spray actors was assessed.

A total of 462 soak pits were constructed to the standard design of 2 meters wide by 1 meter long by 1 meter deep, and used for the disposal of insecticide-contaminated effluent; 203 soak pits were built in the Phase I districts and 259 in the Phase II districts. The walls of the 462 soak pits were all lined with plastic sheets to prevent any percolation of effluent into the environment. In addition, in all 462 soak pits constructed in 2018, 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: SOAK PIT AT BULULU STORE IN KABERAMAIDO DISTRICT, CONSTRUCTED WITH THE WALL LINED WITH POLYTHENE SHEET



FIGURE 6: THE ENTIRE WASH AREA IS COVERED WITH PLASTIC SHEETS



To ensure adequate and standardized storage facilities, VectorLink Uganda renovated the Budaka district store to bring it up to the BMP recommended standard of the remaining 13 district stores. 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 equipped the seven Phase II districts with thermometers. In addition, the National Drug Authority (NDA) inspected all the 14 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 2018.

5.2 MANAGEMENT OF INSECTICIDE POISONING

To manage insecticide poisoning that may arise from insecticide inhalation, ingestion and dermal entry during spray operations, VectorLink Uganda collaborated with the MOH to train 64 clinicians and laboratory technicians from the 15 IRS districts on identifying signs and symptoms of insecticide poisoning, and on managing incidents of poisoning. VectorLink equipped a total of 177 health facilities with 1,850 ampoules of atropine using non-PMI funds.

The project conducted medical examination of the spray team members, excluding security guards, to ensure that only healthy spray team members would handle and use insecticides. All 3,405 female spray team members received pregnancy tests, and only six tested positive. The project counseled all the women who tested positive for pregnancy about avoiding any possible contact with the insecticide, following which two women left voluntarily and the rest were deployed for other appropriate positions as data clerks and parish mobilizers, based on their personal qualifications and interest.

All the 462 parish stores and 14 district stores in the 15 project districts received first aid kits fully stocked with band-aids, gauze, antibiotic cream, eye wash, hydrocortisone cream, and aspirin, to be administered 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 check-ups for the spray operators before they departed for the field, to assess their physical fitness and provide them with full PPE and a three-meter piece of polythene sheet to cover immovable household items.

5.3 PRE-CONTRACT TRANSPORTATION VEHICLE INSPECTIONS

The project also conducted a two-day (April 7–8, 2018) inspection of 36 transportation vehicles at the Tororo Field Office and Lira Central Warehouse, before signing contracts. This aimed to ensure that all

the vehicles met the PMI BMP health and safety requirements before they were deployed for the spray campaign. Prior to the inspection, all drivers were oriented, and signed the Abt Associates vehicle use policy. The drivers then received certificates of attendance, and their respective vehicles were inspected for compliance. Out of the 36 vehicles inspected, 8 were trucks for transportation of insecticides and 28 were passenger vehicles (used for spray supervision). 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.

FIGURE 7: VEHICLE INSPECTION AT LIRA CENTRAL WAREHOUSE; INSECTICIDE TRANSPORTATION TRUCKS AT LIRA CENTRAL WAREHOUSE DURING INSPECTION



5.4 MID- AND POST-SEASON ENVIRONMENTAL INSPECTIONS

The VectorLink Uganda Project 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 (see section 4.1.2). All project staff and supervisors were charged with identifying areas of weakness, providing correction, and guiding spray operators 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. However, at 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.

Annex B contains a detailed list of inspections and mitigation measures undertaken in the 2018 spray operation.

The project reported all incidents that arose during the 2018 spray campaign (Table 9). The field team responded to all these incidents in a prompt manner and tried to understand the root cause of the incidents and institute remedial measures. In incidents where a spray operator was either involved in a minor accident or exposed to insecticide and needed to take days off duty, the person was compensated for the time away and assigned lighter duties if the situation so demanded. In incidents involving pilferage and data falsification the suspects were immediately dismissed from any further engagement in the IRS campaign and the matter was reported to police for investigation. The incident reports were first shared

with the PMI VectorLink Project Environmental Specialist, and then reviewed by HR, legal and security experts at the home office, and finalized and shared with the Contracting Officer’s Representative and PMI Activity Manager. All efforts were made to report the incidents as soon as possible, within the 48-hour period (refer to Table 9 below).

TABLE 9: SUMMARY OF INCIDENT CASES RECORDED IN PHASE I AND II DISTRICTS SPRAY CAMPAIGN

1	Spray operator bit by an unrestrained dog in a homestead	Pallisa district
2	Spray operator assaulted by a homeowner	Budaka district
3	Insecticide pilferage – A spray operator shared a portion of insecticide with a household member	Alebtong district
4	Insecticide pilferage – A spray operator sold a portion of insecticide to a woman	Pallisa district
5	A spray operator lost one bottle of insecticide while in the field; the bottles fell from the haversack and he did not notice	Namutumba district
6	Falsified data – A spray operator marked houses as sprayed that had not yet been sprayed	Budaka district
7	Falsified data – A spray operator sprayed only one house, using one insecticide bottle, and marked other structures as sprayed that had not yet been sprayed.	Budaka district
8	Exposure to insecticide – A lance got detached from the trigger, and the insecticide spilled onto the spray operator and caused irritation of eyes and skin.	Dokolo district
9	Exposure to insecticide – The spray operator flipped over the face shield to improve her ability to see, but had mistakenly put on the nose mask upside down, and so inhaled insecticide.	Butaleja district
10	Bicycle accident – A spray operator had an accident during her departure to the field and suffered an arm fracture.	Pallisa district
11	Insecticide pilferage – A spray operator in Ojwina division in Lira district was found in possession of approximately 4 liters of insecticide in a container and confessed stealing the insecticide along with six other spray operators.	Lira district

5.5 POST-SEASON DEMOBILIZATION AND WASTE DISPOSAL

5.5.1 CLOSURE OF PARISH STORES AND SOAK PITS

The project conducted post-IRS assessment and supervision at all 462 operations sites (soak pits) and parish stores based on the standard smartphone checklists, to ensure that all the operational sites were cleaned appropriately, shut down and handed over 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, and reconciled the numbers using ledger books and stock cards. All empty insecticide bottles and used polythene sheets will be recycled at Gentex Enterprises, while uncontaminated paper cartons will be delivered to Pulp and Paper Mills Ltd. in Jinja district, and all contaminated waste paper material (material safety data sheets, insecticide-impregnated papers), used nose masks, bicycle cushions and insecticide cardboard will be incinerated at Green Label Service Limited incinerator in Iganga. The project will keep 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. Table 10 shows the different categories of waste generated and their respective management mechanisms.

FIGURE 8: DECOMMISSIONED SOAK PIT AT KYERE STORE, POST IRS, COVERED WITH POLYTHENE SHEET WITH ABOUT 10CM OF SOIL, AND GATES LOCKED



TABLE 10: DIFFERENT CATEGORIES OF WASTE GENERATED DURING 2018 SPRAY CAMPAIGN, AND PLANNED MANAGEMENT MECHANISM

Type of Waste	Quantity	Disposal Site	Disposing Company	Planned Management Mechanism
Actellic bottles	554,568 bottles	Luwero district	Gentex Enterprises Ltd	Recycling: production of electric cable conduits and pipes
Damaged helmets	364.0 kgs	Luwero district	Gentex Enterprises Ltd	Recycling: production of electric cable conduits and pipes
Damaged face shields	242.5 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)	128.4 kgs	Luwero district	Gentex Enterprises Ltd	Recycling: production of electric cable conduits and pipes
Empty aerosol cans*	77 kgs	Iganga district	Green Label Services Ltd	Recycle and reuse for making handmade oil lamps
Reagent glass bottles*	16 kgs	Iganga district	Green Label Services Ltd	Destruction and landfilling
Dry cell batteries*	66 kgs	Iganga district	Green Label Services Ltd	Destruction and landfilling
Solid rechargeable lead acid batteries*	32 kgs	Iganga district	Green Label Services Ltd	Destruction and landfilling
Expired pharmaceutical drugs (doxycycline capsules)*	8 kgs	Iganga district	Green Label Services Ltd	Landfill and dilution, then flushing into a protected soak pit or lagoon
Insecticide cartons (cardboard)	3 1422.4 kgs	Jinja district	Pulp and Paper Mills Limited	Recycling: production of packaging materials

Type of Waste	Quantity	Disposal Site	Disposing Company	Planned Management Mechanism
Cardboard packaging (for used nose masks, chalk, eye drops, hydrocortisone cream, soap)	1108.2 kgs	Jinja district	Jinja district	Pulp and Paper Mills Limited
Used nose masks	2769.3 kgs	Iganga district	Green Label Services Limited	Incineration
Contaminated bicycle cushions	1666.8 kgs	Iganga district	Green label Services Limited	Incineration
Contaminated paper wastes (data safety sheets, and insecticide-impregnated papers)	9620kgs	Iganga district	Green Label Services Ltd	
HDPE polythene sheets	3712.7 kgs	Luwero district	Gentex Enterprise Limited	Recycling
LDPE polythene sheets	411.4 kgs	Luwero district	Gentex Enterprise Limited	Recycling
Damaged hand gloves, aprons and coveralls	452.0 kgs	Iganga district	Green Label Services	Destruction and landfilling
Damaged gumboots*	1183.6 kgs	Iganga district	Green Label Services	Recycling

*This includes wastes from Uganda IRS Project Phase II spray campaigns.

6. MID-SPRAY AND POST-SEASON SPRAY ACTIVITIES

6.1 MID-SPRAY REVIEW MEETING

As part of continuous IRS quality improvement, the PMI VectorLink Uganda Project organized mid-spray review meetings for both Phase I and Phase II districts, bringing together some NMCP/MOH supervisors supporting the districts and the project staff. These meetings were an effort to learn, identify collaboration opportunities, track performance and deal with emerging challenges in the target districts. The one-day meeting addressed key IRS implementation activities with a view to ensuring that any challenges were resolved and that all districts were up to speed to ensure achievement of their targets. The following areas were reviewed:

- IRS spray performance (daily output, data management, data reliability of PMT data versus spray operator collection forms/spray cards)
- IRS operations (spray quality from entomological point of view, use of insecticide)
- IRS supervision (PMT reporting, house preparation, DOS, use of supervision checklists and supervision plan)
- Logistics management (insecticide tracking, daily store keeper performance vehicle management)
- Environmental compliance (incident management, status of soak pits, use of PPE, waste management, daily medical check-ups and documentation)

The above discussions triggered multiple learning sessions, and below are some of the recommendations aimed at ensuring, among other things, that spray quality and IRS targets would be achieved, while observing IRS best management practices:

- District coordinators to take full responsibility for data movement from parish stores to data centers, to ensure data quality and timeliness in data entry.
- District coordinators to ensure that all supervisors (team leaders, parish supervisors and other supervisors) conduct DOS in order to enhance spray quality.
- Use of supervisory tools and checklists should be enhanced in all districts.
- District coordinators to review insecticide use rate, especially in urban centers, to establish reasons for the low use rate through direct and indirect supervision in respective localities.
- District coordinators to conduct vehicle tracking by documenting days each vehicle provides required service, to ensure accountability by vehicle vendors and share weekly reports with logistics coordinators.
- Discourage spray teams from using motorcycles as opposed to bicycles.
- Improve LCI participation in mobilization.
- The supervision team to continuously remind the team leaders and parish supervisors about their roles.

6.2 POST-SPRAY REVIEW MEETING

On July 26, 2018, the project held a one-day IRS learning review meeting at the Prime Hotel in Tororo district to provide insight on the effectiveness of the 2018 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 72 people participated in the IRS review meeting including project staff (43), CDFU representatives (8), MOH officials (6), and District Malaria/IRS focal persons (15). Key learning from this review meeting will help guide the next spray planning, and focus on the emerging issues and implementation gaps.

During the review of the progress, achievements and challenges of IRS implementation, the team focused on recruitment, training, IRS, logistics, environmental compliance, IEC/SBCC, M&E, entomology and the district IRS perspective. Table 11 highlights the responses to key issues observed during the 2018 spray campaign. Annex C is a list of meeting participants.

TABLE 11: SUMMARY OF FINDINGS FROM THE REVIEW MEETING

What worked well	What did not work well
<ul style="list-style-type: none"> Improved data collection (real time) Bringing MOH officials for IRS planning meetings Boot camp and refresher trainings Team work, good administration and district support Supervision of spray campaign in Phase II Timely delivery of spray supplies to the parish stores Proper supervision of IRS implementation Having IPC during spraying Supply of adequate PPE for all spray teams and supervisors Appropriate engagement with the district leaders Collaboration and teamwork across the project Ownership by government and commitment of district teams New/improved soak pit design Entomological monitoring activities conducted by well-trained MOH officials 	<ul style="list-style-type: none"> Recruitment timeline for Phase II districts too short Inadequate transport facilitation during recruitment Inadequate time for logistics delivery, especially between the two spray phases IRS activities coinciding with rainy season Community refusals to allow houses to be sprayed Limited time given for community dialogues Limited time between the spray phases impacted preparations for recruitment, training, deployment and logistics
Where are the gaps?	How do we respond to the gaps?
<ul style="list-style-type: none"> Too many operational sites Less than timely procurement, planning and forecasting SBCC needs to be given priority through adequate planning and use of innovations 	<ul style="list-style-type: none"> Reduce operational sites, with possibility of increasing the EC team Allocate more time for planning and pre-IRS activities Proper timing of activities and timely logistical support to the team Priority to be given to the SBCC activities in terms of planning, budgeting and incorporating new innovations

7. ENTOMOLOGY

PMI VectorLink Project Uganda conducts routine entomological monitoring in selected sites to provide data for decision-making. Data generated is used to justify decisions such as the type of insecticide used during spray campaigns, and timing for IRS. It also helps to assess the quality and impact of the vector control intervention. The project in collaboration with the MOH conducted the following activities:

- IRS quality assurance assessments using wall cone bio-assays in 15 spray districts (Alebtong, Amolatar, Budaka, Butaleja, Butebo, Dokolo, Namutumba and Pallisa (Phase I districts) and Bugiri, Kaberamaido, Kibuku, Lira, Otuke, Serere and Tororo (Phase II districts).
- IRS decay rate monitoring in four districts, including Pallisa (Phase I) and Kaberamaido, Lira and Tororo (Phase II). The tests will be conducted every month until mosquito mortality drops below 80% for two consecutive months.
- Fumigant effect of pirimiphos-methyl CS in four districts (Pallisa, Kaberamaido, Lira and Tororo).

This report highlights the results of the wall bioassays and fumigant effect assessment conducted after spraying. The project is also conducting long-term vector bionomic studies to monitor vector seasonality, abundance, and distribution, feeding and resting behaviors and insecticide resistance in selected district sentinel sites. Data on vector bionomics and insecticide resistance will be reported in the semi-annual progress and annual entomological reports.

7.1 IRS QUALITY ASSAYS

The MOH teams, with support from the Uganda PMI VectorLink Project staff, conducted cone bioassay tests for quality checks in one sentinel site in each of the current 15 IRS districts, and assessed the decay rate one month after spraying in Pallisa, Kaberamaido, Lira and Tororo districts.

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 spray operators. A total of 45 houses were sampled in the 15 sentinel sites in the 15 IRS districts in eastern and northern Uganda. The tests were carried out using known susceptible *An. gambiae* s.s. (Kisumu strain) colonies reared at the three insectaries based at Vector Control Division (MOH), Gulu University and Tororo. Sugar-fed adults two to three days old were exposed to the sprayed walls in the selected houses. The tests were done based on WHO-approved protocols.

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.

7.2 AIRBORNE EFFECT

The project conducted fumigant assays to test for any airborne effect of Actellic 300CS in sprayed houses in one sentinel village each in the four districts of Kaberamaido, Lira, Pallisa and Tororo. The MOH teams introduced batches of 10 *An. gambiae* s.s. (Kisumu strain) in Lira and Kaberamaido and 20 *An. gambiae* s.s. in Tororo and Pallisa) into a wire cage hung 10 cm from the sprayed wall surface and one meter above the floor. For the control, the team introduced 10 *An. gambiae* s.s. into a wire cage and hung it outdoors in a shaded area within the compound at least 10 meters away from the sprayed house in Lira and Kaberamaido. In Tororo and Pallisa 20 *An. gambiae* s.s. mosquitoes were used in the control. After 30 minutes of exposure, mosquitoes were scored for knockdown and then removed from the cage using an aspirator, transferred to paper cups and provided with sugar solution. The paper cups with exposed mosquitoes were then placed in a different 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. Mortality from fumigant assays was compared with that from the cone bioassay to determine the relative contribution of fumigant and contact mortality. Fumigant tests will be conducted monthly until mosquito mortality due to airborne effect approaches zero or contact mortality falls below 80% for two consecutive months.

7.3 RESULTS OF THE CONE BIOASSAY TEST

In each of the 15 districts, 100% mortality of test mosquitoes was recorded in wall bioassay tests conducted within one week of IRS (at time zero). At one month post spraying, mortality on all sprayed wall surfaces tested was 100% in the four routine monitoring sites in Pallisa, Kaberamaido, Lira and Tororo. The high *An. gambiae* s.s. mortality rates recorded on all the different wall surfaces showed that the quality of spraying was good in all of the IRS districts.

The average mortality of test mosquitoes remained at 100% at two and three months post spraying in Pallisa district, where spraying was conducted in April 2018. Spraying in Kaberamaido, Lira and Tororo was conducted in June 2018. Tables 12 show the wall bioassay results at time zero and at one to three months post spraying, respectively. Subsequent wall bioassay tests will continue monthly in all the four districts until mosquito mortality drops below 80% for two consecutive months, to characterize the insecticide decay rates.

7.4 RESULTS OF THE FUMIGANT EFFECT ASSESSMENT

Of 180 *An. gambiae* s.s. exposed in sprayed houses in July 2018 to assess fumigant effect, 98.3% died due to the aerosol effect of pirimiphos-methyl, with only 42.2% and 96.7% of mosquitoes knocked down at 30 mins and 60 mins post exposure, respectively (Table 12).

TABLE 12: WALL BIO-ASSAY RESULTS IN FOUR INSECTICIDE DECAY RATE MONITORING SITES

Time	% Mortality of <i>An. gambiae</i> s.s. (Kisumu strain)																Over all Mean
	Pallisa				Kaberamaido				Lira				Tororo				
	Painted	Plain Brick	Mud	Mean	Painted	Plain Brick	Mud	Mean	Painted	Plain Brick	Mud	Mean	Painted	Plain Brick	Mud	Mean	
T0	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 (30/30)	100 (30/30)	100 (30/30)	100	100
T1	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 (30/30)	100 (30/30)	100 (30/30)	100	100
T2	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 (30/30)	100 (30/30)	100 (30/30)	100	100
T3	100 (30/30)	100 (30/30)	100 (30/30)	100	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
T4	100 (30/30)	100 (30/30)	100 (30/30)	100	“	“	“	“	“	“	“	“	“	“	“	“	“

Pallisa, T0 =April 2018; Kaberamaido, Lira, Tororo, T0 = June 2018; TBD = To be Done

TABLE 13: FUMIGANT EFFECT OF ACTELIC 300 CS ON THE KNOCKDOWN AND MORTALITY OF AN. GAMBIAE S.S. JULY 2018

District	Type of Wall Surface	Number of <i>An. gambiae</i> s.s Tested in Sprayed Houses	Number Knocked Down after 30 Minutes (%)	Number Knocked Down after 60 Minutes (%)	Number Dead after 24 Hours (%)	Number Tested in Control	Number Dead in Control (%)
Pallisa	Plastered and painted	60	27 (45%)	60 (100%)	60 (100%)	60	0 (0%)
Kaberamaido							
Lira	Plain brick	60	27 (45%)	60 (100%)	60 (100%)	60	0 (0%)
Tororo	Mud and wattle	60	22 (37%)	54 (90%)	57 (95%)	60	0 (0%)

8. MONITORING AND EVALUATION

The M&E activities for the 2018 IRS campaign closely followed the processes outlined in the annual VectorLink Uganda Work Plan and the VectorLink M&E Plan.

8.1 APPROACH AND KEY OBJECTIVES

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

- Design and implement a robust data management and reporting system.
- Emphasize accuracy of both data collection and data entry through comprehensive trainings and supervision at all levels.
- Facilitate data use in both field and office settings through participatory project design and implementation.
- Ensure appropriate documentation of implementation successes and challenges to create an environment for continuous learning and project improvement.
- Streamline and standardize the data information flow to minimize errors and facilitate timely reporting.
- Ensure IRS data security and storage for future reference through establishment and enforcement of proper storage facility.

8.2 DATA MANAGEMENT AND PROCESSING

8.2.1 DATA COLLECTION

Data was collected using standardized data collections forms designed to capture data on all core PMI indicators (for a summary of data collection forms, see Annex D). In the 2018 IRS campaign, IRS data was recorded in the database as quickly and accurately as possible on a daily basis to have real-time insight into the status of the spray campaign. Before the beginning of mobilization and spray operations, those involved in data collection and supervision were trained in the data collection process and in filling out the forms. Data collection forms went through several checks before being entered into the database.

8.2.2 DATA ENTRY

PMI VectorLink Uganda used a Microsoft Access format database. A cleaning tool was incorporated into the database to ensure high data quality through a series of logic checks and controls to validate and clean data, and to generate reports. Data entry clerks at all the 15 project data centers used the data cleaning tool daily to reconcile and clean data throughout the campaign. A total of 56 data entry clerks were hired to enter campaign data, 33 (58.9 %) of whom were male and 23 (41.1%) were female. Additionally, the M&E team and data supervisors reviewed the data entered for anomalies, and addressed issues with data center staff.

8.2.3 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 was fully 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 during the first week of the spray, especially in districts with new data clerks, were given more attention, which resulted in improvements in the observed gaps over the course of the campaign.

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 2018 spray campaigns. See Annex D (Table D-3) for a summary of the data quality forms.

8.2.4 DCV FORM

This form is used during randomized household visits to check the accuracy of data collected in the field, to ensure that the data recorded on the Daily Spray Operator Forms matches the information households reported and/or the data recorded on the IRS Cards disseminated to households. Overall, VectorLink technical staff, the DHT and MOH staff completed 4,396 DCVs using smartphones for auditing spray coverage data. Corrective measures on observed anomalies, like inadequate marking of structures, undercounting of number of structures sprayed, and over-counting of eligible structures by counting food stores, were provided either in the field or through SMS to prevent repetitive errors. Moreover, the audit results made the mop-up operations easier. The most common issues found through the use of the DCV form are summarized in Table 14. The

TABLE 14: USE OF DCV FORM: COMMON ISSUES AND CORRECTIVE ACTIONS

Errors/Issues Observed	Corrective Actions Taken
Improper household marking by spray operators – some spray operators were not marking structures found.	Supervisor provided on-the-spot retraining for spray operators and monitored their performance through subsequent supervisory visits.
IRS Cards – some spray operators did not record all of their relevant information on household IRS cards.	The supervisory team identified the problem and carried out intensive onsite support and training. The support was given particularly to spray operators who were found to commit the error frequently.
Not recording non-sprayed structures – some spray operators did not record data on non-sprayed structures on their spray operator forms and did not mark the structures.	Spray operators were provided on-the-spot training on recording all eligible structures found, both sprayed and non-sprayed, to ensure that more structures were sprayed.

8.3 DATA STORAGE

Hard copies of the Daily Spray Operator Forms are stored at the data entry centers at each district during the spray campaign. Upon completion of the spray exercise, the data cards are collected from each data entry center and brought to a central storage place at the Tororo field office for safe custody. The forms were filed by date and store to provide a uniform categorization system and facilitate easy reference. Data backup was done in each of the data entry clerks' back-up folder, created on each laptop, to avoid incidental loss of data. A copy of the data was also sent to the Database Manager through the District Biostatistician for back-up in the project server.

9. RESULTS

9.1 TOTAL NUMBER OF STRUCTURES AND POPULATION CAPTURED IN 2018 SPRAY CAMPAIGNS

9.1.1 STRUCTURES FOUND

Spray operators found a total of 1,369,305 eligible structures during the 2018 spray campaign in Phases I and II. Of the structures found, 1,292,309 structures were sprayed, for an overall spray coverage rate of 94.4%. All districts exceeded the minimum required coverage rate of 85%. District-level data is presented in Table 15. Detailed spray data by sub-county is shown in Annex F. Annex G presents the spray data disaggregated by structure type. Out of the total houses found, 254,332 were permanent, 290,329 semi-permanent, and 824,644 temporary houses, which are primarily grass thatched structures.

The main reasons for non-sprayed structures included 82,766 structures where household owners were storing large amounts of food in their homes that could not be moved for spraying (as opposed to in standalone granaries that people do not sleep in), locked structures (19,290), and refusals (5,840). Main reasons for refusals are summarized in section 11.1.

9.1.2 POPULATION PROTECTED

IRS provided protection to a total of 4,436,156 people, including 121,590 pregnant women and 892,390 children under five years of age. See Table 15 for a breakdown of population protected by district.

TABLE 15: DISTRICT SUMMARY OF PHASE I AND II CAMPAIGN 2018 SPRAY RESULTS

Spray Campaign	District	Structures Found	Population Found	Structures Sprayed	Sprayed Structures				% Population Protected
					Spray Coverage (%)	Total Population Protected	Pregnant Women	Children <5	
Phase I	Alebtong	92,544	238,372	84,098	90.9	220,260	4,570	39,041	92.4
	Amolatar	63,178	165,667	60,687	96.1	161,721	3,835	30,393	97.6
	Budaka	64,353	252,097	61,437	95.5	245,064	6,688	52,086	97.2
	Butaleja	78,743	311,336	73,938	93.9	298,256	9,056	65,762	95.8
	Butebo	43,540	153,390	41,303	94.9	150,497	4,547	30,147	98.1
	Dokolo	73,300	197,253	69,138	94.3	187,271	4,449	33,363	94.9
	Namutumba	93,116	364,102	90,090	96.8	357,286	11,562	74,865	98.1
	Pallisa	94,712	333,601	91,130	96.2	323,168	8,824	64,103	96.9
Total		603,486	2,015,818	571,821	94.8	1,943,523	53,531	389,760	96.4
Phase II	Bugiri	131,566	493,348	124,720	94.8	477,094	14,099	105,199	96.7
	Kaberamaido	86,959	248,276	82,948	95.4	239,486	5,957	48,422	96.5
	Kibuku	65,767	257,086	62,855	95.6	250,096	7,619	54,734	97.3
	Lira	154,173	484,612	132,944	86.2	440,295	12,800	72,882	90.9
	Otuke	45,215	124,762	44,499	98.4	123,377	3,160	24,622	98.9
	Serere	112,072	354,824	109,630	97.8	350,202	9,809	78,168	98.7
	Tororo	170,067	627,992	162,892	95.8	612,083	14,615	118,602	97.5
Total		765,819	2,590,900	720,488	94.1	2,492,633	68,059	502,629	96.2
Grand total		1,369,305	4,606,718	1,292,309	94.4	4,436,156	121,590	892,389	96.3

9.2 USE OF MOSQUITO NETS

Across the 15 districts, households reported having 2,123,656 mosquito nets at the time the spray operator visited during the April–May, June–July, and September 2018 spray campaigns. Additionally, 730,427 (34.7 %) children under five years of age were reported as having slept under a mosquito net the previous night (Annex H).

9.3 INSECTICIDE CONSUMPTION AND SPRAY OPERATOR PERFORMANCE INDICATORS

Spray operators used 554,568 bottles of Actellic 300CS during the 2018 spray campaign. On average, spray operators sprayed 7.2 structures per day, and 2.3 structures were treated per bottle of insecticide. Annex I provides a detailed breakdown of insecticide use and spray operator performance per district.

10. GENDER

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:

- Explicit inclusion of 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 spray operators, and presented data that show that women are as effective as their male counterparts in terms of structures sprayed per day. The project emphasized placing qualified women into supervisory roles and into highly gender-segregated roles: storekeepers, sub-county supervisors, team leaders, and parish supervisors.
- Continuing promotion of a respectful working environment through the project's sexual harassment policy for all employees.
- 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 and recruited during the campaign are assigned to roles without exposure to insecticide.
- Ensuring women have accommodations in operational sites where they feel safe and comfortable, including separate bathrooms and showers equipped with sanitary bins and PPE in appropriate sizes.
- Creating an adaptable system that enables two women to be together on a spray team.
- Providing sex-disaggregated data for all indicators, as appropriate.
- Job-sharing: allowing two women to share one position to increase the acceptability of women working on IRS, and to mitigate concerns about balancing seasonal IRS labor with household responsibilities. This approach worked well and will be implemented more broadly next year.

During the 2018 IRS campaign, women represented 32% of all seasonal staff. 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 a typical activity for men, which acts as a barrier in hiring more women for IRS. Table 16 below provides details on female participation during the 2018 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. VectorLink Uganda will share lessons learned on engaging women in security functions with other VectorLink country teams. In future years, the project will adapt its recruitment practices to move towards more-egalitarian hiring across all cadres.

TABLE 16: SEASONAL WORKERS DURING THE 2018 IRS CAMPAIGN

Category	Female	Male	Total	% Female
Mobilizers	104	368	472	22.0
Team leaders	303	964	1,267	23.9
Sub-county supervisors	39	159	198	19.7
Spray operators	1,872	4,384	6,256	29.9
Data clerks	23	33	56	41.1
Parish supervisors	107	369	476	22.5
Washers	716	43	759	94.3
Store keepers	102	360	462	22.1
Guards	221	703	924	23.9
Project assistants	2	5	7	28.6
Total	3,489	7,388	10,877	32.1

II. MOH CAPACITY BUILDING

The PMI VectorLink Uganda Project built 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, environmental compliance, M&E and IRS planning and implementation. VectorLink Uganda conducted a training of master trainers (refer to Table 3) 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 2018 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 spray operators and other actors at the district level. Detailed training information is included in section 2.4.4. Also, while this activity was not originally included in the 2018 VectorLink Uganda work plan, a national and district-level boot camp has been approved by PMI to take place in December 2018. Two Home Office staff will travel to Uganda to conduct a 6-day comprehensive training on all aspects of IRS.

12. CHALLENGES, LESSONS LEARNED AND RECOMMENDATIONS

12.1 CHALLENGES

Overall the 2018 spray campaign was successful, but the project also experienced several challenges during this campaign. The main challenges experienced during the IRS campaign included:

- At the project level, there was a need to reinforce the trainings especially with regard to supervision during spray activities. Supervision was a key challenge observed during spraying the Phase I districts with IRS supervisors paying limited attention to their roles leading to inaccurate data capture by spray operators.
- With the introduction of smartphones as a supervisory tool, errors in checklist use were noted in the Phase I campaign. It was also noted that some team leaders were not supervising the end of day clean-up processes.
- The project encountered a number of incidents during the 2018 spray campaign including insecticide pilferage and data falsification. These incidents can be attributed to supervision challenges on the ground, as well as the sub optimal quality of some of the recruited spray team members, who were dishonest. The project is aware of these challenges and will ensure that there is extra scrutiny before recruiting spray operators for upcoming spray campaigns. The project will also address these challenges in appropriate trainings and enhance on the ground supervision to avoid these incidents in the future.
- The project encountered resistance to IRS in semi-urban and urban centers, especially in Lira and Tororo, due to strong insecticide odor, staining of walls by insecticide residues, general inconvenience associated with moving household items to make room for spraying, and claim of application of alternative vector control interventions such as use of long-lasting insecticide treated nets. This also resulted in low IRS compliance in these centers.
- During this campaign, the project operated 462 sites at the parish level and these many operational sites were associated with high costs of supervision and also compromised the quality of supervision. The project is discussing ways to merge some sites to reduce the total number of operational sites to help address these challenges.
- There was also limited compliance to filling of the supervisory tools by the different supervisors. Supervisors had a target of five entries per tool per day which was largely not complied too especially in areas where there was resistance. Supervisors concentrated more on mobilization and community engagement while others took time to get familiarized with the tools since these tools were being used for the first time.
- There were some reports of forced entry by district authorities in Lira district, which created negative publicity for IRS. The district officials sometimes have the misconception that they have the right to enforce implementation of all government programs.
- Resistance/refusal of IRS by some households in rural communities in the target districts due to:

- Strong and long-lasting odor of Actellic 300CS, and competing farming activities that took them away from home
- Presence of bedbugs after spraying, which was attributed to IRS.
- Resistance to IRS from some religious sects, especially in Budaka.
- Resistance to IRS by organic farmers in Dokolo district, fearing likely insecticide contamination of their produce, leading to low pricing or ultimate rejection of the produce.
- Limited participation by some cadres of government officials in IRS activities. This included complaints from LCIs regarding their per diem package, which they felt was inadequate given their efforts during IRS. As a result some of the LCIs were reluctant to devote time to IRS activities. Similarly, limited participation of some DHEs in mobilizing the communities, due to competing NGO activities in some districts.
- Some communities that did not benefit from the government-sponsored Operation Wealth Creation Program, where households received free agricultural inputs, tended to resist IRS because they felt left out as beneficiaries of all government-sponsored programs.
- Inaccessibility of target communities due to poor roads caused by flooding in Butaleja and Alebtong districts and reduced spray performance by spray operators due to heavy rains.

12.2 LESSONS LEARNED AND RECOMMENDATIONS

- Based on the supervision gaps identified in the Phase I districts, the project put in place a robust training plan to address all the key gaps and challenges identified. The Director of Vector Control – PMI VectorLink Project, Mr. Allan Were, helped the project develop the training and supervision plan. This included training of different cadres of personnel on supervision, including the project staff, the team leaders, and the sub-county and parish supervisors. These trainings focused on: the participants' roles as supervisors; understanding the supervision plan; the participants' roles in supporting the insecticide supply chain management; instilling a sense of accountability in the supervisors; using the supervision tools to detect and deter lack of discipline among seasonal workers; and proper incident reporting.
- The team leader training also emphasized the end of the day clean-up process to ensure that the spray operators employed the correct progressive rinsing procedures, and protected themselves and the environment as per PMI BMP standards. Please note that all supervisors will need refresher training before the next spray campaign on the content of the supervisory tools.
- The project also instituted a stronger supervision structure in the field, which included team leaders and parish supervisors. These cadres were trained to conduct supervision in the field using the appropriate supervision tools including the DCV. As a result of these measures, supervision in the field was strengthened. Phase II saw significant reduction in errors in conducting supervision with smart phones, as the majority of the supervisors had by then become more familiar with the tool. However, despite the strengthening of the supervisory structure, the project is mindful that further improvements are needed to strengthen supervision, ensure that the results are being closely monitored to take any necessary prompt corrective actions.
- The project is mindful of the fact that no force should be used at the community level, and no one should be forced to spray their houses. The project continued to engage with the district leadership in Lira regarding the use of force and encouraged constructive dialogue at the community and household levels.

- Despite the increased supervisory structures, improvements need to be made to strengthen supervision and ensure the results are being closely monitored to take any necessary corrective actions.
- To mitigate the resistance among the organic farmers, the project worked with the district local government, MOH/NMCP and PMI to hold a meeting with the districts' leadership, leaders of organic farmers, the PMI Uganda team and the NMCP/MOH to resolve mobilization issues and come up with a model that supports co-existence of both IRS and organic farming. One key lesson learned was that early engagement is needed for resistant communities. This is especially true of the organic farmers who strongly resist IRS. The project will continue to actively engage with the organic farmers about IRS, seeing how spraying schedules can be adjusted based on harvesting of crop schedules. The district leadership and PMI Uganda need to engage the organic farming agents on alternative methods of securing their crop post-harvest.
- The project continued to engage leaders of the resistant communities in dialogues to enlist their support as satisfied users or champions in mobilizing their own groups to embrace IRS.
- The project held community dialogues and engaged in IPC to dispel the prevalent myths about IRS especially with regard to bedbugs. These issues were also addressed in radio talks and radio shows.
- EC is an integral and essential part of IRS activities, and therefore all project staff and supervisors should pay close attention to EC during campaign supervision. In year two, the store managers, DEOs, and district Malaria Focal Persons for all 15 project districts should participate in a refresher training on EC to ensure they are able to offer support and supervision in all areas of EC.
- The number of operational sites should be reviewed and possibly reduced to provide a selection of better located stores and allow more efficient preparation of the stores for a quality IRS campaign.

ANNEX A: 2018 IRS PROCUREMENT

TABLE A-1: PPE AND OTHER SUPPLIES PROCURED

Item	Description	Quantity Procured	Units
1	Paracetamol 500mg tab (10 blister of 10 tabs)	61	Pieces
2	Hydrocortisone 1% cream 15g	508	Vials
3	Eye wash – gentamycin 0.3% eye/ear drops 10ml	497	Packets
4	Clotrimazole antibiotic cream	548	Tubes
5	Crepe bandage elastic 10cm x 4-4.5cm stretched	24	Bottles
6	Adhesive tape 7.5cmx4m	141	Tubes
7	Band-aid strips – plasters	75	Pieces
8	Gauze rolls, 7.5cm x 5cm	156	Pieces
9	Alcohol swabs – disinfectant wipes (individually wrapped)	5	Packets
10	Pregnancy test strips (HCG)	2,700	Packets
11	Atropine 1mg/ml in 1ml amp	6	Packets
12	Sanitary pads always	276	Packets
13	Apron	106	Pieces
14	Face shield	555	Pieces
15	Helmets	284	Pieces
16	Mouth/nose masks (box of 20 pcs.)	7,325	Boxes
17	Socks, cotton (pair)	1,837	Pairs
18	Nylon rope (15 M)	96	Pieces
19	Basin (40-litre)	147	Pieces
20	Polythene sheet (1 meter)	1,906	Pieces
21	Polythene sheet (23 meters)	6,118	Pieces
22	Oil dispenser	181	Pieces
23	Washing soap (bar of 5 pcs)	52	Cartons
24	Lubricating oil (0.5-litre)	36	Bottles
25	Batteries – C or D cell (pair)	1,057	Pairs
26	Liquid soap (20-litre jerry can)	62	Jerry cans
27	Exercise books (48pgs) (pcs)	1,142	Books
28	Pen (pcs)	1,254	Pieces
29	Marker (pcs)	60	Pieces
30	Neck protection	7,500	Pieces
31	Toothbrushes	4,000	Pieces
32	Punching machines	24	Pieces
33	Long scrubbing brush with hard and long bristles	268	Pieces
34	Short scrubbing brush with soft bristles	268	Pieces
35	Danger warning signs for stores	300	Pieces
36	Araldite	585	Pairs

Item	Description	Quantity Procured	Units
37	Laptops for data entry	24	Units
38	Smartphones	200	Pieces
39	Laptops for project staff	25	Pieces
Printed Materials			
40	Emergency Response procedure	300	Pieces
41	Operators Health and Safety	300	Pieces
42	Spill Response Procedure	300	Pieces
43	MSDS Actellic	300	Pieces
44	TOT Handout Books	600	Books
45	IRS Team Leader Guides	1,300	Books
46	Household cards	500,000	Pieces

ANNEX B: INSPECTION REPORTS AND SUPERVISION RESULTS

2018 MID- AND POST-SPRAY INSPECTION REPORTS

INTRODUCTION

The PMI VectorLink Uganda Project conducted 2018 spray operations from April 9 to July 11, 2018 in all 15 PMI/DFID supported districts. During the campaign, the entire IRS project technical team and supervisors were involved in EC inspections for the duration of IRS. The team members were distributed to the districts to conduct intensive supervision and undertook mid-, and post-spray inspections of the spray campaign in all districts to ensure quality IRS during the 2018 campaign.

During the supervision and EC inspection visits, the team used project-wide IRS checklists to observe soak pits, bathrooms, insecticide storage conditions, community involvement, household preparation, IEC, and performance of spray operators. District staff, MOH and sub-county supervisors were also actively involved as supervisors using checklists installed on smartphones. At the end of each day, district supervisory teams held a general discussion on the status, achievements, shortcomings, and constraints and then forwarded the recommendations to district offices for corrective actions to be taken.

GENERAL OBSERVATIONS

All the soak pits in the project districts were inspected by IRS supervisors spearheaded by the project EC team prior to the start of spray operations. The EC gaps identified during the inspections were shared and discussed with all stakeholders during the TOT, and roles for implementing corrective measures were shared and addressed accordingly. All project-supported districts have stores in which to keep insecticides and other IRS materials. Due to limited space in some stores to accommodate insecticide amounts received, the project distributed 95% of the total amount of insecticide required at each parish store.

Insecticide-contaminated wastes such as empty bottles, used masks, torn gloves, and contaminated cartons have been collected and stored at the district stores before shipping to the disposal plants. Empty bottles and cartons will be provided to the recyclers as per signed memorandums of understanding (MOUs) for recycling. Incineration of the used masks will be incinerated at the designated incineration company.

MID-INSPECTION OBSERVATIONS

The store keepers numbered/serialized all the bottles of insecticides and distributed them to each spray team as required.

- Most of the district stores had proper working soak pits and cleaning procedures were followed correctly.
- Insecticide and other IRS materials were properly kept in good lockable stores to prevent insecticide contamination.
- The majority of homeowners removed their belongings, including food items from the houses prior to spraying. In a few cases where this was not done, spray operators and SLs provided support.

- IRS project provided all districts with plastic sheets to cover household items that were kept inside during spraying.

POST-SPRAY ACTIVITIES AND INSPECTIONS

Collection of contaminated IRS wastes (empty bottles, cartons and used masks) from the district stores were collected to the central warehouse in Bugiri and Lira waste stores.

- PPE, including coveralls, were properly washed and stored in the district stores.
- Spray pumps were cleaned and stored.
- All unused insecticide is stored safely in the district stores for use in the next spray campaign.
- Soak pits are cleaned, covered and closed.
- Polyethylene sheets used as ground cover on soak pit sites were washed and stored in district stores.
- Plastic sheets were properly collected from spray operators, washed and stored properly.

RECOMMENDATIONS

- Ensure availability of appropriate storage space to store the full amount of insecticides needed for an area.
- Continued hire of private storage facilities.

TABLE B-1: ENVIRONMENTAL MITIGATION AND MONITORING REPORT

Mitigation Measure	Status of Mitigation Measures	Issues Relating to Required Conditions	Remarks
<p>Pre-contract vehicle inspection and certification of vehicles used for project staff and pesticide and transportation</p>	<ul style="list-style-type: none"> • All drivers of transportation vehicles were trained on safety precautions to undertake while transporting insecticides and project staffs during spray campaign. They were issued with training certificates and made to sign Abt vehicle usage policy. • A total of 36 vehicles were inspected and issued with vehicle inspection certificates. 8 were trucks for transportation of insecticide and 28 were passenger vehicles. • The drivers for vehicles submitted their phone numbers during the training. They received basic PPE including respiratory masks, overalls, and spill response procedure. • All insecticide transportation trucks were provided the spill response kit and polythene sheets to lay down on the vehicle floor before loading the insecticide. 	<ul style="list-style-type: none"> • The gaps identified were first aid kit and fire extinguishers in both trucks and passenger vehicles. • None of the 8 trucks for insecticide transportation had spill response kit at the time of inspection. 	<ul style="list-style-type: none"> • The EC team and the Logistics Coordinator ensured all the vendors install these items to meet the criteria specified in the BMP before passing the vehicles which lack first aid kit and fire extinguishers. However, effective 2019 campaign, the PMI VectorLink Uganda shall provide all hired vehicles with fire extinguishers, first aid kit, and spill response kit. • In order to ensure that all vendors supply vehicles to standards, the bid document should include the requirement of first aid kits, and fire extinguishers. • Provision of spill response kit for trucks will be made mandatory in coming 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 462 parish stores and soak pits were sited 30 meters away from schools, and residence. • 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 used- sawdust, charcoal, bigger stones, smaller stones, and gravel as the top layer installed, to avoid percolation of effluent and allow ample time for treatment of effluent respectively. • All the wash area were sloped at declination towards soak pit and covered with polythene sheets to avoid seepage, gather and discharge all the wastewater generated from the wash area into the soak pits 	<ul style="list-style-type: none"> • Not all soak pits were upgraded to 2m x 1m x 1m deep in Phase I districts. Due to the short period of time amidst the transition, some retained their previous size but the walls were lined with polythene sheets and the charcoal content double to enable proper treatment of effluent. 	<ul style="list-style-type: none"> • In the next campaign, all soak pits in Phase I districts will be built to standard 2m x 1m x 1m deep.
Medical examination of the spray team for fitness to handle and use insecticide during spray campaign.	<ul style="list-style-type: none"> • All female actors recruited were screened exclusively for pregnancy. Of 3,476 females tested, only six were found pregnant. • In addition, together with male spray actors, they were all subjected to health fitness test. The process was carried out by the Clinicians and laboratory personnel who attended training on insecticide poison management in IRS. 	<ul style="list-style-type: none"> • The number of clinicians and laboratory personnel is insufficient to manage a large number of the spray team in the shortest period possible. 	<ul style="list-style-type: none"> • In the next campaign, more Clinicians and Laboratory personnel needs to be trained to improve on the quality of the medical examination process by each handling at least 15 spray actors per day of screening.
Preparedness to cases of insecticide exposures during spray campaign	<ul style="list-style-type: none"> • 177 health facilities in the categories of Health Center IIIs, HC IVs and Government referral Hospitals in the 15 project districts were equipped with of atropine. • All the 462 parish stores were equipped with fully stocked first aid kits. 		

Mitigation Measure	Status of Mitigation Measures	Issues Relating to Required Conditions	Remarks
<p>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</p>	<ul style="list-style-type: none"> • 462 store keepers 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 spray operators. • All stores received danger warning signs, emergency response procedures, spill response procedures and spray operators' health and safety. • Use of PPE was incorporated into all training provided in 2018. Spray operators received PPE and a pair of neck cover protection. • Training on the mixing of insecticide (Actellic 300CS) was done at TOT at the district level and during cascade training at sub-county and no mistake in mixing which could compromise the quality of spray. • At all parish stores, the supervision team ensured that all the wastewater and remaining insecticides from barrel 1, 3, 5 and 7 are taken back to the field in the next morning. 	<ul style="list-style-type: none"> • There were 227 and 55 cases in Phase I and II respectively out of 3967 Homeowner Preparation supervisory reports indicating spray operators not wearing full PPE. • For all the 204 and 1141 spray operator early morning mobilization conducted in Phase I and Phase II campaign respectively, none of the spray operators have flashlights/torch. • 345 cases recorded out of 1,372 store keeper performance supervisory report indicated that the fire extinguishers and thermometers were missing. • 21 cases of spray operators not using insecticide left over from previous day and wastewater were recorded out of 1,346 spray operator early morning mobilization conducted 	<ul style="list-style-type: none"> • There is a need to prepare a video on the use of PPE and play it during the rehearsal training on PPE use. • Old boots and coveralls need to be changed with new ones. • There is a need for a practical demonstration to supervisors during boot camp on how to conduct a direct observation of spray operators' performance. • Flashlights/torches need to be procured for the spray operators in the next campaign. • Despite all parish stores in Phase II were equipped with thermometers, there is a need to equip Parish stores with thermometers and fire extinguishers in the next campaign. • The team leaders and parish supervisors should ensure that all insecticide leftovers and wastewater are taken back to the field. This will be emphasized during TOT and to the supervisors.

Mitigation Measure	Status of Mitigation Measures	Issues Relating to Required Conditions	Remarks
<p>Team leaders conducting the physical inspection of spray operators to ensure that they are healthy and provision of breakfast to spray operators before wearing PPE and departure to the field</p>	<ul style="list-style-type: none"> The team leaders were supplied with spray operator early morning health checklist to conduct health checks for spray operator. For 2018 campaign, the project ensured that all spray operators are provided with breakfast before wearing PPEs and departure to the field and avoid the temptation of spray operator eating while working in the field. 	<ul style="list-style-type: none"> 27 cases of team leaders not conducting the physical inspection of spray operators every morning was recorded out of 1,346 early mobilization supervisory reports. In 44 cases and 65 cases out of 1,346 morning mobilization inspection conducted indicated spray operators not properly fed or hydrated prior to leaving operation sites for work, respectively. 	<ul style="list-style-type: none"> In the next campaign, the store keepers and Team Leaders will be tasked to ensure that all spray operators eat together in the distance 30 meters away from the store and every spray operator must sign on breakfast attendance list. During the TOT in the next campaign, it should be emphasized to the TLs that it is mandatory to conduct the physical inspection of spray operators every morning before departure to the field
<p>Spray operators giving messages to homeowners to remove all the items before spraying, close the door for at least 2 hours, open the door for 30 minutes to allow fresh air in, then swept from the door inwardly and collect the dead mosquitoes and insect and dump them into a pit latrine, continue to sleep under mosquitoes net and wash itchy skin and go to health clinic if symptoms they experience any feeling of insecticide exposure.</p>	<ul style="list-style-type: none"> The spray operators during the campaign did send out the keys to the homeowners during the spray in Phase I and Phase II spray campaign. During the spray campaign, for all reported cases of non-compliance - by failing to remove items from the houses - the team leaders, parish supervisors, and spray operators 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 spray operators were not giving the right information. 56 cases of the residents not informed of the potential exposure protocol were recorded out of 4491 homeowner supervisory reports, 6 cases of household items not removed from the area before spraying the eaves, were recorded 	<ul style="list-style-type: none"> In the next campaign, all spray operators, project staff, and supervisors involved in the spray campaign should always ensure that the key messages are given to every holds before spraying. Although, the involvement of mobilizers, district, sub-county, and community leaders in the operation improve on the level of community participation in the spray.

Mitigation Measure	Status of Mitigation Measures	Issues Relating to Required Conditions	Remarks
Provision of adequate facilities and supplies for end-of-day cleanup.	<ul style="list-style-type: none"> For each parish store in Phase I and II campaign, 2 long overalls hanging ropes, 7 barrels and 2 basins were supplied to hold leftover insecticide, wastewater, wash strainers, soak CFVs and Nozzles during and after the triple rinsing process respectively. 	<ul style="list-style-type: none"> 3 cases of wastewater not being collected in the drum, 5 cases of overalls not properly washed and dried, out of 1194 end of day clean supervisory reports were recorded. 	<ul style="list-style-type: none"> Team leaders and parish will have to strengthen the end of day cleanup process in the next campaign.
	<ul style="list-style-type: none"> For the 2018 spray season, purging of the hose, lance, CFV, and nozzle with each rinse was incorporated in the progressive rinsing procedure This rinsing procedure was demonstrated at all levels of TOT and was practiced during the spray campaign. 	<ul style="list-style-type: none"> The challenge after this change was that the level of compliance was low as the spray operator found it tiresome and time-consuming by purging the nozzle and spraying into the barrels repeatedly during the triple rinsing process. 	
Identification of solid waste handling firms	<ul style="list-style-type: none"> In the initial stages prior to the spray campaign in Phase II district, 3 memoranda of understanding 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 cardboards and other paper wastes and Green Label Services Ltd to incinerate all the use nose masks, bicycle cushions and other contaminated combustible waste IRS waste materials 		<ul style="list-style-type: none"> The project ECO will be involved in the supervision of the recycling and disposal process by the waste firms to ensure that there high-level compliance
Management of IRS wastes	<ul style="list-style-type: none"> All waste generated by the project during the spray campaign and collected and segregated at the parish store, have been transferred to the district store for further sorting and will be consolidated at the two main wastes stores in Bugiri and Dokolo, quantified, packed and transferred to the recycling and disposal firms. 		<ul style="list-style-type: none"> The task of recycling and disposal will be accomplished by the waste recycling and disposal with whom the project signed an MOU

Mitigation Measure	Status of Mitigation Measures	Issues Relating to Required Conditions	Remarks
Indoor spraying of sprayable structure only.	<ul style="list-style-type: none"> Spray operators sprayed the indoor walls of living structures. This included inner walls, ceiling, and eaves. The structure such food stores, latrines, houses for elderly persons, where a newly born baby sleeping and animal sheds were not sprayed. 	<ul style="list-style-type: none"> From direct supervision, 17 cases of spraying operators covering food sacks and then spraying the food storage facilities were recorded. 	<ul style="list-style-type: none"> From environment and community health and safety perspectives, these cases were corrected on site and the spray operators warned seriously never to repeat the act.
Pump service, maintenance, and calibration	<ul style="list-style-type: none"> All pumps were first checked and repaired at the district stores prior to the campaign to ensure no pump with leakage is put at parish store for spray exercise. Each parish store was provided a spare pump. In addition, to trained pump technicians, spray operators, Supervisors, and Team leaders were trained on pump maintenance. The Team leaders and spray operators check their pumps on daily basis to ensure no leakage and conducted pump maintenance every rest day i.e., 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 1194 spray operator performance inspections conducted showed there were pump leakages. 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 are often found with frequent breakdown should be replaced in the next campaign. The high level of rapid pump maintenance exhibited in 2018 campaign should be maintained or even exceeded where possible. More stock black rings for CFV should be procured.
Choice of selection of sites for disposal of wastewater including mobile soak pit 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 changed to be non-compliance after heavy precipitation for a good number of days that the water table rose up and the soak 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 anytime in event of the heavy precipitation, should be strictly avoided.

Mitigation Measure	Status of Mitigation Measures	Issues Relating to Required Conditions	Remarks
IEC campaigns to inform homeowners of their responsibilities to health and safety during the spray campaign	<ul style="list-style-type: none"> • The project produced IRS community roll poster 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 medium representatives were oriented on the IRS project. • Interpersonal communication (door to door) and dialogue engagements with the most resistance community was conducted in all the 15 project districts to establish compliance during the spray campaign 	<ul style="list-style-type: none"> • Religious sects were resistant to IRS including the Kanyiriri group in Pallisa and Kibuku. • There were groups of organic farmers in Bata and Okwalongwen sub-counties in Dokolo district that resisted IRS due to the fear of losing market 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 backup in a ledger. 	<ul style="list-style-type: none"> • One bottle of insecticide got lost from one spray operator in Namutumba district during Phase I and was not recovered. 	<ul style="list-style-type: none"> • Store keepers and team leaders should ensure that each spray operator signs for every insecticide bottle issued and fills in empty bottles.

ANNEX C: 2018 POST-IRS EVALUATION MEETING PARTICIPANTS

TABLE C-1: 2018 POST-IRS EVALUATION MEETING PARTICIPANTS

Areas	Professional category	Sex			Remarks
		M	F	Total	
Project districts	Malaria Focal Person	15	0	15	
MOH	NMCP	1	6	7	
CDFU	Project Team	5	4	9	
Project staff	Technical staff	6	23	29	
	Support staff	3	9	12	
Total		30	42	72	

ANNEX D: DATA COLLECTION AND QUALITY ASSURANCE TOOLS

TABLE D-1: VECTORLINK UGANDA IRS 2018 DATA COLLECTION TOOLS

Data Collection Tool	Usage
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 store keepers and team leaders for daily distribution and monitoring of insecticide stock and usage.
Daily spray performance summary form	Used by store keepers to summarize the daily data from each spray team to assess performance on a daily basis.

TABLE D-2: DATA QUALITY ASSURANCE TOOLS

<p>Data Collection Verification (DCV) Form</p>	<p>Purpose:</p> <ul style="list-style-type: none"> • 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. <p>Used during field audits by:</p> <ul style="list-style-type: none"> • IRS M&E and Database Managers • IRS Operations Manager • IRS Spray Operations district Coordinators • District staff • MOH staff • Technical project staff
<p>Data Entry Site Supervision Checklist</p>	<p>Purpose:</p> <ul style="list-style-type: none"> • To check the application of data entry and documentation protocols and provide on-the-spot support to data entry clerks (DECs) <p>Used during visits to data entry centers by:</p> <ul style="list-style-type: none"> • M&E Manager • M&E Coordinator • Database Manager • IT Specialist
<p>DOS, Direct Observed Spraying</p>	<p>Objective: Ensure spray quality, specifically insecticide mixing and spray technique, but also including personal, household and environmental safety</p> <p>Purpose.</p> <ul style="list-style-type: none"> • To make sure spray operators follow BMP and are immediately corrected if they are not • Ensure any gaps identified during the previous day are corrected, and any consistent or ongoing issues are escalated • Document gaps identified daily and bring it for the morning briefing session • Supervision team are expected to directly observe spray operators daily when within the household.

ANNEX E: NATIONAL AND DISTRICT STAFF TRAINED

Categories of Persons Trained	Training on IRS Delivery								Other Trainings																
	TOT		Spray Operations		Pump Technician Training		Poison Management		National Training on Updated WHO tube test guidelines		Data Capture and Reporting		EC, Washing, Fire Safety and Operation Site Security		Store Management and Safety		SBCC, Mobilization and Enumeration		Transport Safety and Security		Training of Master Trainers		Total (M/F)		Grand Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
*MOH Supervisors	4	2	4	2	0	0	4	2	0	0	4	2	4	2	4	2	4	2	4	2	4	2	4	2	6
*National Trainers	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
*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	16	4	16	4	0	0	16	4	0	0	16	4	16	4	16	4	16	4	16	4	16	4	16	4	20
Project Assistants	5	2	0	0	0	0	0	0	0	0	5	2	0	0	0	0	0	0	0	0	0	0	5	2	7
Data Entry Clerks	0	0	0	0	0	0	0	0	0	0	33	23	0	0	0	0	0	0	0	0	0	0	33	23	56
Clinicians	0	0	0	0	0	0	43	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	21	64
Parish Mobilizers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	539	103	0	0	0	0	359	103	462
*Sub-county Supervisors	157	39	157	39	0	0	157	39	0	0	157	39	159	39	159	39	157	39	159	39	0	0	159	39	198
*Parish Store keepers	360	102	360	102	360	102	360	102	0	0	360	102	360	102	360	102	360	102	0	0	0	0	102	360	462
*Parish supervisors	369	107	369	107	0	0	369	107	0	0	369	107	369	107	369	107	369	107	0	0	0	0	369	107	467
Team Leaders	0	0	964	303	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	964	303	1,267
Spray Operators	0	0	4,384	1,872	0	0	4,384	1,872	0	0	4,384	1,872	4,384	1,872	0	0	4,384	1,872	0	0	0	0	4,384	1,872	6,256
Washers	0	0	43	716	0	0	43	716	0	0	0	0	43	716	43	716	0	0	0	0	0	0	43	716	759
Drivers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	0	36

*Participants trained across all project areas.

ANNEX F: SUB-COUNTY SUMMARY OF CAMPAIGN 2018 SPRAY RESULTS

District	Sub-county	Structures Found	Sprayed					Total Population	% Population Protected
			Structures Sprayed	Spray Coverage (%)	Population Protected	Pregnant Women	Children <5		
Alebtong	Abako	12,606	11,815	93.7	28,700	623	4,982	30,768	93.3
	Abia	9,571	8,867	92.6	23,054	522	4,027	24,429	94.4
	Akura	9,480	8,744	92.2	22,949	392	3,762	24,506	93.6
	Alebtong TC	2,925	2,366	80.9	6,962	113	1,041	8,139	85.5
	Aloi	11,122	9,570	86.0	26,801	431	4,450	29,888	89.7
	Amugu	11,004	9,794	89.0	27,431	689	5,387	30,473	90.0
	Apala	8,584	7,912	92.2	20,036	351	3,187	21,367	93.8
	Awei	10,553	9,292	88.1	23,829	516	4,342	26,470	90.0
	Omoro	16,699	15,738	94.2	40,498	933	7,863	42,332	95.7
Alebtong Total		92,544	84,098	90.9	220,260	4,570	39,041	238,372	92.4
Amolatar	Agikdak	4,242	4,055	95.6	10,098	221	1,981	10,498	96.2
	Agwingiri	7,400	7,280	98.4	18,517	512	3,355	18,922	97.9
	Akwon	3,433	3,418	99.6	8,094	177	1,527	8,100	99.9
	Amolatar TC	4,336	4,130	95.2	13,036	295	2,102	13,232	98.5
	Aputi	6,004	5,887	98.1	15,824	362	2,878	16,125	98.1
	Arwotcek	7,291	7,233	99.2	18,532	386	3,839	18,788	98.6
	Awelo	5,669	5,379	94.9	13,503	268	2,414	14,201	95.1
	Etam	6,689	6,419	96.0	16,863	347	3,280	16,952	99.5
	Muntu	5,399	5,164	95.6	13,239	289	2,491	13,646	97.0
	Namasale	8,510	7,779	91.4	22,232	627	4,256	23,146	96.1

District	Sub-county	Structures Found	Sprayed				Total Population	% Population Protected	
			Structures Sprayed	Spray Coverage (%)	Population Protected	Pregnant Women			Children <5
	Namasale TC	4,205	3,943	93.8	11,783	351	2,270	12,057	97.7
Amolatar Total		63,178	60,687	96.1	161,721	3,835	30,393	165,667	97.6
Budaka	Budaka	3,626	3,562	98.2	13,881	347	2,968	14,033	98.9
	Budaka TC	7,422	6,899	93.0	29,469	572	5,040	30,928	95.3
	Iki+Iki	6,403	6,208	97.0	24,532	785	5,395	24,890	98.6
	Kachomo	5,376	5,124	95.3	18,147	518	4,269	18,398	98.6
	Kaderuna	4,977	4,804	96.5	19,486	621	4,104	19,809	98.4
	Kakule	3,863	3,725	96.4	13,856	332	2,988	14,062	98.5
	Kameruka	4,717	4,247	90.0	16,221	590	3,893	16,861	96.2
	Kamonkoli	7,803	7,379	94.6	31,617	737	6,160	33,335	94.8
	Katiira	3,916	3,831	97.8	15,110	411	3,201	15,480	97.6
	Lyama	5,744	5,536	96.4	22,845	764	5,483	23,768	96.1
	Mugiti	3,707	3,547	95.7	13,739	292	2,909	14,168	97.0
	Naboa	3,713	3,625	97.6	14,348	374	3,167	14,423	99.5
	Nansanga	3,086	2,950	95.6	11,813	345	2,509	11,942	98.9
Budaka Total		64,353	61,437	95.5	245,064	6,688	52,086	252,097	97.2
Bugiri	Budhaya	10,236	9,904	96.8	37,519	1,175	8,456	37,944	98.9
	Bugiri TC	14,186	13,360	94.2	45,010	1,572	7,519	46,719	96.3
	Bulesa	13,286	12,358	93.0	45,769	1,329	9,884	47,247	96.9
	Bulidha	10,140	9,177	90.5	35,403	1,093	7,627	37,487	94.4
	Buluguyi	10,859	10,461	96.3	40,597	1,301	9,771	41,544	97.7
	Buwunga	13,705	12,989	94.8	53,848	1,453	12,429	55,992	96.2
	Iwemba	7,105	6,787	95.5	26,568	729	5,995	27,564	96.4
	Kapyanga	15,335	14,486	94.5	55,427	1,307	12,606	57,496	96.4
	Muterere	12,224	11,905	97.4	42,945	1,542	9,647	43,662	98.4
	Nabukalu	12,556	12,082	96.2	49,480	1,366	11,647	51,249	96.5
	Nankoma	11,934	11,211	93.9	44,528	1,232	9,618	46,444	95.9

District	Sub-county	Structures Found	Sprayed					Total Population	% Population Protected
			Structures Sprayed	Spray Coverage (%)	Population Protected	Pregnant Women	Children <5		
Bugiri Total		131,566	124,720	94.8	477,094	14,099	105,199	493,348	96.7
Butaleja	Budumba	6,773	6,177	91.2	25,247	777	5,316	26,876	93.9
	Busaba	9,854	9,542	96.8	37,427	1,492	8,190	38,345	97.6
	Busabi	6,277	6,001	95.6	22,985	520	4,623	23,768	96.7
	Busolwe	4,677	4,496	96.1	17,885	520	4,144	18,683	95.7
	Busolwe TC	4,537	4,068	89.7	15,880	419	3,263	17,312	91.7
	Butaleja	4,899	4,665	95.2	19,591	555	4,139	20,224	96.9
	Butaleja TC	6,415	5,714	89.1	22,108	606	4,591	23,934	92.4
	Himutu	6,041	5,288	87.5	21,092	641	4,527	22,682	93.0
	Kachonga	6,780	6,483	95.6	28,914	1,023	7,427	29,479	98.1
	Mazimasa	9,550	9,255	96.9	38,468	1,075	8,125	39,531	97.3
	Nawanjofu	6,337	6,177	97.5	24,866	734	6,030	25,320	98.2
	Naweyo	6,603	6,072	92.0	23,793	694	5,387	25,182	94.5
Butaleja Total		78,743	73,938	93.9	298,256	9,056	65,762	311,336	95.8
Butebo	Butebo	9,376	8,712	92.9	31,876	926	6,124	32,640	97.7
	Butebo TC	4,958	4,861	98.0	16,613	598	3,284	16,874	98.5
	Kabwangasi	8,864	8,530	96.2	34,986	1,131	7,202	35,458	98.7
	Kakoro	6,981	6,495	93.0	22,797	654	4,429	23,183	98.3
	Kanginima	4,524	4,174	92.3	14,216	388	2,550	15,123	94.0
	Petete	8,837	8,531	96.5	30,009	850	6,558	30,112	99.7
Butebo Total		43,540	41,303	94.9	150,497	4,547	30,147	153,390	98.1
Dokolo	Adeknino	8,933	8,763	98.1	20,864	571	4,217	21,331	97.8
	Adok	7,466	7,363	98.6	19,267	444	3,582	19,411	99.3
	Agwata	8,003	7,835	97.9	19,500	419	3,197	19,872	98.1
	Amwoma	5,767	5,717	99.1	14,742	370	2,708	15,455	95.4
	Bata	6,460	5,082	78.7	13,841	262	2,334	17,070	81.1
	Dokolo	6,099	5,629	92.3	16,736	423	3,251	17,418	96.1
	Dokolo TC	7,418	6,636	89.5	21,060	555	3,689	23,089	91.2

District	Sub-county	Structures Found	Sprayed					Total Population	% Population Protected
			Structures Sprayed	Spray Coverage (%)	Population Protected	Pregnant Women	Children <5		
	Kangai	5,739	5,593	97.5	16,286	323	2,679	17,202	94.7
	Kwera	6,668	6,666	100.0	16,245	458	2,882	16,245	100.0
	Okwalogwen	4,996	4,212	84.3	13,574	315	2,267	14,811	91.6
	Okwongodul	5,751	5,642	98.1	15,156	309	2,557	15,349	98.7
Dokolo Total		73,300	69,138	94.3	187,271	4,449	33,363	197,253	94.9
Kaberaido	Alwa	8,953	8,562	95.6	25,078	478	4,595	25,988	96.5
	Anyara	11,184	10,427	93.2	26,820	723	5,657	28,643	93.6
	Apapai	4,419	4,139	93.7	11,454	255	2,304	12,014	95.3
	Aperikira	5,298	5,222	98.6	15,729	366	3,332	15,816	99.4
	Bululu	8,491	8,437	99.4	25,642	705	5,270	25,950	98.8
	Kaberaido	8,354	8,170	97.8	22,325	568	4,448	22,924	97.4
	Kaberaido TC	1,739	1,680	96.6	5,740	166	885	5,753	99.8
	Kakure	4,956	4,710	95.0	13,904	360	3,003	14,251	97.6
	Kalaki	6,596	6,186	93.8	18,265	434	3,624	19,092	95.7
	Kobulubulu	7,675	7,213	94.0	21,575	504	4,328	22,246	97.0
	Ochero	9,054	8,559	94.5	24,896	682	5,239	26,421	94.2
	Otuboi	10,240	9,643	94.2	28,058	716	5,737	29,178	96.2
Kaberaido Total		86,959	82,948	95.4	239,486	5,957	48,422	248,276	96.5
Kibuku	Bulangira	6,883	6,517	94.7	25,789	752	5,750	26,215	98.4
	Buseta	5,501	5,042	91.7	20,868	670	4,852	21,439	97.3
	Kabweri	4,733	4,632	97.9	18,962	493	3,898	19,790	95.8
	Kadama	6,271	6,174	98.5	24,771	680	5,396	25,198	98.3
	Kagumu	8,229	7,786	94.6	31,460	899	6,822	32,769	96.0
	Kasasira	8,253	8,067	97.7	32,614	1,047	7,496	33,633	97.0
	Kibuku	4,060	3,953	97.4	15,790	431	3,399	16,495	95.7
	Kibuku TC	3,140	3,040	96.8	11,337	345	2,308	11,510	98.5
	Kirika	8,118	7,851	96.7	29,673	835	5,909	30,165	98.4

District	Sub-county	Structures Found	Sprayed					Total Population	% Population Protected
			Structures Sprayed	Spray Coverage (%)	Population Protected	Pregnant Women	Children <5		
	Tirinyi	7,307	6,822	93.4	27,295	1,065	6,337	28,211	96.8
	Tiryini	3,272	2,971	90.8	11,537	402	2,567	11,661	98.9
Kibuku Total		65,767	62,855	95.6	250,096	7,619	54,734	257,086	97.3
Lira	Adekokwok	10,364	8,734	84.3	31,698	587	4,760	35,275	89.9
	Adyel Division	12,502	11,199	89.6	42,293	1,682	6,287	45,116	93.7
	Agali	7,471	4053	54.2	12,439	230	2,301	18,596	66.9
	Agweng	13,086	12,460	95.2	34,699	809	6,729	36,428	95.3
	Amach	11,972	7,663	64.0	24,580	413	3,913	34,180	71.9
	Aromo	17,194	16,148	93.9	45,454	1,286	8,947	48,512	93.7
	Bar	15,353	12,287	80.0	35,020	614	5,994	42,290	82.8
	Central Division	7,839	6,149	78.4	26,220	792	3,554	29,030	90.3
	Lira	9,870	9,236	93.6	35,320	753	4,979	36,576	96.6
	Ngetta	11,397	10,785	94.6	33,045	594	5,573	34,073	97.0
	Ogur	14,417	13,861	96.1	40,317	904	7,521	41,185	97.9
	Ojwina	18,785	17,273	92.0	67,105	3,605	10,691	71,198	94.3
	Railway Division	3,923	3,096	78.9	12,105	531	1,633	12,153	99.6
Lira Total		154,173	132,944	86.2	440,295	12,800	72,882	484,612	90.9
Namutumba	Bulange	17,319	16,929	97.7	67,425	2,170	15,067	68,027	99.1
	Ivukula	17,860	16,729	93.7	61,362	2,334	13,297	63,590	96.5
	Kibaale	12,115	12,042	99.4	50,114	2,324	11,606	50,410	99.4
	Kigulu	4,959	4,845	97.7	18,943	555	3,806	19,122	99.1
	Kiwanyi	4,358	4,358	100.0	16,997	514	3,554	16,997	100.0
	Kizuba	3,634	3,578	98.5	13,732	370	2,896	13,829	99.3
	Magada	3,065	3,036	99.1	11,866	267	2,483	12,017	98.7
	Mazuba	3,080	3,061	99.4	13,807	372	3,168	13,853	99.7
	Namutumba	9,534	9,358	98.2	35,916	879	7,385	36,386	98.7
	Namutumba TC	9,121	8,518	93.4	32,690	1,069	5,817	34,226	95.5

District	Sub-county	Structures Found	Sprayed					Total Population	% Population Protected
			Structures Sprayed	Spray Coverage (%)	Population Protected	Pregnant Women	Children <5		
	Nawaikona	4,480	4,258	95.0	21,723	366	3,230	22,231	97.7
	Nsinze	3,591	3,378	94.1	12,711	342	2,556	13,414	94.8
Namutumba Total		93,116	90,090	96.8	357,286	11,562	74,865	364,102	98.1
Otuke	Adwari	4,483	4,411	98.4	12,014	315	2,376	12,117	99.1
	Agwete	265	265	100.0	658	19	167	661	99.5
	Alango	6,652	6,559	98.6	18,589	313	2,718	18,884	98.4
	Ogor	6,255	6,204	99.2	17,333	434	3,710	17,431	99.4
	Ogwete	5,288	5,275	99.8	15,911	559	3,926	15,937	99.8
	Okwang	9,515	9,396	98.7	24,328	601	4,854	24,549	99.1
	Olilim	5,843	5,616	96.1	16,167	493	3,466	16,542	97.7
	Orum	4,325	4,221	97.6	11,239	268	2,183	11,419	98.4
	Otuke TC	2,589	2,552	98.6	7,138	158	1,222	7,222	98.8
Otuke Total		45,215	44,499	98.4	123,377	3,160	24,622	124,762	98.9
Pallisa	Agule	5,543	5,459	98.5	20,571	546	4,080	21,284	96.7
	Akisim	4,735	4,377	92.4	16,063	455	3,105	16,820	95.5
	Apopong	9,060	8,684	95.8	31,251	783	6,600	31,817	98.2
	Chelekura	4,390	4,101	93.4	14,774	442	2,665	15,783	93.6
	Gogonyo	9,718	9,575	98.5	35,153	1,109	7,736	35,525	99.0
	Kameke	6,481	6,368	98.3	19,711	529	4,003	19,799	99.6
	Kamuge	6,432	6,269	97.5	23,923	575	4,895	24,136	99.1
	Kasodo	5,523	5,416	98.1	18,348	360	3,604	18,445	99.5
	Kibale	5,575	5,437	97.5	17,942	511	3,341	18,210	98.5
	Olok	5,567	5,434	97.6	18,685	502	3,871	18,891	98.9
	Opwateta	5,323	4,560	85.7	16,006	467	3,424	18,285	87.5
	Pallisa	6,699	6,187	92.4	21,929	651	4,058	24,497	89.5
	Pallisa TC	11,653	11,294	96.9	40,504	932	6,693	41,721	97.1
	Puti+Puti	8,013	7,969	99.5	28,308	962	6,028	28,388	99.7

District	Sub-county	Structures Found	Sprayed					Total Population	% Population Protected
			Structures Sprayed	Spray Coverage (%)	Population Protected	Pregnant Women	Children <5		
Pallisa Total		94,712	91,130	96.2	323,168	8,824	64,103	333,601	96.9
Serere	Atiira	8,457	8,275	97.8	24,697	556	4,860	25,000	98.8
	Bugondo	14,436	14,247	98.7	42,972	1,160	9,620	43,117	99.7
	Kadungulu	12,602	12,463	98.9	40,103	1,252	10,092	40,513	99.0
	Kasilo TC	1,528	1,485	97.2	4,783	109	906	4,878	98.1
	Kateta	20,484	19,862	97.0	68,810	2,110	15,935	70,310	97.9
	Kyere	18,492	18,020	97.4	57,143	1,392	11,975	57,572	99.3
	Labori	7,249	7,116	98.2	24,452	827	6,219	24,687	99.0
	Olio	10,484	10,208	97.4	31,428	788	6,291	32,021	98.1
	Pingire	14,341	13,966	97.4	43,622	1,298	9,900	44,525	98.0
	Serere TC	3,999	3,988	99.7	12,192	317	2,370	12,201	99.9
Serere Total		112,072	109,630	97.8	350,202	9,809	78,168	354,824	98.7
Tororo	Eastern Division	7,106	6,722	94.6	31,473	662	4,188	32,744	96.1
	Iyolwa	6,922	6,671	96.4	25,719	767	5,538	26,446	97.3
	Kirewa	10,194	9,811	96.2	34,565	870	7,157	35,357	97.8
	Kisoko	5,779	5,528	95.7	21,812	410	4,241	22,436	97.2
	Kwapa	7,723	7,521	97.4	24,864	488	4,643	24,927	99.7
	Malaba TC	5,467	5,013	91.7	18,733	561	3,382	19,698	95.1
	Mella	6,711	6,292	93.8	21,500	383	3,982	22,093	97.3
	Merikit	8,446	8,257	97.8	31,328	688	6,170	31,792	98.5
	Mogola	6,902	6,450	93.5	23,044	656	4,647	24,197	95.2
	Molo	6,368	6,016	94.5	20,870	405	3,943	21,498	97.1
	Mukuju	10,846	10,436	96.2	37,481	682	7,332	38,339	97.8
	Mulanda	12,878	12,737	98.9	48,069	1,291	9,704	48,445	99.2
	Nabuyoga	9,719	9,425	97.0	37,106	914	7,832	37,989	97.7
	Nagongera	8,732	8,173	93.6	30,491	717	6,238	31,702	96.2
	Nagongera TC	3,769	3,560	94.5	13,991	301	2,618	14,579	96.0
	Osukuru	15,577	14,305	91.8	51,452	1,188	10,245	53,709	95.8

District	Sub-county	Structures Found	Sprayed				Total Population	% Population Protected	
			Structures Sprayed	Spray Coverage (%)	Population Protected	Pregnant Women			Children <5
	Paya	10,385	10,159	97.8	37,642	1,041	7,733	38,022	99.0
	Petta	5,413	5,260	97.2	20,074	464	3,936	20,442	98.2
	Robongi	10,886	10,606	97.4	38,986	1,063	7,195	39,677	98.3
	Sopsop	4,685	4,569	97.5	17,466	441	3,992	17,599	99.2
	Western Division	5,559	5,381	96.8	25,417	623	3,886	26,301	96.6
Tororo Total		170,067	162,892	95.8	612,083	14,615	118,602	627,992	97.5
Grand Total		1,369,305	1,292,309	94.4	4,436,156	121,590	892,389	4,606,718	96.3

ANNEX G: STRUCTURES FOUND AND SPRAYED BY DISTRICT

District	Sleeping/Living Structure			House Type						TOTAL	
				Permanent		Semi-Permanent		Mud/ Grass Thatch			
	Found	Sprayed	% of Sleeping/Living	Found	Sprayed	Found	Sprayed	Found	Sprayed	Found	Sprayed
Alebtong	92,544	84,098	90.9	5,099	4,262	5,134	4,445	82,311	75,391	92,544	84,098
Amolatar	63,178	60,687	96.1	3,661	3,432	8,015	7,570	51,502	49,685	63,178	60,687
Budaka	64,353	61,437	95.5	11,169	10,671	33,055	31,863	20,129	18,903	64,353	61,437
Bugiri	131,566	124,720	94.8	58,665	55,675	16,224	15,436	56,677	53,609	131,566	124,720
Butaleja	78,743	73,938	93.9	11,106	10,306	36,828	34,796	30,809	28,836	78,743	73,938
Butebo	43,540	41,303	94.9	7,156	6,777	15,566	14,913	20,818	19,613	43,540	41,303
Dokolo	73,300	69,138	94.3	5,127	4,462	6,005	5,511	62,168	59,165	73,300	69,138
Kaberaido	86,959	82,948	95.4	6,550	6,014	3,337	3,121	77,072	73,813	86,959	82,948
Kibuku	65,767	62,855	95.6	10,065	9,641	23,666	22,933	32,036	30,281	65,767	62,855
Lira	154,173	132,944	86.2	37,938	32,498	29,481	25,580	86,754	74,866	154,173	132,944
Namutumba	93,116	90,090	96.8	27,021	26,128	35,803	34,299	30,292	29,663	93,116	90,090
Otuke	45,215	44,499	98.4	2,349	2,243	1,179	1,139	41,687	41,117	45,215	44,499
Pallisa	94,712	91,130	96.2	15,641	15,125	19,037	18,427	60,034	57,578	94,712	91,130
Serere	112,072	109,630	97.8	12,761	12,518	2,393	2,341	96,918	94,771	112,072	109,630
Tororo	170,067	162,892	95.8	40,024	38,074	54,606	53,082	75,437	71,736	170,067	162,892
Grand Total	1,369,305	1,292,309	155.1582	254,332	237,826	290,329	275,456	824,444	779,027	1,369,305	1,292,309

ANNEX H: NUMBER AND USE OF MOSQUITO NETS IN 2018 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	13,932	1.2	4,018	28.8
	Abia	10,804	1.2	3,321	30.7
	Akura	9,865	1.1	2,834	28.7
	Alebtong TC	3,158	1.3	732	23.2
	Aloi	13,135	1.4	3,699	28.2
	Amugu	11,698	1.2	3,859	33.0
	Apala	9,848	1.2	2,548	25.9
	Awei	11,844	1.3	3,247	27.4
	Omoro	18,749	1.2	6,811	36.3
	Alebtong Total		103,033	1.2	31,069
Amolatar	Agikdak	5,068	1.2	1,578	31.1
	Agwingiri	8,862	1.2	2,401	27.1
	Akwon	4,572	1.3	1,282	28.0
	Amolatar TC	6,001	1.5	1,708	28.5
	Aputi	8,512	1.4	2,452	28.8
	Arwotcek	9,826	1.4	3,397	34.6
	Awelo	7,686	1.4	2,041	26.6
	Etam	9,214	1.4	2,885	31.3
	Muntu	6,728	1.3	2,131	31.7
	Namasale	9,691	1.2	3,287	33.9
Namasale TC	4,196	1.1	1,645	39.2	

District	Sub-county	Total # of Mosquito Nets Found	Average # Nets/ Sleeping Structure	# of Children <5 Sleeping Under Mosquito Nets	% < 5 Sleeping under Net
Amolatar Total		80,356	1.3	24,807	30.9
Budaka	Budaka	6,634	1.9	2,629	39.6
	Budaka TC	16,080	2.3	4,276	26.6
	Iki+Iki	11,033	1.8	3,930	35.6
	Kachomo	9,837	1.9	3,517	35.8
	Kaderuna	8,922	1.9	3,441	38.6
	Kakule	6,258	1.7	2,518	40.2
	Kameruka	6,851	1.6	3,172	46.3
	Kamonkoli	14,704	2.0	5,262	35.8
	Katiira	6,349	1.7	2,397	37.8
	Lyama	10,463	1.9	4,659	44.5
	Mugiti	7,002	2.0	2,304	32.9
	Naboa	6,847	1.9	2,683	39.2
	Nansanga	5,647	1.9	2,066	36.6
Budaka Total		116,627	1.9	42,854	36.7
Bugiri	Budhaya	15,718	1.6	6,733	42.8
	Bugiri TC	23,849	1.8	5,743	24.1
	Bulesa	20,669	1.7	7,543	36.5
	Bulidha	14,268	1.6	6,426	45.0
	Buluguyi	16,119	1.5	8,178	50.7
	Buwunga	25,509	2.0	9,594	37.6
	Iwemba	11,653	1.7	5,248	45.0
	Kapyanga	25,493	1.8	10,397	40.8
	Muterere	18,984	1.6	7,647	40.3
	Nabukalu	21,631	1.8	9,582	44.3
	Nankoma	21,081	1.9	7,723	36.6
Bugiri Total		214,974	1.7	84,814	39.5

District	Sub-county	Total # of Mosquito Nets Found	Average # Nets/ Sleeping Structure	# of Children <5 Sleeping Under Mosquito Nets	% < 5 Sleeping under Net
Butaleja	Budumba	10,892	1.8	3,985	36.6
	Busaba	16,342	1.7	5,706	34.9
	Busabi	9,767	1.6	3,706	37.9
	Busolwe	7,459	1.7	2,974	39.9
	Busolwe TC	8,025	2.0	2,360	29.4
	Butaleja	7,953	1.7	3,257	41.0
	Butaleja TC	8,478	1.5	3,274	38.6
	Himutu	7,043	1.3	2,641	37.5
	Kachonga	9,460	1.5	4,172	44.1
	Mazimasa	15,827	1.7	6,620	41.8
	Nawanjofu	9,604	1.6	4,129	43.0
	Naweyo	9,938	1.6	4,159	41.8
	Butaleja Total		120,788	1.6	46,983
Butebo	Butebo	12,329	1.4	4,894	39.7
	Butebo TC	7,257	1.5	2,251	31.0
	Kabwangasi	14,831	1.7	5,212	35.1
	Kakoro	10,757	1.7	3,511	32.6
	Kanginima	5,820	1.4	1,866	32.1
	Petete	11,451	1.3	4,591	40.1
Butebo Total		62,445	1.5	22,325	35.8
Dokolo	Adeknino	11,923	1.4	3,659	30.7
	Adok	9,813	1.3	2,922	29.8
	Agwata	11,661	1.5	2,588	22.2
	Amwoma	8,201	1.4	1,687	20.6
	Bata	7,438	1.5	1,961	26.4
	Dokolo	7,936	1.4	2,794	35.2
	Dokolo TC	10,158	1.5	2,989	29.4
	Kangai	8,367	1.5	2,029	24.3
	Kwera	9,649	1.4	2,408	25.0

District	Sub-county	Total # of Mosquito Nets Found	Average # Nets/ Sleeping Structure	# of Children <5 Sleeping Under Mosquito Nets	% < 5 Sleeping under Net
	Okwalogwen	7,207	1.7	1,717	23.8
	Okwongodul	8,594	1.5	1,971	22.9
Dokolo Total		100,947	1.5	26,725	26.5
Kaberamaido	Alwa	11,569	1.4	3,709	32.1
	Anyara	13,399	1.3	4,514	33.7
	Apapai	5,941	1.4	1,812	30.5
	Aperikira	8,346	1.6	3,143	37.7
	Bululu	13,310	1.6	4,699	35.3
	Kaberamaido	10,968	1.3	3,674	33.5
	Kaberamaido TC	2,731	1.6	626	22.9
	Kakure	6,840	1.5	2,778	40.6
	Kalaki	9,039	1.5	3,100	34.3
	Kobulubulu	10,434	1.4	3,766	36.1
	Ochero	12,022	1.4	4,166	34.7
	Otuboi	13,098	1.4	4,584	35.0
Kaberamaido Total		117,697	1.4	40,571	34.5
Kibuku	Bulangira	11,426	1.8	4,647	40.7
	Buseta	9,141	1.8	4,000	43.8
	Kabweri	8,445	1.8	3,162	37.4
	Kadama	12,786	2.1	4,309	33.7
	Kagumu	14,197	1.8	6,371	44.9
	Kasasira	13,707	1.7	5,700	41.6
	Kibuku	7,401	1.9	2,614	35.3
	Kibuku TC	5,544	1.8	1,943	35.0
	Kirika	13,564	1.7	4,837	35.7
	Tirinyi	11,943	1.8	4,486	37.6
	Tiryini	5,090	1.7	1,883	37.0
Kibuku Total		113,244	1.8	43,952	38.8

District	Sub-county	Total # of Mosquito Nets Found	Average # Nets/ Sleeping Structure	# of Children <5 Sleeping Under Mosquito Nets	% < 5 Sleeping under Net
Lira	Adekokwok	18,099	2.1	3,798	21.0
	Adyel Division	22,619	2.0	5,323	23.5
	Agali	5,648	1.4	1,780	31.5
	Agweng	15,758	1.3	5,490	34.8
	Amach	12,148	1.6	2,939	24.2
	Aromo	20,294	1.3	7,737	38.1
	Bar	16,242	1.3	4,791	29.5
	Central Division	14,119	2.3	2,594	18.4
	Lira	18,102	2.0	3,834	21.2
	Ngetta	15,276	1.4	4,354	28.5
	Ogur	20,137	1.5	6,381	31.7
	Ojwina	38,901	2.3	9,160	23.5
	Railway Division	7,311	2.4	1,239	16.9
Lira Total		224,654	2.2	59,420	26.4
Namutumba	Bulange	33,476	2.0	12,189	36.4
	Ivukula	32,718	2.0	11,154	34.1
	Kibaale	23,767	2.0	8,830	37.2
	Kigulu	9,025	1.9	3,138	34.8
	Kiwanyi	8,822	2.0	2,862	32.4
	Kizuba	6,500	1.8	2,272	35.0
	Magada	5,851	1.9	1,976	33.8
	Mazuba	6,380	2.1	2,530	39.7
	Namutumba	18,038	1.9	6,147	34.1
	Namutumba TC	14,515	1.7	4,624	31.9
	Nawaikona	7,987	1.9	2,181	27.3
	Nsinze	6,580	1.9	1,971	30.0
Namutumba Total		173,659	1.9	59,874	34.5
Otuke	Adwari	6,528	1.5	2,011	30.8
	Agwete	341	1.3	161	47.2

District	Sub-county	Total # of Mosquito Nets Found	Average # Nets/ Sleeping Structure	# of Children <5 Sleeping Under Mosquito Nets	% < 5 Sleeping under Net
	Alango	9,928	1.5	2,083	21.0
	Ogor	8,038	1.3	3,093	38.5
	Ogwete	6,745	1.3	3,552	52.7
	Okwang	12,703	1.4	4,151	32.7
	Olilim	7,085	1.3	2,824	39.9
	Orum	5,436	1.3	1,767	32.5
	Otuke TC	3,565	1.4	935	26.2
Otuke Total		60,369	1.4	20,577	34.1
Pallisa	Agule	10,045	1.8	3,314	33.0
	Akisim	7,928	1.8	2,339	29.5
	Apopong	14,626	1.7	5,921	40.5
	Chelekura	7,432	1.8	2,077	27.9
	Gogonyo	18,180	1.9	6,816	37.5
	Kameke	10,078	1.6	2,942	29.2
	Kamuge	10,624	1.7	4,079	38.4
	Kasodo	8,709	1.6	2,474	28.4
	Kibale	8,130	1.5	2,649	32.6
	Olok	8,984	1.7	3,154	35.1
	Opwateta	7,290	1.6	2,917	40.0
	Pallisa	10,201	1.6	2,804	27.5
	Pallisa TC	22,092	2.0	5,448	24.7
	Puti+Puti	13,305	1.7	5,322	40.0
Pallisa Total		157,624	1.7	52,256	33.2
Serere	Atiira	12,881	1.6	4,344	33.7
	Bugondo	22,145	1.6	8,849	40.0
	Kadungulu	21,205	1.7	9,640	45.5
	Kasilo TC	2,537	1.7	862	34.0
	Kateta	34,685	1.7	14,779	42.6
	Kyere	29,402	1.6	11,273	38.3

District	Sub-county	Total # of Mosquito Nets Found	Average # Nets/ Sleeping Structure	# of Children <5 Sleeping Under Mosquito Nets	% < 5 Sleeping under Net
	Labori	11,664	1.6	5,694	48.8
	Olio	16,084	1.6	5,413	33.7
	Pingire	21,099	1.5	8,427	39.9
	Serere TC	6,809	1.7	1,877	27.6
Serere Total		178,511	1.6	71,158	39.9
Tororo	Eastern Division	18,235	2.7	3,158	17.3
	Iyolwa	12,742	1.9	5,454	42.8
	Kirewa	13,938	1.4	5,779	41.5
	Kisoko	10,753	1.9	3,755	34.9
	Kwapa	12,833	1.7	4,214	32.8
	Malaba TC	8,449	1.7	2,878	34.1
	Mella	10,414	1.7	3,439	33.0
	Merikit	15,234	1.8	5,454	35.8
	Mogola	11,664	1.8	4,210	36.1
	Molo	10,768	1.8	3,327	30.9
	Mukuju	18,499	1.8	6,545	35.4
	Mulanda	21,431	1.7	8,788	41.0
	Nabuyoga	16,455	1.7	7,068	43.0
	Nagongera	15,344	1.9	5,935	38.7
	Nagongera TC	7,546	2.1	2,427	32.2
	Osukuru	25,496	1.8	8,130	31.9
	Paya	17,794	1.8	6,836	38.4
	Petta	9,645	1.8	3,676	38.1
	Robongi	20,032	1.9	5,672	28.3
	Sopsop	7,613	1.7	3,297	43.3
	Western Division	13,843	2.6	3,000	21.7
Tororo Total		298,728	1.8	103,042	34.5
Grand Total		2,123,656	2.2	730,427	34.7

ANNEX I: 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	10.3	4.2	2.4
	Abia	8.9	3.9	2.3
	Akura	8.5	3.6	2.3
	Alebtong TC	6.4	2.9	2.2
	Aloi	7.2	3.1	2.3
	Amugu	8.5	3.5	2.4
	Apala	8.7	3.7	2.3
	Awei	8.1	3.3	2.4
	Omoro	9.3	4.0	2.3
	Alebtong Total		8.6	3.6
Amolatar	Agikdak	9.1	3.4	2.7
	Agwingiri	9.0	3.7	2.4
	Akwon	8.0	3.3	2.4
	Amolatar TC	8.3	3.7	2.3
	Aputi	8.3	3.6	2.3
	Arwotcek	9.4	3.6	2.6
	Awelo	9.5	4.1	2.3
	Etam	8.5	3.8	2.2
	Muntu	7.8	2.8	2.8
	Namasale	9.1	3.4	2.6
Namasale TC	8.6	2.4	3.6	

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
Amolatar Total		8.7	3.5	2.5
Budaka	Budaka	4.6	2.8	1.6
	Budaka TC	7.3	1.3	5.5
	Iki+Iki	6.3	3.0	2.1
	Kachomo	8.7	3.8	2.3
	Kaderuna	6.5	2.7	2.4
	Kakule	6.7	2.7	2.5
	Kameruka	6.9	2.9	2.4
	Kamonkoli	5.2	2.5	2.1
	Katiira	7.1	3.1	2.3
	Lyama	6.4	2.8	2.2
	Mugiti	7.0	3.1	2.3
	Naboa	8.5	3.7	2.3
	Nansanga	8.7	3.4	2.6
Budaka Total		6.6	3.9	1.7
Bugiri	Budhaya	6.8	3.0	2.2
	Bugiri TC	7.9	3.3	2.4
	Bulesa	7.6	3.7	2.1
	Bulidha	5.3	2.5	2.1
	Buluguyi	6.6	3.3	2.0
	Buwunga	8.2	3.9	2.1
	Iwemba	5.8	3.0	1.9
	Kapyanga	9.3	4.4	2.1
	Muterere	8.6	3.7	2.3
	Nabukalu	6.9	3.4	2.0
	Nankoma	7.5	3.6	2.1
Bugiri Total		7.3	3.4	2.1

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
Butaleja	Budumba	6.2	2.9	2.1
	Busaba	9.4	3.6	2.6
	Busabi	9.0	3.9	2.3
	Busolwe	7.7	3.4	2.2
	Busolwe TC	8.4	3.3	2.6
	Butaleja	7.3	3.5	2.1
	Butaleja TC	7.3	3.8	1.9
	Himutu	8.0	3.4	2.4
	Kachonga	6.5	2.9	2.2
	Mazimasa	8.8	3.9	2.2
	Nawanjofu	8.6	4.3	2.0
	Naweyo	7.1	3.6	2.0
	Butaleja Total		7.8	3.5
Butebo	Butebo	9.3	3.9	2.4
	Butebo TC	9.6	3.9	2.5
	Kabwangasi	7.8	3.7	2.1
	Kakoro	7.1	3.5	2.0
	Kanginima	9.2	4.3	2.1
	Petete	8.9	3.6	2.5
Butebo Total		8.5	3.8	2.3
Dokolo	Adeknino	10.4	4.0	2.6
	Adok	8.6	3.6	2.4
	Agwata	7.5	4.0	1.9
	Amwoma	6.8	3.4	2.0
	Bata	5.1	2.1	2.5
	Dokolo	6.5	3.2	2.0
	Dokolo TC	4.8	2.6	1.9
	Kangai	7.3	3.6	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
	Kwera	10.1	3.9	2.6
	Okwalogwen	6.8	3.0	2.2
	Okwongodul	7.9	3.0	2.6
Dokolo Total		7.2	3.2	2.2
Kaberamaido	Alwa	9.5	3.7	2.6
	Anyara	9.7	3.5	2.8
	Apapai	10.8	4.1	2.6
	Aperikira	10.4	4.1	2.5
	Bululu	10.4	4.2	2.5
	Kaberamaido	10.7	3.9	2.8
	Kaberamaido TC	9.0	3.1	2.9
	Kakure	7.8	3.1	2.5
	Kalaki	9.4	4.0	2.3
	Kobulubulu	8.3	3.3	2.5
	Ochero	9.6	3.7	2.6
	Otuboi	8.7	3.3	2.6
Kaberamaido Total		9.5	3.7	2.6
Kibuku	Bulangira	6.3	2.4	2.6
	Buseta	6.5	2.2	3.0
	Kabweri	7.4	2.8	2.7
	Kadama	7.5	3.3	2.3
	Kagumu	8.3	3.3	2.5
	Kasasira	8.7	3.3	2.6
	Kibuku	8.0	3.4	2.4
	Kibuku TC	5.9	2.3	2.5
	Kirika	6.7	2.6	2.6
	Tirinyi	7.4	3.3	2.2
	Tiryini	7.9	3.0	2.6

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 Total		7.3	2.9	2.5
Lira	Adekokwok	5.5	2.5	2.1
	Adyel Division	4.8	2.4	2.0
	Agali	5.3	2.0	2.6
	Agweng	10.0	4.4	2.3
	Amach	6.7	2.4	2.8
	Aromo	9.2	3.6	2.5
	Bar	6.5	2.7	2.4
	Central Division	4.7	2.9	1.6
	Lira	5.9	3.3	1.8
	Ngetta	8.6	3.8	2.3
	Ogur	9.9	3.0	3.3
	Ojwina	7.8	4.3	1.8
	Railway Division	5.8	3.1	1.9
Lira Total		6.6	2.8	2.5
Namutumba	Bulange	8.8	3.9	2.3
	Ivukula	9.5	3.9	2.5
	Kibaale	11.5	5.4	2.1
	Kigulu	8.0	3.9	2.0
	Kiwanyi	10.2	3.9	2.6
	Kizuba	8.3	2.7	3.1
	Magada	9.7	3.8	2.6
	Mazuba	6.9	4.0	1.7
	Namutumba	7.8	3.9	2.0
	Namutumba TC	9.0	3.8	2.4
	Nawaikona	6.4	2.6	2.4
	Nsinze	6.2	3.6	1.7
Namutumba Total		8.7	3.9	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
Otuke	Adwari	10.8	4.1	2.6
	Agwete	12.6	4.2	3.0
	Alango	10.3	3.5	3.0
	Ogor	13.3	4.4	3.0
	Ogwete	12.8	4.6	2.8
	Okwang	13.2	4.6	2.9
	Olilim	11.2	4.0	2.8
	Orum	12.5	4.5	2.8
	Otuke TC	12.9	4.7	2.7
	Otuke Total		12.0	4.2
Pallisa	Agule	9.0	4.1	2.2
	Akisim	7.2	4.1	1.8
	Apopong	8.4	3.6	2.3
	Chelekura	9.9	4.3	2.3
	Gogonyo	10.0	4.5	2.2
	Kameke	11.0	4.5	2.4
	Kamuge	8.4	3.5	2.4
	Kasodo	9.7	3.8	2.6
	Kibale	8.4	3.4	2.5
	Olok	9.5	4.7	2.0
	Opwateta	9.2	4.6	2.0
	Pallisa	10.0	4.2	2.4
	Pallisa TC	8.5	3.5	2.5
	Puti+Puti	8.2	4.2	2.0
Pallisa Total		9.0	4.0	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
Serere	Atiira	10.1	4.0	2.5
	Bugondo	11.1	4.5	2.5
	Kadungulu	11.1	4.2	2.6
	Kasilo TC	9.1	4.0	2.3
	Kateta	10.8	4.4	2.4
	Kyere	10.5	4.2	2.5
	Labori	11.3	4.6	2.5
	Olio	10.0	4.2	2.4
	Pingire	11.5	4.5	2.6
	Serere TC	10.8	4.5	2.4
Serere Total		10.8	4.3	2.5
Tororo	Eastern Division	6.7	2.8	2.4
	Iyolwa	8.2	3.8	2.1
	Kirewa	8.2	3.2	2.6
	Kisoko	8.5	3.3	2.5
	Kwapa	8.7	3.5	2.5
	Malaba TC	8.1	3.0	2.7
	Mella	7.8	3.1	2.5
	Merikit	8.4	3.3	2.5
	Mogola	9.0	3.8	2.4
	Molo	7.6	2.7	2.8
	Mukuju	8.1	3.6	2.3
	Mulanda	9.6	3.9	2.5
	Nabuyoga	7.8	3.0	2.6
	Nagongera	9.0	3.6	2.5
	Nagongera TC	8.1	3.2	2.5
	Osukuru	7.0	3.0	2.3
Paya	8.9	3.6	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
	Petta	8.6	3.3	2.6
	Robongi	10.0	4.0	2.5
	Sopsop	9.0	3.2	2.8
	Western Division	5.4	2.3	2.4
Tororo Total		8.1	3.3	2.5
Grand Total		8.2	3.6	2.3

ANNEX J: 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 4								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
Objective 1: Implementation of Malaria Vector Control (VC) Interventions																				
1.1	Successfully execute IRS and other malaria vector control programs																			
1.1.1	Annual country work plan developed and submitted on-time	Project records Annually		1		1														
1.1.2	Number of eligible structures targeted for spraying	Project records Annually		PMI	940,017	1,008,109														
				DFID	347,680	361,196														
1.1.3	Number of eligible structures sprayed with IRS	Project records Annually		PMI	799,014	950,939														
				DFID	295,528	341,370														
1.1.4	Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	Project records Annually		85%	PMI	94.3														
					DFID	94.5														

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results										
				Year 1		Year 2		Year 3		Year 4				
				Target	Result	Target	Result	Target	Result	Target	Result			
1.1.5	Number of people protected by IRS	Project records	Sex		3,419,524	3,504,041								
		Annually	Pregnant women Children <5	PMI	M: 1,651,665 W: 1,767,859 Preg. Women: 85,510 Children <5: 677,933 930,990	M: 1,709,390 W: 1,794,651 Preg women: 99,619 Children <5: 716,548 932,115								
			DFID	M: 455,254 W: 475,736 Preg. Women: 17,994 Children <5: 168,515	M: 456,136 W: 475,979 Preg Women: 21,971 Children <5: 175,842									
1.1.6	EOSR submitted within 45 days after the end of spray(including completing MEP and EMMR)	Project Annually		I	I									
1.1.7	Post-spray Data Quality Audit conducted within 90 days of spray completion	Data Collection Forms Annually		N/A	N/A									
1.1.8	Number of Insecticide Treated Nets (ITNs) distributed, by channel	Project Records Annually	Channel	N/A	N/A									

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 4								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
1.1.9	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															
1.1.10	Operational routine monitoring systems for continuous ITN distribution established and disaggregated by channel	Project Records Annually	Channel	N/A	N/A															
1.1.11	ITN durability monitoring data collection completed on time as planned in a given project year	Project Records Annually		N/A	N/A															
1.2	Provide technical assistance and planning support for IRS and other integrated malaria vector control activities																			
1.2.1	Number of VC project training workshops targeting NMCP and other host country staff	Project Training Records Annually	Technical Area Job Function	1 ^a	1															
1.2.2	Number of NMCP and other vector control host country staff accessing DHIS2	DHIS2 Logs Annually	Job Function	N/A	N/A															

^a National trainers Boot camp done in March 2018

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4			
				Target	Result	Target	Result	Target	Result	Target	Result		
1.3	Ensure safe and judicious use of insecticides and other malaria vector control products												
1.3.1	Number of vector control personnel trained in environmental compliance and personal safety standards in vector control implementation	Project Training Records Annually	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%								
1.3.2	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%								
1.3.3	Number of adverse reactions to pesticide exposure documented	Incident Report Forms Annually	Type of Exposure	0	0								
1.4	Strengthen capacity of NMCPs, vector control personnel, and other institutions to implement and manage IRS and other vector control activities												
1.4.1	Total number of people trained to support VC in targeted areas	Project Training Records Annually	Sex (# and %) VC Intervention Type	10,656 IRS M: 6,820, 64% W: 3,836, 36%	8,463 ^{bb} IRS M: 6,080, 71.8% W: 2,383, 28.2%								

^b This indicator includes Spray Operators, Team Leaders, and Supervisors only

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4			
				Target	Result	Target	Result	Target	Result	Target	Result		
1.4.2	Number of people trained during IRS Training of Trainers	Project Training Records Annually	Sex (# and %)	1,126 M: 901, 20% W: 225, 20%	1,136 M: 888, 78.2% W: 248, 21.8%								
1.4.3	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%	10,877 M: 7,388, 67.9% W: 3,489; 32.1%								
1.4.4	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%	915 M: 712; 77.8 % W: 203, 22.2%								
1.5	Promote gender equality in all facets of planning and implementation												
1.5.1	Number of women hired to support VC campaigns	Project Records Annually	Returning female seasonal workers hired in a more senior capacity	3,767; 100	3,408; 90.5 ^c								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4			
				Target	Result	Target	Result	Target	Result	Target	Result		
1.5.2	Number and percentage of women hired in supervisory roles in target areas for vector control activities	Project Records Annually	VC Intervention Type Job Function	IRS 573; 30%	IRS 449; 23.0% TLs: 303, 23.9% Sub-county supervisors: 39, 19.7% Parish Supervisors: 107, 22.5% Project Assistants: 2, 28.6%								
1.5.3	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%								
1.5.4	Number and percentage of women in senior leadership roles in VectorLink country offices	Project Records Annually	Sex (# and %)	1; 17%	2; 28.6%								
1.6	Implement and support social behavioral change communication and mobilization activities												
1.6.1	Number of radio spots and talk shows aired	Project Records Annually	VC Intervention Type	56 talk shows and 280 spots	60 talk shows and 280 spots								
1.6.2	Number of print materials disseminated	Project Records Annually	VC Intervention Type	7,090 print materials	7,090 print materials								
1.6.3	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	IRS 11,810 M: 5,647 F: 6,163								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 4								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
1.6.4	Number and percentage of people who feel that the proposed action (sleeping under an ITN/accepting IRS) will reduce their risk of malaria	Project Records Annually		N/A	N/A															
1.6.5	Number and percentage of people with a favorable attitude toward the practice/product (i.e., ITNs, IRS)	Project Records Annually	VC Intervention Type	N/A	N/A															
1.6.6	Number and percentage of people who believe that the majority of their friends and community members practice the behavior	Project Records Annually	VC Intervention Type	N/A	N/A															
1.7	Environmental compliance																			
1.7.1	SEA (with EMMPs) or Letter Report submitted at least 60 days prior to the commencement of vector control campaigns	Project Records Annually		1; 100%	1; 100%															
1.7.2	Number and percentage of permanent and mobile soak pits inspected and approved prior to IRS campaigns	Project Records Annually	Soak Pit Type	462; 100%	462; 100%															
1.7.3	Number and percentage of storehouses inspected and approved prior to IRS campaigns	Project Records Annually	Storehouse Type	462; 100%	462; 100%															
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%															

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results							
				Year 1		Year 2		Year 3		Year 4	
				Target	Result	Target	Result	Target	Result	Target	Result
2. Entomological and Epidemiological Data to Drive Decision-Making											
2.1 Vector control activities monitored via entomological and epidemiological data											
2.1.1	Number and percentage of project-supported entomological sentinel sites established to monitor vector bionomics and behavior (vector species, distribution, seasonality, feeding time, and location)	Entomological Reports Annually	VC Intervention Type	5; 100%	5, 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; insecticide susceptibility and resistance intensity; mechanism of resistance; quality assurance and residual efficacy monitoring of IRS programs; or vector behavior: feeding time & location)	Entomological Reports Annually	VC Intervention	1; 100%	1, 100% IRS						

^c Bugiri only for one year

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4			
				Target	Result	Target	Result	Target	Result	Target	Result		
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%	5; 100% IRS								
2.1.4	Number and percentage of insecticide resistance testing sites that tested at least one insecticide from pyrethroid, organophosphate, carbamate, clothianidin, and chlorfenapyr insecticides	Entomological Reports Annually	Insecticide Type	11; 100%	5; 45.5% pyrethroid, organophosphate, carbamate, clothianidin, chlorfenapyr								
2.1.5	Number of wall bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS	Entomological Reports Annually		180 ^d ; 100%	194; 107.8%								
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%								

^d 12 wall bio-assay cones are tested per district for all the current 15 IRS districts. Repeat tests done in Budaka and Namutumba to ascertain quality

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4			
				Target	Result	Target	Result	Target	Result	Target	Result		
2.1.7	Number of wall bioassays conducted after the completion of spraying at monthly intervals to evaluate insecticide decay	Entomological Reports Annually	Insecticide Type	eActellic 300CS: 312: 100%	Actellic 300CS: 120 ^f								
2.1.8	Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites	Entomological Reports Annually	Insecticide Type	60;	60: 100% Pirimiphos methyl: 10 Bendiocarb: 10 Delta methrin: 10 Alpha cypermethrin: 10 Permethrin: 10 Clothianidin: 5 Chlorfenaphyr: 5								
2.1.9	Number of countries with an integrated vector control analytics dashboard available for decision making	Project Records Annually		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								

^ePost-IRS routine monthly monitoring wall bio-assay studies for Pallisa would be from June to December = 7*12 =84, while post-IRS routine monthly monitoring wall bio-assay studies for Kaberamaido, Lira and Tororo would be from July to December = 3*6*12 = 216 giving a total of 300 cone tests. VL had expected to start post-IRS routine monthly monitoring wall bio-assay studies for Pallisa would be from June but VL started in May now giving a total of 312

^f 120 bioassays have been conducted as of 31/08/2018. Routine monthly monitoring wall bioassays are still ongoing.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4			
				Target	Result	Target	Result	Target	Result	Target	Result		
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								
2.2.2	Completed integrated data and visualization landscaping for vector control decision making complete	Project Records Annually		N/A	N/A								
2.2.3	Implemented sub-national insecticide as part of an IRM strategy	Project Records Annually		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								
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								

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results							
				Year 1		Year 2		Year 3		Year 4	
				Target	Result	Target	Result	Target	Result	Target	Result
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 QA/QC test at least 60 days prior to spray campaign	Procurement Records Annually	Insecticide Type	I; 100%	I; 100%						
3.1.2	Number and percentage of insecticide procurements received on-time to allow for the initiation of spray operations as scheduled	Procurement Records Annually	Insecticide Type	I; 100%	I, 100%						
3.1.3	Number and percentage of international equipment procurements, including PPE, received on-time to allow for the initiation of vector control campaigns as scheduled	Procurement Records Annually	VC Intervention Type	I; 100%	I; 100%						
3.1.4	Number and percentage of local procurements for PPE received on-time to allow for the initiation of spray operations as scheduled	Procurement Records Annually		I; 100%	I; 100%						
3.1.5	PPE procured according to workforce composition	Procurement Records Annually		N/A	N/A						
3.2	Robust inventory management and logistics systems established										
3.2.1	Number and percentage of logistics and warehouse managers trained in vector control supply chain management	Project Training Records Annually	VC Intervention Type Sex	462; 100%	462:100%						

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 4								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
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%	Actellic 300CS: 462; 100%															
3.2.3	Successfully completed spray operations without an insecticide stock-out	Inventory and Stock Records Annually	Insecticide Type	462; 100%	Actellic 300CS: 462, 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															
4.2	Create and share knowledge through dissemination of best practices and lessons learned																			
4.2.1	Number of innovations, best practices, and other data or lessons learned shared with other partners or international institutions for global reporting on the Vector Learning Exchange	Project Records Annually	Technical Area	1	0															
4.2.2	Number of individual members who use the Vector Learning Exchange [§]	Project Records Annually	N/A	21	0															

[§] VL Uganda will create and share a report on the VLE that focuses on collaboration at different levels with implementing partners, with districts, with community members and using structures that are already in place.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results																
				Year 1		Year 2		Year 3		Year 4		Year 4								
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result							
4.2.3	Number of symposia and/or presentations submitted to and accepted at global conferences	Project Records Annually	Technical Area	1	1; Entomology															
4.2.4	Number of success stories written or videos produced and shared on the VectorLink project website	Project Records Annually		1	1															
4.2.5	Number of peer-reviewed journal articles submitted and accepted	Project Records Annually	Technical Area	1	0															
4.2.6	Number of critical guidance, standards, or plans that incorporate disseminated findings/best practices	Project Records Annually	Technical Area	1	0															
4.3	Develop and deploy cost-savings approaches																			
4.3.1	Number of innovative or novel approaches implemented to achieve cost savings in IRS and integrated malaria vector control programs	Project Records Annually	VC Intervention Type	1 ^h	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															

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

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results								
				Year 1		Year 2		Year 3		Year 4		
				Target	Result	Target	Result	Target	Result	Target	Result	
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	5 ⁱ	0							

NB: Targets are annual figures and it is anticipated that where these were not achieved they will be met during remaining part of the work plan period

ⁱ VectorLink provides TA for IRS to 5 tea estates.(Ankole Tea Estate, Bugambe Tea Estates, Kiko Tea Estates, Mizizi Tea Estates and Mwenge Tea Estates)