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THE PMI VECTORLINK SIERRA LEONE 2021 END OF SPRAY REPORT (EOSR)

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THE PMI VECTORLINK SIERRA LEONE 2021 END OF SPRAY REPORT

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1. ACRONYMS

BMP	Best Management Practices
CDC	Centers for Disease Control and Prevention
DCV	Data Collection Verification
DEC	Data Entry Clerk
DHMT	District Health Management Team
ECO	Environmental Compliance Officer
IEC	Information, Education and Communication
IRS	Indoor Residual Spraying
M&E	Monitoring and Evaluation
MEP	Monitoring and Evaluation Plan
MOHS	Ministry of Health and Sanitation
MSP	Mobile Soak Pit
NMCP	National Malaria Control Program
PMI	U.S. President's Malaria Initiative
PPE	Personal Protective Equipment
PMT	Performance Management Tracking
SBC	Social Behavior Change
SEA	Supplemental Environmental Assessment
SOP	Spray Operator
TL	Team Leader
TO	Task Order
TOT	Training of Trainers
USAID	United States Agency for International Development
WHO	World Health Organization

2. EXECUTIVE SUMMARY

One key objective of the U.S. President's Malaria Initiative (PMI) VectorLink Project is to reduce the malaria incidence by limiting exposure to malaria vectors through indoor residual spraying (IRS) in addition to insecticide treated net (ITN) use. To achieve this objective, PMI VectorLink Sierra Leone conducted the first district-wide IRS campaign in the Southern (Bo District) and Northern (Bombali District) regions of Sierra Leone using a clothianidin insecticide (SumiShield™ 50WG). The 2021 spray campaign was conducted from May 8, 2021 to June 9, 2021, during which 147,992 structures were targeted. In total, PMI VectorLink Sierra Leone found 160,919 eligible structures and sprayed 150,895 structures. This effort resulted in an overall spray coverage of 93.8% for both districts while protecting 672,696 people from the burden of malaria in 2021.

The followings are key highlights of PMI VectorLink Sierra Leone 's spray campaign in 2021:

- A total of 6,549 people were trained, of whom 2,815 (43 %) were women. Out of the total number of people trained, there were 984 spray operators (SOPs), of whom 257 (26.1 %) were women.
- A total of 48,889 sachets of SumiShield™ 50WG were used (Table 7) in Bo and Bombali combined. The utilization ratios were: 3.10 and 3.07 structures per SumiShield™ 50WG sachet in Bo and Bombali districts respectively.
- During the second week of the campaign, wall cone bioassays were conducted to assess the quality of the spray. The results indicated 100 % mortality for both mud and cement sprayed houses with SumiShield™ 50WG insecticide.
- Utilization of mobile soak pits (MSPs) in remote areas to reduce the travel time of SOPs and safely dispose of IRS liquid waste from the field.
- Implementation of mobile technology, including a mobile performance management tracking (PMT) tool to monitor daily operational results. PMI VectorLink Sierra Leone also used the WebEx system as a communication tool for daily internal debriefing on IRS progress.
- Use of the VectorLink Collect database (DHIS2) to closely monitor the spray progress electronically on a daily basis. Upon the submission of the paper-based SOP data collection forms to the data entry centers at the end of each day, the data entry clerks reviewed and recorded the data into VectorLink Collect throughout the entire campaign.
- Development of Information, Education, Communication (IEC) messaging in close collaboration with the National Malaria Control Program's (NMCP) IEC/Behavior Change Communication (BCC) technical working group and the USAID-funded Breakthrough Action project.
- Organization of advocacy meetings in Bo and Bombali districts with the district councils, paramount chiefs, section chiefs, councilors and village chiefs prior to the start of the spray campaign to minimize refusal rates.
- The VectorLink project worked in very close collaboration with the NMCP/Ministry of Health and Sanitation (MoHS) and two District Health Management Teams (DHMT) during the planning and implementation of the spray campaign. The NMCP and DHMT were involved in the training of seasonal workers at all levels (master training, training of trainers, SOP training, mobilizers training, etc.) as well as the supervision activities.

Table 1 below summarizes key results obtained during the 2021 IRS campaign.

Table 1: Summary of the 2021 IRS Campaign Results

Insecticide class	Bo	Bombali	Total
	Clothianidin (SumiShield™ 50WG)	Clothianidin (SumiShield™ 50WG)	
Number of structures targeted by IRS (eligible structures selected based on the 2020 enumeration results)	91,032	56,960	**147,992**
Number of structures found by IRS teams during the spray campaign	95,672	65,247	**160,919**
Number of structures sprayed	92,795	58,100	**150,895**
Spray progress (sprayed/targeted)	101.9%	102.0%	**102.0%**
Spray coverage (sprayed/found)	97.0%	89.0%	**93.8%**
Population protected	408,715	263,981	**672,696**
Pregnant women protected	16,447	10,157	**26,604**
Children under five protected	69,901	41,202	**111,103**
Number of people receiving training funded by US Government (USG) to conduct IRS**	687	536	**1, 223**

*** The PMI annual indicator for "people trained to deliver IRS" includes SOPs, team leaders, site managers and brigade supervisors; it excludes clinicians, data clerks, IEC mobilizers, IEC assistants, drivers, washers, porters, pump technicians, security guards, and storekeepers.*

3. Country Background & Activity Summary

In 2021, U.S. President's Malaria Initiative (PMI) supported the first district-wide indoor residual spraying (IRS) campaign in line with the National Malaria Control Program (NMCP) Strategic Plan.

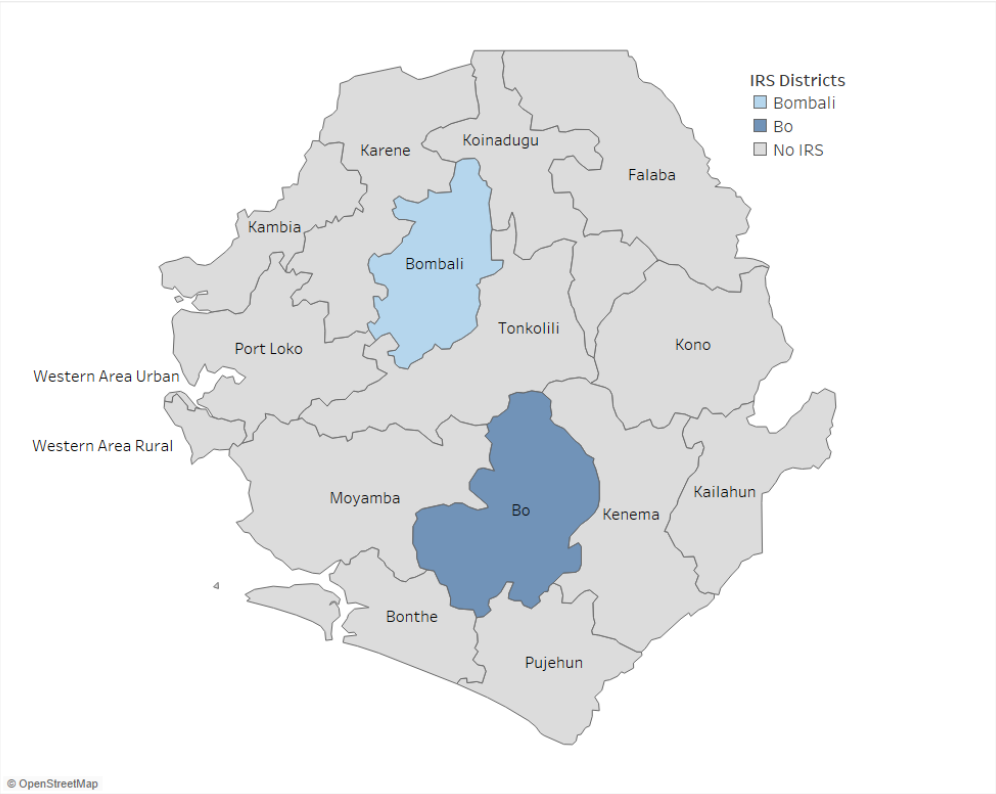
Table 2: PMI Supported IRS in Sierra Leone: 2021

Year	Geographic Area	IRS Strategy	Insecticide	Number of Structures Sprayed	Population Protected
2021	Bo and Bombali districts	Blanket	Clothianidin (SumiShield™ 50WG)	150,895	672,696

IRS, with lambda-cyalothrin (pyrethroid), was initially piloted in selected chiefdoms of Bo (Badjia, Gbo, Bagbwa), Bombali (M/Ndohahun, Makari Gbanti, Paki Masabong), Kono (Nyawa Lenga, Selenga, Fiama, Gbaneh, Nimikoro, Kamara, Gorama) and Western Rural Area (Malambay, Lumpa, Macdonald, Crossing, Masorie, Newton, Kent, York, John Thorpe, Songo, Waterloo, Kissy town) in 2012 through the World Health Organization (WHO) to assess the feasibility and acceptability of IRS by communities and to determine the effectiveness of IRS. Out of 24,810 rooms targeted for IRS in Bombali district, 95% were sprayed with 97,078 persons protected. In Bo district, 98% of the 18,335 rooms targeted for IRS were sprayed with 51,661 persons protected. The overall coverage for the four districts was 97.8% of rooms sprayed from the 75,393 targeted rooms with 380,826 people protected (WHO, 2015). The IRS pilot occurred before the Ebola outbreak and high acceptance of IRS was observed in the selected chiefdoms. Unavailability of financial resources forced IRS to be discontinued after 2012, and no IRS program was implemented in Sierra Leone until 2021.

In 2021, in accordance with the recommendations from the National Steering Committee, PMI VectorLink Sierra Leone supported NMCP to conduct spray operations in all 28 chiefdoms in Bo and Bombali Districts (16 in Bo and 12 Bombali) from May 8, 2021 to June 9, 2021.

Figure 1: IRS Districts and Entomological Monitoring Sentinel Sites of PMI VectorLink Sierra Leone



4. IMPLEMENTATION OF IRS ACTIVITIES

The 2021 spray campaign took place in the challenging context of the global COVID-19 pandemic. For a safe implementation of the IRS campaign, the project developed a COVID-19 mitigation plan, which included preventive measures, control mechanism and management of possible suspected cases of COVID-19 at all the operational sites. Field supervisions helped the project ensure compliance with the various safety and health measures put in place for safe implementation of IRS activities during the pandemic. Please see Annex C for the complete list of recommended measures.

4.1. IRS PLANNING AND PARTNERS' COLLABORATION

Districts and Insecticide Selection

The Sierra Leone Integrated Vector Management Technical Working Group (IVMTWG) met on March 10, 2020 to review the entomological data collected from the sentinel sites as well as the epidemiological data, which resulted in the recommendation to start the 2021 IRS campaign in Bo and Bombali districts due to the highest Human Biting Rate (HBR) and high malaria incidence observed there, and the fact that IRS was previously conducted in both districts in 2012 with high acceptance rates.

The 2018-2020 insecticide resistance monitoring data showed that the main vector, *Anopheles gambiae* s.l., was fully susceptible to clothianidin (neonicotinoid) and pirimiphos-methyl (organophosphate). Based on the full susceptibility of *An. gambiae* s.l. to clothianidin at all sites, the planned country-wide distribution of piperonyl butoxide (PBO) nets, as well as the observed residual life (six to eight months) of Clothianidin observed in other countries, the IVMTWG recommended clothianidin (SumiShield™ 50WG) for use during the 2021 IRS campaign. The recommendation from the IVMTWG to use SumiShield™ 50WG was approved in September 2020 by the National Steering Committee (NSC).

In addition, the project conducted an enumeration activity in September 2020, where eligible structures were identified in both Bo and Bombali districts. The enumeration revealed a total of 194,510 eligible structures found in both districts combined (76,272 in Bombali and 118,238 in Bo). In close coordination with NMCP, the urban cities of Bo and Makeni were removed as targeted spray areas due to their urban setting and low malaria incidence rates, which resulted in the final selection of 147, 992 eligible structures (91,032 in Bo and 56,960 in Bombali districts). Please refer to Annex D and E for enumeration results.

Initially planned for April 28, 2021, the start of the 2021 IRS campaign was postponed to May 8, 2021 due to the delay in clearing the Goizper sprayers through customs which resulted from changes in the government clearance process of ocean shipments. With the support of the U.S. Embassy and Ministry of Health and Sanitation, the sprayers were cleared, and the IRS campaign was implemented from May 8 to June 9, 2021 in the districts of Bo and Bombali. The 2021 IRS mini-launch ceremonies took place in Makeni, Bombali district, and in Bo City, Bo district on April 24, 2021 and were combined with the World Malaria Day (WMD) commemoration in the two districts. The local health authorities, paramount chiefs, district health management team (DHMT), district administrative authorities, partners (Catholic Relief Services (CRS) and Breakthrough Action), PMI VectorLink and PMI Sierra Leone teams also participated in the launch ceremonies. In addition, the US Ambassador, USAID Mission Director, the Chief Medical Officer (CMO) and the Director of the Environmental Health/MOHS visited the VectorLink Insectary and observed spraying during the first week of the spray campaign.

Figure 2: IRS Mini Launch Ceremony in Bo and Bombali

MOHS Deputy Minister speech during the launch ceremony in Bo District

USAID/PMI's speech during the launch ceremony in Makeni, Bombali district

USAID/PMI's speech during the launch ceremony in Bo district

Figure 3: US Ambassador, USAID Mission Director and Government Officials' Visit to Makari Community

The US Ambassador, USAID Mission Director and the MOHS officials observing the mixing of insecticide before spraying in Makarie community.

The project managed spray operations in 14 operational sites (eight in Bo and six in Bombali). With the support of the DHMT, seasonal workers were recruited from the communities benefiting from spraying. Spray operators (SOPs) worked in all chiefdoms according to the spray plans developed before the campaign. and adjusted on a daily basis based on the performance level (i.e., changing the spray date of a community because of significantly high refusals while more mobilization efforts are conducted there to turn refusals into acceptance of IRS). Each operational site had a warehouse to store spray materials as well as permanent soak pits to accommodate the spray teams' waste during the end-of-day clean-up. The team set up a total of nine mobile soak pits (MSPs) for use in remote areas and 20 permanent soak pits.

Each morning, breakfast was served to SOPs, Team Leaders (TLs) and Brigade Supervisors before they were deployed to the field to conduct spray operations. Right after the teams were served breakfast, a morning mobilization meeting took place, where the spray teams were brought together for important information-sharing (i.e., performance related aspects, recommendations, etc.).

Vehicles were rented by the project to transport the spray teams to and from the targeted spray sites/communities and operational sites. The team also used vehicles for supervision-related purposes and to transport spray equipment and insecticide.

At the end of each day, SOPs handed their completed spray data collection forms to their TLs, who checked and compiled them before submitting them to their brigade supervisors. The brigade supervisors then submit the forms after review to the M&E assistant who after review submit them to the site managers. The site managers sent spray data collection forms to the two data entry centers (one in Bo city and one in Makeni City) for immediate entry into the PMI VectorLink Collect Sierra Leone database. Table 3 below shows the number of spray teams recruited during the 2021 IRS campaign.

Table 3: Number of Spray Teams Recruited during the 2021 IRS Campaign

Region	Districts	Operation Sites	Number of Team Leaders	Number of SOPs	Total
Southern	Bo	Bumpe	10	50	60
		Dambala	13	65	78
		Gondama	18	90	108
		Gerihun	16	80	96
		Jembe	17	85	102
		Jimmy	7	35	42
		Ngalu	9	45	54
		Sumbuya	8	40	48
		Total	98	490	588
Northern	Bombali	Binkolo	10	50	60
		Makeni City	19	95	114
		Mara	7	35	42
		Rokonta	10	50	60
		Kagbere	9	45	54
		Kamabai	10	50	60
		Total	65	325	390
Total			**163**	**815**	**978**

4.2. TRAINING

PMI VectorLink Sierra Leone organized training sessions for all seasonal staff. The project designed the training sessions to ensure that all seasonal workers were trained in their respective roles and had a solid understanding of how to implement their respective IRS activities. PMI VectorLink Sierra Leone staff conducted all training sessions in collaboration with the NMCP, including representatives from the Ministry of Health and Sanitation (MOHS) at the national, regional and district levels as well as the Environment Protection Agency (EPA).

A master training, led by the Ghana-based VectorLink's Regional Vector Control Manager was held from February 16-20, 2021 and was designed for IRS managers and master trainers from the national and district levels, to acquire the knowledge, skills, and tools required to plan, train, implement, supervise, and monitor a high-quality IRS campaign. Participants at the training included the VectorLink Sierra Leone team, the National Malaria Control Program (NMCP), Directorate of Environmental Health, EPA, district officials, as well as the PMI Mission team. During the training, participants were taught the critical factors leading to the successful implementation of an IRS campaign.

In addition, the project incorporated gender awareness and sexual harassment training in all the trainings conducted before the campaigns began. Participants learned about the importance of gender equity for the success of the spray campaign, and for women's empowerment in society.

Table 4 below shows the number of training sessions and the number of people trained, disaggregated by district, and gender.

Table 4: Number of Training Sessions and People Trained, Disaggregated by Job Title, Spray District and Gender.

Training	Bo		Bombali		National Level (NMCP/MoHS/EPA		TOTAL		
	M	F	M	F	M	F	M	F	Total
Training of Master Trainers	2	1	2	1	12	6	16	8	24
Training of Site Managers and Brigade Supervisors (TOT)	36	6	27	7	0	0	61	15	76
Training of Financial Assistants	1	0	1	1	0	0	2	1	3
Training of Data Cleaners and M&E Assistants	13	11	12	6	0	0	25	17	42
Training of Data Entry Clerks	36	8	16	15	0	0	52	23	75
Training of Clinicians	2	93	2	66	0	0	4	159	163
Training for Storekeepers	9	2	5	1	0	0	14	3	17
Training of Security guards	24	0	18	0	0	0	42	0	42
Training of Team Leaders	75	25	48	16	0	0	123	41	164
Training of Spray Operators	416	129	311	128	0	0	727	257	984
Training of Drivers	82	0	47	0	0	0	129	0	129
Training of Sprayer Technicians	7	4	7	0	0	0	11	7	18
Training of Sprayer Washers	40	22	24	11	0	0	64	33	97
Training of IEC Assistants, IEC Supervisors and Radio Journalists	26	8	22	2	0	0	48	10	58
Training of PPE Washers	8	43	11	35	0	0	19	78	97
Training of EC Assistant	1	0	1	0	0	0	2	0	2
Training of Logistics Assistants	1	0	1	0	0	0	2	0	2
Training of IEC Mobilizers and Village Headmen	1236	1042	1157	1121	0	0	2393	2163	4556
Total	**2,015**	**1,394**	**1,712**	**1,410**	**12**	**6**	**3,734**	**2,815**	**6,549**
Percentage of Women	43.0%								

A total of 36 IEC supervisors, 14 IEC assistants and eight journalists from the selected radios received three days of training on the benefits of IRS, community mobilization, the steps to be followed by beneficiaries before, during and after spraying, and how to increase IRS acceptance. One mobilizer per village and the headman of each village (village leaders) received a one-day briefing session on messages and flyers to use with beneficiaries of IRS. A total of 2,278 community mobilizers and 2,278 village headmen were oriented on IRS to conduct mobilization in their communities.

Government Health Workers in charge of the Peripheral Health Units (PHUs) also received a one-day briefing session for insecticide poisoning case management. Additionally, all drivers received a one-day briefing on environmental compliance and safety aspects.

Figure 4: Masters Training with Application of COVID-19 Prevention Measures

Practical session during master training

Temperature check during master training

Health and Safety of Seasonal Workers and Beneficiaries

Prior to the start of the spray campaign, VectorLink trained seasonal workers and district health staff on the management of potential health risks (fatigue, dizziness, diarrhea, skin irritation, eyes irritation, chest discomfort, etc.) of SumiShield™ 50WG, detailed steps to take in the event of an incident, and proper household preparation. In addition, all seasonal workers went through the general pre-campaign medical checkup, including the female workers (i.e., SOPs, team leaders, spray supervisors, guards, storekeepers and washers) who also took a pregnancy test. No female seasonal workers were found to be pregnant. All relevant seasonal workers were insured through a group medical insurance for potential medical assistance.

4.3. Spray Operations & Supervision

Number of Eligible Structures Found and Spray Coverage

During the spray campaign, SOPs found a total of 160,919 structures (95,672 in Bo and 65,247 in Bombali) and sprayed 150,895 (92,795 in Bo and 58,100 in Bombali). In Bo, SOPs sprayed 97.0 % of all structures identified, and 89.0 % of all structures in Bombali. The overall coverage rate achieved for the two districts was 93.8 %. The low coverage rate in Bombali is due to the high level of refusals, despite enhanced mobilization efforts.

VectorLink staff, NMCP and DHMT staff jointly supervised the spray campaign. On each spray day, site supervisors, brigade supervisors and team leaders supervised the distribution of SOPs to communities designated for spraying. All supervisors, including team leaders, observed SOP performance, as well as homeowner and structures preparation. At the end of each spray day, site supervisors supervised the end-of-day clean-up procedures performed by sprayer washers.

4.3.1 Number of People Hired to Support Campaign by Cadre & Sex

In collaboration with local government authorities (district medical officer, malaria focal Person, IRS focal person, IEC/BCC focal person), PMI VectorLink Sierra Leone hired 1,549 seasonal workers (931 seasonal workers in Bo, including 686 men and 245 women; 617 seasonal workers in Bombali, including 433 men and 185 women) (Table 5).

Table 5: Distribution of Seasonal Workers Hired for Each Position by Gender and Spray District

Hired	Bo		Bombali		Total		Grand Total
	M	F	M	F	M	F	Total
Site Manager	7	1	4	2	11	3	14
Finance Assistants	1	0	1	1	2	1	3
Data Entry Clerks	36	8	16	15	52	23	75
Data Cleaners	6	2	4	1	10	3	13
Storekeeper	10	1	5	1	15	2	17
Site Cleaner	4	12	9	3	13	15	28
Brigade Supervisors	29	5	20	7	49	12	61
Team Leaders	72	26	44	21	116	47	163
Spray Operators	405	85	241	84	646	169	815
Sprayer Technician	7	4	7	0	14	4	18
Water Fetchers	3	21	14	6	17	27	44
Sprayer washers	43	27	19	8	62	35	97
PPE Washers	10	41	7	31	17	72	89
IEC coordinator	0	0	0	1	0	1	1
(M&E) Assistants	4	4	4	2	8	6	14
EC Assistants	1	0	1	0	2	0	2
Logistics Assistant	1	0	1	0	2	0	2
IEC Coordinator Assistant	6	2	5	1	11	3	14
District Coordinator	1	0	0	0	1	0	1
IEC supervisors	16	6	13	1	29	7	36
Security guards	24	0	18	0	42	0	42
Total	**686**	**245**	**433**	**185**	**1,119**	**430**	**1,549**

4.3.2 OPERATIONS SITES

Table 6: Operational Sites and Chiefdoms in Each District

District	Operations Site	Chiefdom Names	Type of Facility (Health Center, Municipal Building, etc.)
Bo	Bumpe	Bumpe	Community building provided free of charge
	Dambala	Niawa Lenga, Selnga, Valunia	Community building provided free of charge
	Gerihun	Kakua Rural, Gbo	Community building provided free of charge
	Gondama	Bongor, Jaiama, Tikonko	Community building provided free of charge
	Jembe	Badjia, Baoma, Wonde	Health facility building provided free of charge
	Jimmy	Bagbo	Health facility building provided free of charge
	Ngalu	Bagbwe, Njala Komboya	Community building provided free of charge

District	Operations Site	Chiefdom Names	Type of Facility (Health Center, Municipal Building, etc.)
	Sumbuya	Lugbu	Health facility building provided free of charge
Bombali	Binkolo	Safroko Limba	Community building provided free of charge
	Makeni	Bombali Shebora, Gbanti, Paki Masabong	Community building provided free of charge
	Mara	Mara	Community building provided free of charge
	Rokontha	Bombali Sheray, Makarie	Community building provided free of charge
	Kagbere	Gbendembu, Magbenda Dowahun, Kamaranka	Community building provided free of charge
	Kamabai	Biriwa Limba, Ngowahun	Community building provided free of charge

4.3.3 Key Operational Details

For the 2021 spray campaign, the project used a payroll company, Bakertilly, to make all necessary payments to seasonal workers, after experiencing significant payment delays from the mobile payment company, Orange. The payment through Bakertilly made it easier to pay workers in very remote areas with no mobile payment options.

4.4. Insecticide

Table 7 below shows insecticide usage by district. At the end of the campaign, the project had 43,630 sachets of SumiShield™ 50WG remaining, and set to expire in November 2023. As seen in Table 7, one sachet of insecticide sprayed 3.10 structures in Bo, while spray operators in Bombali sprayed 3.07 structures per sachet.

Table 7: Average Number of Structures Sprayed by Sachet of Insecticide, by District, Sierra Leone IRS Campaign, 2021

District	No. Structures Sprayed	SumiShield™ 50WG	Average Number of Structures Sprayed per Sachet of Insecticide
Bo	92,795	29,967	3.10
Bombali	58,100	18,922	3.07
Total	**150,895**	**48,889**	**3.09**

4.5. Information, Education and Communication / Behavior Change Communication Activities & Outcomes

Mobilization Methodology

PMI VectorLink Sierra Leone organized awareness raising events with village headmen before and during the IRS campaign. During the 2021 IRS campaign, mobilizers were recruited within their own communities and trained. The training included the benefits of IRS, the safety of the insecticide, reasons for the use of PPE by SOPs, and instructions on what to do before, during and after spraying. The headmen and community mobilizers were responsible for reaching out to their communities and mobilizing and convincing beneficiaries to accept IRS.

The mobilizers also encouraged beneficiaries not to panic at the sight of SOPs wearing full PPE. The team emphasized on this aspect due to the general fear of spray as communities were attributing the insecticide to the chlorinated solution that was used to spray houses during the Ebola epidemic, which was rumored to have caused deaths. The project team worked with media channels to broadcast radio spots and inform communities of the IRS campaign schedule and its benefits for malaria control. Post-spray campaign activities included radio broadcasts to continue sensitizing communities on precautions (i.e. not painting walls for eight months, not covering the wall with posters, etc.) to take after spraying.

PMI VectorLink Sierra Leone worked closely with the NMCP to conduct IEC during mobilization activities. IEC messaging was developed in close collaboration with Breakthrough Action, NMCP and the IEC/BCC technical working group. The messages aimed to increase acceptance of IRS and decrease refusal rates.

The project adopted the following working methodologies to conduct mobilization:

- Developed key IEC/BCC documents (IRS communication plan including IRS messages, rumor mitigation plan, etc.) in close collaboration with Breakthrough Action, NMCP and IEC/BCC technical working group.
- Drafted messages and designed banners, posters and flyers taking into account the findings from the Malaria Behavior Survey conducted by Breakthrough Action.
- Discussed and planned IEC/social behavior change (SBC) activities in collaboration with the NMCP's SBCC technical working group and Breakthrough Action. Conducted advocacy meetings in each district with local and traditional authorities in the districts, chiefdoms, and communities.
- Trained seasonal staff involved in the implementation of SBC activities (IEC assistants, IEC supervisors, spray team and mobilizers).
- Disseminated IEC materials in the intervention districts and communities.
- Conducted mobilization through the IEC assistants, IEC supervisors, mobilizers, and community leaders.
- Aired radio messages on the most listened radio stations with a wide geographical coverage in the two targeted districts. Messages included benefits of IRS, and what to do before, during and after IRS campaign.
- Organized radio broadcasts with the participation of DHMT, paramount chiefs, and IEC officials from the public health system to strengthen advocacy at all levels.
- Provided supervisory training and ensured supervision of field mobilization teams.

Advocacy and Mobilization

To ensure the involvement of local leaders in the spray campaign and to help the project minimize refusals from beneficiaries, PMI VectorLink Sierra Leone conducted the following activities:

- Organized an advocacy and engagement workshop in each district, with district councils, paramount chiefs, section chiefs, the youth and local leaders at the community level. The health, administrative and traditional authorities, as well as religious leaders took part in the community engagement meetings led by the IEC assistants and the IEC supervisors.
- Mobilizers (village headmen and one additional person), who were recruited within their own villages, informed communities of the benefits of IRS, and what to do before, during and after spraying.
- Organized advocacy actions in the communities before and during the IRS campaign. The PMI VectorLink project collaborated with local leaders through courtesy visits, meetings with local authorities, and information sessions at different levels (chiefdom, section and community) to

strengthen advocacy and IRS messages and to share information about the spray program. As local leaders, village chiefs supported the project in setting up banners and posters and carrying out IEC mobilization in their villages and announcing the planning of IRS. Their support helped to ensure smooth community mobilization and increased IRS acceptance in some communities.

Mobilizers and IEC supervisors visited the communities to be sprayed a day before the spray in each village, and also accompanied spray teams to the field on spray days. The team used the following five categories of messages during mobilization activities:

- Advocacy messages targeting local authorities and leaders to gain their support in advocating for IRS within their communities.
- Messages to communities about the benefits of IRS.
- Messages to beneficiaries on household preparation.
- Messages to SOPs on approaches they should adopt and precautions they should take during and after spraying.
- Messages to beneficiaries on what to do after spraying, including not covering or painting treated walls for at least eight months after spraying.

Figure 5: Mobilizer Using a Megaphone to Sensitize the Population in Her Community for IRS Acceptance.

The PMI VectorLink project used mass communication (radio, megaphones, community meetings while respecting safe distancing, advocacy meetings, launching ceremony), and distributed banners at district and commune levels, as well as flyers (Annex F) at the household level during the 2021 spray campaign. The team reviewed all materials jointly with the NMCP communication staff in order to comply with the Sierra Leone government's requirements and strategy.

The project also aired radio messages in local dialects (Krio, Mende, Temne, Limba, Loko and Fullah) in collaboration with radio stations (radio Maria and radio Mankneh in Bombali, and radio Kiss 104 and radio

SLBC (Sierra Leone Broadcasting Corporation) in Bo), targeting broad geographic coverage in the project's intervention regions and districts to strengthen IRS messages and disseminate the spray schedules. The team aired two types of radio spots: a radio spot announcing the arrival of IRS in the district and a radio spot to educate people on not painting or hanging posters on the wall for eight months after spraying.

During the live interactive radio talk shows, stakeholders from the health sector and the communities were brought into the radio stations as guests to communicate with beneficiaries on the importance and benefits of the IRS campaign, as well as the safety of the insecticide.

Despite the mobilization efforts, the project experienced a significant number of refusals. Reasons for refusal included general fear of spray, as communities attributed the insecticide to the chlorinated solution that was used to spray houses during the Ebola epidemic, which was rumored to have caused deaths. In addition, some politically motivated groups (anti-government parties) sent videos and messages on social media encouraging communities not to accept IRS in Bombali and indicated that the implementation of IRS was meant to kill people. In Mara chiefdom, one of the reasons for refusal was the land dispute between the headquarter of the chiefdom where the operations site is located and the surrounding villages. VectorLink worked with the NMCP, Bombali district health medical team, DHMT district councils, paramount chiefs and councilors to address the refusal issues. Some of the mitigation measures included having IRS beneficiaries, who already had their houses sprayed, share their positive experiences on interactive radio talk shows in the different local languages. In addition, as a motivation factor, the district Chairman, and the Paramount Chiefs of chiefdoms with high refusal rates sprayed their houses and sent out messages on social media and within the community to encourage the population to also have their structures sprayed. Furthermore, local radios interviewed the community leaders, and the interviews were aired to increase the acceptance rate. Some Paramount Chiefs and DHMT also attended radio talk show with opportunity given to the population to call and ask questions. With these enhanced sensitization efforts, more communities accepted IRS, which helped improve the spray coverage.

Figure 6: Radio Talk Shows at Radio Maria and Radio Mankne in Bombali to Sensitize the Population for IRS Acceptance.

Radio talk shows in Bombali with DHMT, Paramount Chiefs and VectorLink

Figure 7: Meeting with Local Leaders to Address Refusal Cases in Bombali.

DHMT and VectorLink meeting with village headmen to address refusals in Gbantoi

Meeting with Gbanti Paramount Chief to mitigate refusals

Figure 8: Local Authorities Having their Own Houses Sprayed as Motivation Factor to Increase IRS Acceptance in Bombali.

Bombali District Chairman providing water to SOP for insecticide mixing

Bombali Sheray paramount chief observing the mixing of insecticide

4.6. National Capacity Building and Collaboration Efforts

As part of its capacity building component, the project worked closely with NMCP to identify focal points from the MOHS. As a result, the MOHS assigned to the project focal points for operations, IEC/BCC, M&E, logistics, and environment compliance who all participated in the master training session in Western Rural area. The NMCP, DHMT, Directorate of Environmental Health and EPA also participated in the joint planning of the campaign, the various trainings, workshops, or advocacy sessions for a successful IRS campaign.

During the campaign, a joint team comprised of DHMT, NMCP, Directorate of Environmental Health and VectorLink was established to supervise IRS activities on a daily basis. At the end of each day, VectorLink organized a "daily debriefing" via WebEx with the supervision team to analyze the results of the day as well as strengths and areas for improvement.

The Government supervisors worked in tandem with PMI VectorLink Sierra Leone to cover areas ranging from environmental compliance, social mobilization, training, logistics management, supervision and coordination of field operations.

Please see Annex G for the spray team organigram.

4.7. Gender Mainstreaming

During the 2021 campaign, the VectorLink Sierra Leone project employed 28.0 % women, with 26.0 % in supervisory roles.

To improve gender mainstreaming, the project sensitized all stakeholders on the importance of recruiting women for IRS campaigns. Recruiters gave priority to women who met all eligibility requirements. As part of the spray campaign requirements to not have pregnant women serve as SOPs, all female workers took a pregnancy test before the start of the campaign.

To make women comfortable in their work, the project:

- Ensured every woman received the appropriate size for coveralls and boots.
- Provided disposable sanitary pads for use while in the field.
- Constructed separate restrooms for male and female workers, properly labeled and well separated for privacy.
- Encouraged women to report any sexual harassment.

The project incorporated gender awareness and sexual harassment training in all the trainings conducted before the campaign started. Participants learned about the importance of gender equity and equality for the success of the spray campaign, and for women's empowerment in society.

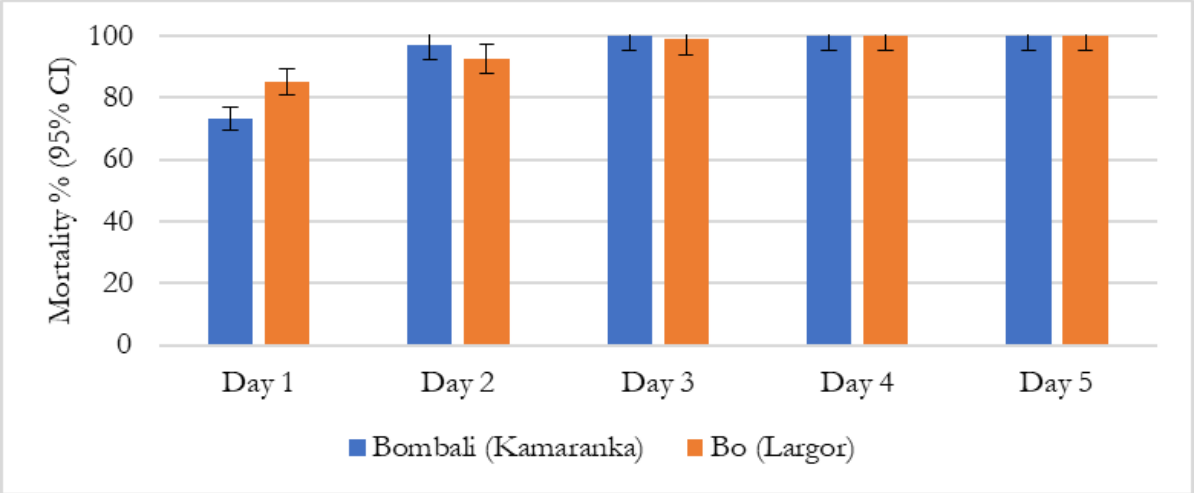
During the campaign, gender awareness and sexual harassment guidelines were posted at all operations sites. A one-page addendum code of ethics was added to the contracts and was signed by every seasonal worker. No complaints or incidents related to sexual harassment were reported to the project gender focal point person during the spray campaign.

5. ENTOMOLOGY

5.1. INSECTICIDE SUSCEPTIBILITY

In 2020, the team collected larvae in Bombali and Bo districts where IRS was planned to be implemented and non-IRS sites in Port Loko, Karene, Western Area Rural, and Kono districts. *Anopheles gambiae* s.l. larvae were reared to adults at the Vector-Borne disease insectary and laboratory (VDIL) in Makeni, Bombali district. The World Health Organization (WHO) susceptibility tests for clothianidin were conducted according to PMI/VectorLink Standard Operating Procedure (SOP 06/01) on adults aged 2-5 days from Bombali and Bo districts. Clothianidin insecticide papers were prepared by VectorLink Sierra Leone at the diagnostic concentration of 2% by dissolving SumiShield™ 50WG in distilled water and using a pipette to evenly treat Whatman No.1 filter papers. After exposure to clothianidin-treated papers, mortality was recorded after every 24 hours for five days or until 100% mortality was achieved. Susceptibility to other insecticides, pyrethroids (alphacypermethrin, deltamethrin, permethrin) with and without PBO, pirimiphos-methyl and chlorfenapyr was also assessed in all targeted districts. All mosquitoes tested were susceptible to clothianidin, the active ingredient in SumiShield™ 50WG, which was subsequently sprayed in Bo and Bombali districts (Figure 9). *Anopheles gambiae* s.l. in Sierra Leone are resistant to all pyrethroid insecticides, but the synergist PBO was able to partially restore susceptibility. The annual entomological monitoring report will include all susceptibility data/results.

Figure 9: Susceptibility of *An. gambiae* s.l. to Clothianidin (13.2 mg/Paper), 2020 using the WHO Tube Test



5.2. RESIDUAL EFFICACY

The quality of spraying was checked in Bo and Bombali districts within a week after the start of spraying by conducting cone bioassays in one randomly selected village in each district. In Bo, Gerihun village was selected, while Masongbo village was selected in Bombali district. In each village, 10 randomly sprayed structures were selected for testing; seven had mud walls (the most common wall type) and three were cement. In Gerihun, six mud and four cement-walled (one painted) houses were selected. In Masongbo, the majority of houses were cemented and not painted. Therefore, no painted cemented house was selected. Monitoring of decay rate of SumiShield™ 50WG was done in the same houses in both sites in June, one month after IRS (T1 period).

Cone bioassay testing was done according to VectorLink SOP 09/01. Testing was conducted using susceptible female adult *An. gambiae* s.s. Kisumu strain. Mortality of cone bioassays was scored every 24 hours after exposure to a maximum of five days or until 100% mortality was achieved. A control cone was set on a plywood outside of each sprayed structure under a tree in a shady area. To determine the airborne fumigant effect of the insecticide, a small wire cage (20cm x 20cm x 20cm) with 10 field-collected *An. gambiae* was placed 1m above the ground and 10–15 cm from the sprayed wall for an exposure of 30 minutes with mortality recorded every 24 hours after exposure.

, A total of 600 *An. gambiae* s.s. Kisumu strain adults were exposed to SumiShield™ 50WG -sprayed walls during the quality of spray assessment; 200 were used in plastic cages (20cm x 20cm x 20cm) with 10 *An. gambiae* s.s. Kisumu strain and placed one meter above the ground and 10-15 centimeters away from the sprayed wall for an exposure of 30 minutes to test the fumigant effect and another 200 were used as controls. In all villages, mortality of *An. gambiae* s.s. in cone bioassay on walls sprayed with SumiShield™ 50WG was high after 24 hours and increased to 100% after four days (Figures 10 and 11). This indicates that spray application was uniform with no indication of underdosing. The fumigant effect of the insecticide was able to kill over 50% of mosquitoes 24 hours after exposure, with 80% dying after day 2 (48 hours).

Month one (T1) cone bioassay tests was conducted in June 2021, to assess the residual effectiveness of SumiShield™ 50WG. Mortality of *An. gambiae* s.s. exposed to SumiShield™ 50WG-sprayed walls remained high with mortality reaching 100% after day 2 (Figure 10).

Figure 10: Knock-Down (30 and 60 mins) and Mortality of *An. gambiae* s.s. Kisumu Strain Exposed in WHO Cone Bioassay to SumiShield™ 50WG Sprayed on Mud and Cement Walls in Gerihun in Bo district, Sierra Leone

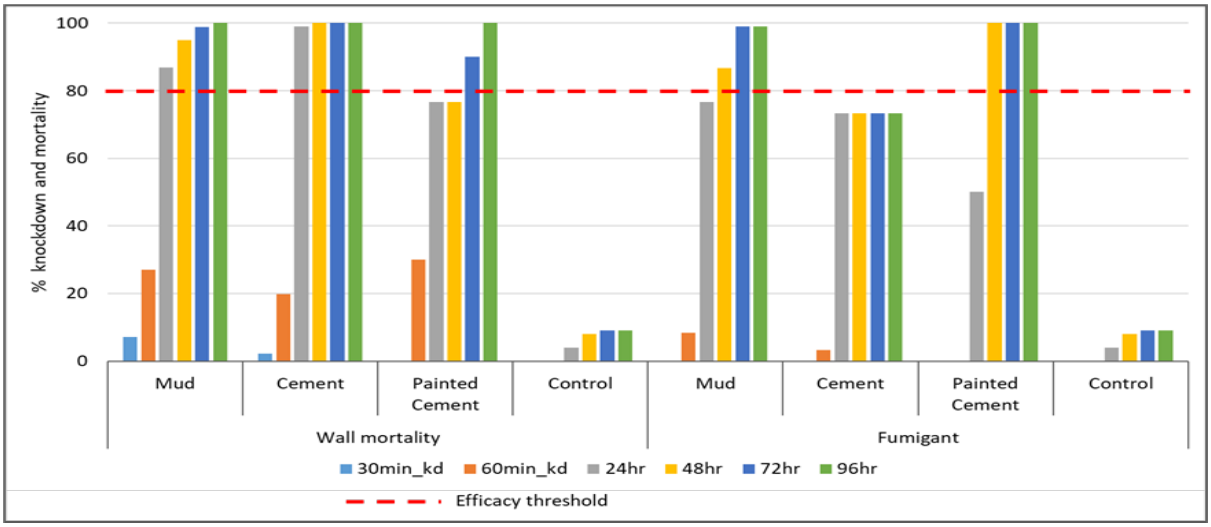


Figure 11: Knock-Down (30 And 60 Mins) and Mortality of *An. gambiae* s.s. Kisumu Strain Exposed in WHO Cone Bioassay to SumiShield™ 50WG Sprayed on Mud and Cement Walls in Masongbo, Bombali District, Sierra Leone.

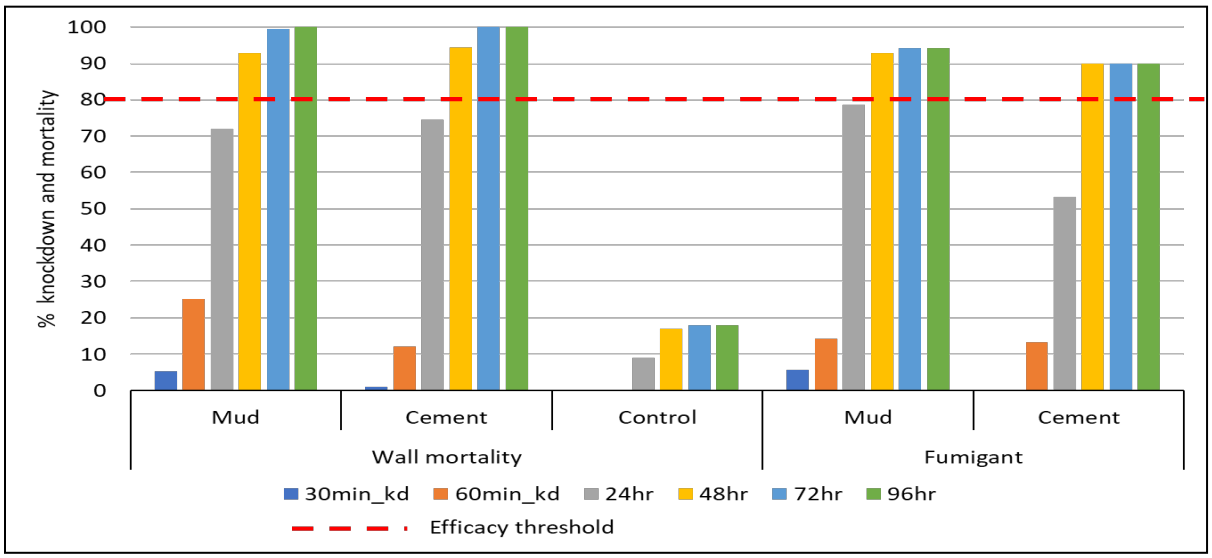
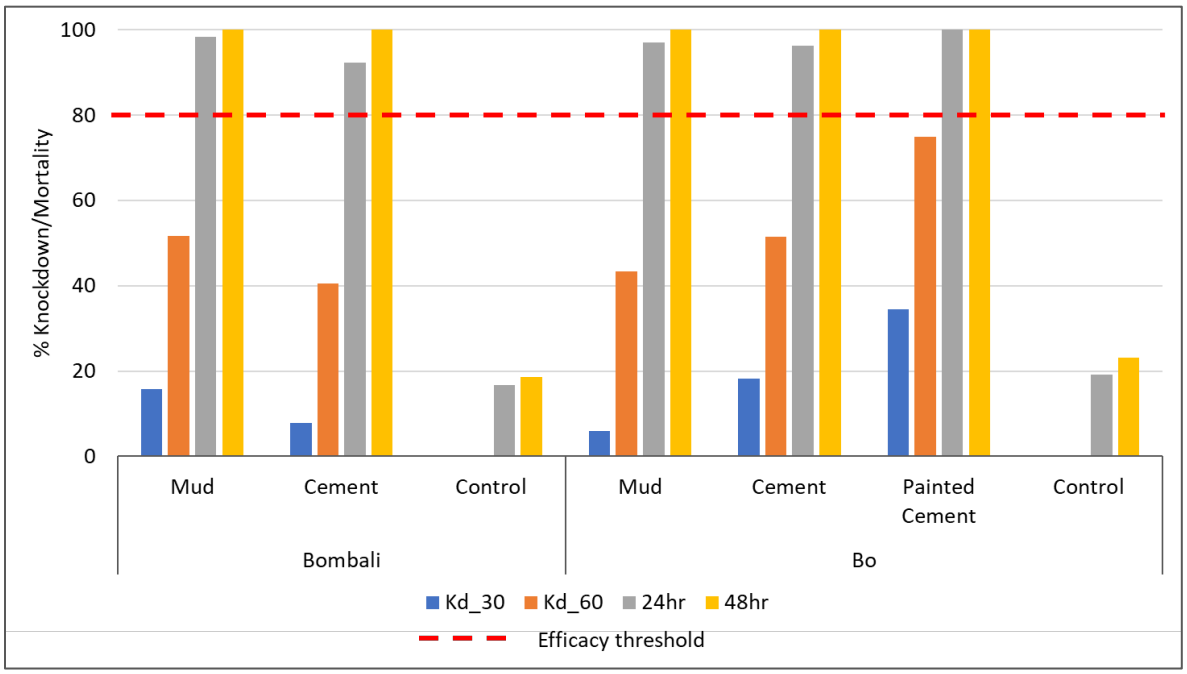


Table 8: Number of Susceptible *An. gambiae* s.s. Kisumu Strain Exposed and the % Mortalities every 24 hours after Exposure to Fumigant Effect of SumiShield™ 50WG Approximately 10 cm from the Sprayed Walls.

Village Name	Surface Type	No. of Houses	No. Exposed Mosquitoes	No. (%) Knock Down		% Mortality			
				30min	60min	24hr	48hr	72hr	96hr
Masongbo (Bombali District)	Mud	7	70	4 (5.7)	10 (14.3)	78.6	92.9	94.3	94.3
	Cement	3	30	0 (0)	4 (13.3)	53.3	90.0	90.0	90.0
	Control	10	100	0 (0)	0 (0)	9.0	17.0	18.0	18.0
Gerihun (Bo District)	Mud	6	60	0 (0)	5 (8.3)	76.7	86.7	86.7	86.7
	Cement	3	30	0 (0)	1 (3.3)	73.3	73.3	73.3	73.3
	Painted Cement	1	10	0 (0)	0 (0)	50.0	100.0	100.0	100.0
	Control	10	100	0 (0)	0 (0)	4.0	8.0	9.0	9.0

Figure 12: Knock-Down (30 and 60 mins) and Mortality of *An. gambiae* s.s. Kisumu Strain Exposed in WHO cone bioassay to SumiShield™ 50WG Sprayed Mud and Cement Walls in Masongbo, Bombali District in June (T1), Sierra Leone



Malaria vectors in Bo and Bombali districts were susceptible to clothianidin in 2020, before the spray with SumiShield™ 50WGin May 2021. From the assessment of spray quality (T0), mortality of *An. gambiae* s.s. (Kisumu) in cone bioassays on walls sprayed with SumiShield™ 50WG was high after 24 hours and increased to 100% within four days post-exposure. SumiShield™ 50WG also had a fumigant effect that should kill a proportion of mosquitoes that fail to land on sprayed surfaces. In June, one month after IRS (T1), there was high mortality of *An. gambiae* s.s. (Kisumu) exposed to SumiShield™-50WG sprayed walls in Bo and Bombali. Monthly exposures using *An. gambiae* s.s (Kisumu) will be performed to monitor insecticide residual efficacy after spray over the next year until mortality falls below 80% for two consecutive months. In general, cone bioassay results show that the spray in Bo and Bombali districts was not underdosed and the insecticide still effective on the wall one month after IRS campaign.

6. ENVIRONMENTAL COMPLIANCE

6.1. IRS CAMPAIGN ASSESSMENTS

Environmental Compliance

The PMI VectorLink Sierra Leone project operated under a nationwide supplemental environmental assessment (SEA) approved by USAID in 2021, which authorizes the use of pyrethroids, organophosphates, carbamates, neonicotinoids, clothianidin/deltamethrin combination and pyrrole (chlorfenapyr) (when listed by WHO PQ).

Challenges and Considerations

PMI VectorLink Sierra Leone conducted an environmental geographical reconnaissance in these two districts to identify appropriate sites for storerooms, the safest method of transporting SOPs and insecticide, and environmental measures required to protect communities during the spray campaign.

Pre-Season Environmental Compliance Assessments (PSECA)

The PMI VectorLink Sierra Leone team conducted a pre-season environmental assessment (PSECA) in all districts prior to the spray campaign, using smartphones with PMI standard environmental compliance checklists. The checklist contained questions to ensure that operational sites, with special emphasis on soak pits and warehouses, were properly set up before spraying. They also guided PMI VectorLink Sierra Leone's staff to ensure that all PPE and insecticides were delivered and safely stored in warehouses and that seasonal staff working in the warehouses or with soak pits had received appropriate training. The team also used smartphones to collect data on the geographical information of each operational site visited in the geographic information system and to take photos of soak pits and warehouses to show what repairs were needed, or if the site was ready. All necessary repairs were made to soak pits prior to the launch of the spray campaign based on the outcome of the inspections.

Environmental Compliance Activities during the Campaign

PMI VectorLink Sierra Leone's staff conducted inspections to ensure that spray operations met environmental compliance standards as specified in the best management practices (BMP). These inspections included monitoring the use of PPE, progressive rinsing of spray pumps, vehicles used to transport spray teams and insecticides, storage conditions of PPE and insecticides as well as warehouses displaying warning signs. The staff also closely monitored the proper management and storage of IRS waste, accuracy of the stock cards at the store level and use of proper spray techniques by SOPs. In addition, the staff checked that beneficiaries had received clear information about the IRS campaign and knew how to prepare their structures for spraying. PMI VectorLink Sierra Leone monitored the condition of fixed and mobile soak pits on a regular basis to ensure proper flow and drainage.

Mobile Soak Pit (MSP)

In some of the operational sites, PMI VectorLink Sierra Leone used mobile soak pits to accommodate spray teams that could not rely on the limited number of permanent soak pits, and to avoid congestion of spray teams within the soak pits.

Post-Spray Environmental Compliance Activities

Post-spray environmental inspections took place in June 2021. The main objective of the inspections was to ensure that all soak pits and stores had been properly decontaminated and closed out. All the secondary stores were emptied of materials and equipment used during the spray campaign. After these items and the insecticide had been removed, stores were decontaminated with water mixed with soap. The decontamination process was

performed before handing the premises back to the owners. All soak pits were covered with a metallic sheet lid to prevent people from accessing materials and from interfering with the insecticide-waste degradation process.

At the end of the campaign, the team returned all mobile soak pit materials to the warehouse. Undamaged containers and buckets were decontaminated and stored for re-use. Damaged materials were classified as IRS waste. The PMI VectorLink Sierra Leone Environmental Compliance Officer supervised decontamination activities.

6.2. Incident Reports

Despite the fact that all the necessary trainings were given, and precautions were taken, the project experienced some incidents, which were managed in a timely manner. The table below summarizes the incidents that were communicated to PMI:

Table 9: Incidents during the 2021 IRS Campaign

No	Incidents	Location	Date
1.	Incident involving the fall of a team leader	Gondama, Bo	05/10/2021
2.	Incident involving a spray operator who experienced abdominal discomfort	Dambala, Bo	05/18/2021
3.	Incident involving a spray operator who was exposed to insecticide after failing to fully bring down faceshield while spraying	Jembe, Bo	05/18/2021
4.	Incident involving spray operators and community youth who got into physical altercation after the theft of one SOP's phone by another SOP. Community became involved and with mediation, matter was resolved, and offending SOP's employment was terminated.	Jembe, Bo	05/20/2021
5.	Incident involving a team leader who was exposed to insecticide	Makeni City, Bombali	5/19/2021
6.	Incident involving the loss of three empty sachets of insecticide and one full sachet	Makeni City, Bombali	5/20/2021
7.	Incident involving one missing empty sachet of insecticide, which was mistakenly disposed of.	Gerihun, Bo	5/21/21
8.	Incident related to the loss of one empty sachet of insecticide	Kagbere, Bombali	06/02/21

6.3. Demobilization & Waste Management

Under the supervision of the Project Environmental Compliance Officer, all solid wastes generated from the 2021 spray campaign were collected and segregated. The team collected all empty insecticide sachets and reconciled the numbers using the chain of custody tools.

VectorLink signed an agreement with the National Petroleum company in Freetown for the incineration of contaminated masks and other paper wastes, such as contaminated empty boxes.

The PMI Vectorlink Sierra Leone project signed a memorandum of understanding with a local firm, Premier Enviro Solutions LTD, to recycle the empty sachets of SumiShield™ 50WG, contaminated plastic sheets, broken or unusable plastic materials and all relevant equipment out of use. Premier Enviro has the technical capability and the Ministry of Environment's authorization for waste management.

Gloves and boots used during the spray campaign contain greater than one percent chlorine. If incinerated, they can create dangerous persistent organic pollutants (POPs). After decontamination (washing them with

soap and water), the project team will dispose of such materials, that are deemed no longer suitable for IRS campaigns, by donating them.

Table 10 below shows the list of waste generated from the 2021 IRS campaign in Sierra Leone.

Table 10: List of Waste Generated from the 2021 Spray Campaign

Designation	Type	Disposal Method	Estimation Date of Transfer to Disposal Site
SumiShield™ 50WG empty sachets	Aluminum sachet	Incineration	August 2021
Plastic materials	Plastic	Recycling	August 2021
Empty boxes	Paper	Incineration	August 2021
Cotton materials	Cotton	Incineration	August 2021
Others (garbage bag, absorbent paper)	Paper-based, biodegradable materials, latex	Incineration	August 2021

7. MONITORING AND EVALUATION

7.1. DATA COLLECTION/ENTRY/QUALITY ASSURANCE

Data Collection

Building on the success of mobile data pilots that took place in Burkina Faso, Kenya, Cote d'Ivoire, and elsewhere, the VectorLink Sierra Leone team had initially planned to fully use mobile data collection throughout the 2021 spray campaign. VectorLink assumed that with the educational grades of seasonal workers in Sierra Leone being similar to those of other VectorLink countries', mobile data collection would also be as successful. However, this represented a major challenge as the majority of SOPs lacked the ability to manipulate the smartphones provided to them to collect data in the field, despite the trainings given to them. Low level of literacy in the two districts was identified as the main reason for the inability to use smartphones, to which they were not accustomed. Despite the enhanced training on the use of smartphones, the SOPs indicated that they were more comfortable using paper. Therefore, the project made the decision to fully switch to paper forms. In addition, network connectivity at several sites was very weak and non-existent in some areas, despite the enhanced internet tools used by the project.

The SOPs were trained on collecting data using the paper forms. Data collection forms went through several checks (i.e., by the team leader, M&E assistants and operational site managers) before being entered into the database. Because the project switched from mobile data collection to paper forms, the team experienced delays in data entry; however, additional data clerks were hired to assist with the backlogged data entry.

VectorLink Collect Database

PMI VectorLink Sierra Leone used the VectorLink Collect database for spray data entry, cleaning, and reporting. The database had multiple advantages, including the ability to have real time view of data entry progress, development of powerful dashboards, and pivot tables to track performance and remote interaction with the system from any location. The project granted access to the VectorLink Collect database to relevant parties within the NMCP and PMI Mission office.

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

The PMI VectorLink Sierra Leone project employed a total of 13 data cleaners and added 30 data entry clerks (DECs) per district when SOPs switched from mobile phones to paper-based data collection. Each district had its own data entry center. Each DEC entered the data from the forms into the project's VectorLink Collect database. DECs entered spray data per structure. The data cleaners completed data cleaning within three weeks after the end of the campaign. The data entered by data clerks was reviewed to ensure that all data from the SOP forms was fully recorded. The team also performed a thorough check for all potential duplicate information.

Data Quality Assurance and Verification

Field monitoring/supervision was reinforced by the VectorLink Sierra Leone team during the 2021 spray campaign in addition to the field data collection verification (DCVs) done by the M&E assistants assigned to each operational site. Data quality assurance was carried out daily during the IRS campaign by a variety of VectorLink staff and M&E assistants. All the IRS forms were verified by team leaders, M&E assistants, and brigade supervisors.

7.2. mHEALTH

Commcare Applications

In 2021, the VectorLink project continued to employ the use of m-Health applications to support quick decision-making across different components of the program, and to complement the CommCare tools used across the project. The complementary m-Health tools were designed in Open Data Kit (ODK), which is open source.

Supervision Forms

Digitized checklists were designed and used for supervision across the program. These included (a) morning mobilization; (b) transport vehicle inspection to assess compliance before teams depart for fieldwork in the morning; (c) homeowner preparation and SOP performance to assess the passing of key messages and observe spraying at the structure level; (d) storekeeper performance checks to ensure compliance with storage requirements and record keeping at the stores; and (e) the end of day clean-up inspections to check compliance at the wash area.

All project supervisors at different levels were issued smartphones to support supervision. For any gaps noted during supervision, the digitalized checklists would generate daily alerts (red flags) to all supervisors and decision makers who would then take the necessary action. During the first few days of the campaign, it was noted that some supervisors were not carefully reading the questions on the checklists before responding. This resulted in a number of false red flags. On-the-job training and immediate feedback were provided to supervisors directly, via WhatsApp fora, morning mobilization meetings, and during the daily debrief meetings.

Performance Management Tracker (PMT)

Daily submission of key operations data via PMT SMS provided key indicators on campaign progress and performance through automated email reports. Each site manager received a mobile phone to submit the daily reports to CommCare HQ via Telerivet. After data verification with the SOPs and TLs, the site manager submitted the data as summarized on the TL forms to the CommCare HQ platform. The same data was updated on the performance tracking sheet posted at every site. The key indicators reported in this system included: the number of SOPs that worked for the day, number of structures found, number of structures sprayed, and the number of insecticide sachets used during the campaign.

Job aid messages

The M&E manager and the technical team designed messages sent as alerts to the different site managers and supervisors. These messages sent out via SMS (through the Dimagi platform) spanned different aspects of the project, including IEC/BCC, operations, M&E, environmental compliance, and gender mainstreaming. The main objective was to reinforce and enhance compliance during the campaign. Messages were shared with all spray teams during the morning mobilization.

8. RESULTS

Key Spray Results

The M&E plan tracks performance and progress across the different components of the project on the following key objectives: implementation of vector control interventions, entomological and epidemiological data to drive decision-making, support the delivery and storage of IRS and other vector control products, and innovation. The M&E plan (Annex A) indicator matrix shows how PMI VectorLink Sierra Leone has performed against these indicators.

To monitor performance during the campaign, the key indicators tracked throughout the campaign included structures targeted, structures found, and the proportion of structures sprayed out of those targeted (spray progress) and those found (spray coverage). During spraying, the project collected population details to establish the populations protected. This included the total population disaggregated by gender and special groups, such as pregnant women and children under five. Table 11 and 12 provides a summary of key results.

Table 11: 2021 IRS Results per Operations Site

Districts	Operations Sites	Targeted Structures	Structures Found	Structures Sprayed	Spray Progress (%)	Spray Coverage (%)
Bo	Bumpe	9,984	11,723	11,227	112.4	95.8
	Dambala	13,000	10,091	9,605	73.9	95.2
	Gerehun	15,896	18,869	18,164	114.3	96.3
	Gondama	17,843	16,084	16,017	89.8	99.6
	Jembe	16,504	19,679	19,226	116.5	97.7
	Jimmy	4,983	5,433	5,126	102.9	94.3
	Ngalu	6,803	6,242	6,088	89.5	97.5
	Sumbuya	6,019	7,551	7,342	122	97.2
	Total	91,032	95,672	92,795	102	97
Bombali	Binkolo	9,025	9,800	8,941	99.1	91.2
	Kagbere	7,339	7,634	6,673	90.9	87.4
	Kamabai	8,879	10,829	9,794	110.3	90.4
	Makeni City	18,742	20,630	19,574	104.4	94.9
	Mara	3,689	5,370	3,615	98	67.3
	Rokontha	9,286	10,984	9,503	102.3	86.5
	Total	56,960	65,247	58,100	102	89.05
Total		**147,992**	**160,919**	**150,895**	**102**	**93.8**

Table 12: Summary of the 2021 Key IRS Results

District	Targeted Structures	Total Structures Found	Total Structures Sprayed	Total Structures Not Sprayed	Spray Coverage (%)	Population Found	Population Protected				Population Not Protected			
							General Population		Special Populations		General Population		Special Populations	
							Males	Females	# of Pregnant Women	# of Children <5	Males	Females	# of Pregnant Women	# of Children<5 years
Bo	91,032	95,672	92,795	2,877	97.0%	412,980	211,230	197,485	16,447	69,901	2,286	1,979	111	632
Bombali	56,960	65,247	58,100	7,147	89.0%	285,572	136,051	127,930	10,157	41,202	11,621	9,970	1047	3184
TOTAL IRS 2021	**147,992**	**160,919**	**150,895**	**10,024**	**93.8%**	**698,552**	**347,281**	**325,415**	**26,604**	**111,103**	**13,907**	**11,949**	**1,158**	**3,816**

Insecticide Usage and SOP Performance

SOPs were given a daily target of 10 structures per day at the start of the campaign. Spray operations started in remote areas, progressively moving inwards towards the more centrally located operations sites in the field. The project used a total of 48,889 insecticide sachets to spray 150,895 structures (Table 13). At the end of the spray campaign, the project had 43,630 sachets of insecticide left.

The large leftover quantity of insecticide was due to the fact that initial pre-campaign estimations were based on the assumption that one sachet of insecticide would spray on average 1.8 structures given the size of the houses in Bo and Bombali. However, campaign data revealed that one sachet of insecticide sprayed an average of three structures. The leftover insecticide, which is set to expire in November 2023, will be used for the 2022 campaign.

Table 13: 2021 IRS Results by District

District	Structures Sprayed	Spray Coverage (%)	Number of Insecticide Sachets Used	Average Number of Structures per Sachet	Average Number of Structures Sprayed per SOP per day
Bo	94,361	97.0	29,967	3.10	9.63
Bombali	57,352	89.0	18,922	3.07	8.82
Total	**150,895**	**93.8**	**48,889**	**3.09**	**9.31**

Reasons for Non-Spray

During the 2021 IRS campaign, VectorLink Sierra Leone did not spray 10,024 found structures (6.2 % of all found structures). The key reasons for non-sprayed structures were refusals (42.3 %, 4,245 structures), locked structures (no occupants home at the time of spray: 41.2 %, 4,131 structures), sick (5.0 %, 500 structures) followed by funeral (2.5 %, 251 structures). Figure 13 provides an overall summary.

Figure 13: Overall Reasons for Non-Sprayed Structures

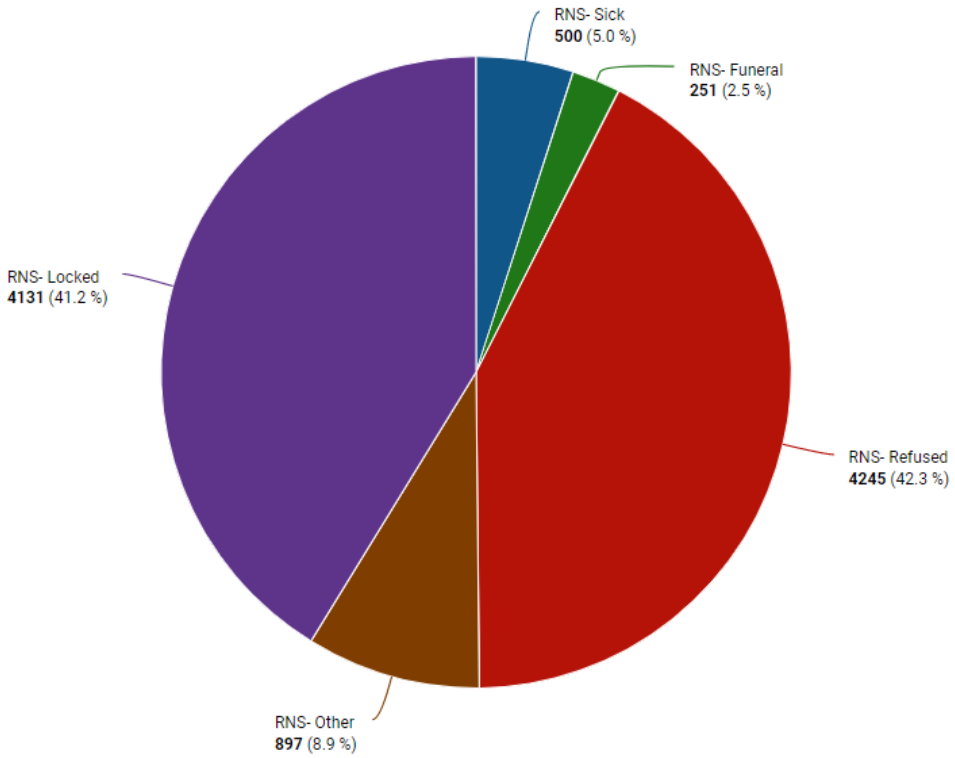


Table 14 below gives the breakdown for the reasons of non-sprayed structures by district.

Table 14: Reasons for Non-Spray by District

Reasons for Non-Spray	Bo	Bombali	Total
Refusal	923 (32.1%)	3,322 (46.5%)	4,245 (42.3%)
Locked structures	1,498 (52.1%)	2,633 (36.8%)	4,131 (41.2%)
Sick	104 (3.6%)	396 (5.5%)	500 (5.0%)
Family/local event	47 (1.6%)	204 (2.9%)	251 (2.5%)
Others	305 (10.6%)	592 (8.3%)	897 (9.0%)
Total	**2,877 (100%)**	**7,147 (100%)**	**10,024 (100%)**

9. CHALLENGES, LESSONS LEARNED AND KEY RECOMMENDATIONS

While the spray campaign was successfully implemented, the VectorLink project faced several challenges in the field, including:

- As part of stakeholder involvement in IRS, VectorLink, DHMT and other stakeholders identified some communities with facilities that could be used as storage facilities and by default, an operations site would be located close to those facilities. To use these facilities, for IRS purposes, an MOU was needed between the NMCP, DHMT, community leaders and the facility owners. The signing of the MOU was delayed because some stakeholders felt that they were not adequately consulted. In some cases, an MOU was not available until about one month before the start of the spray campaign. In other cases, facilities that were initially offered did not meet VectorLink's environmental compliance requirements. Finding replacement facilities for an MOU was a difficult process. These delays affected the start and completion of rehabilitation activities at some sites. Currently, all MOUs are in place and rehabilitation plans in the future will be targeted for completion at least six weeks before the start of the spray campaign
- There was a long delay in clearing internationally procured Goizper sprayers. Generally, VectorLink Sierra Leone cleared internationally procured items through the US embassy without any major issues. However, the project was informed that the Sierra Leone Government changed the clearing process from a manual system to an electronic system around the arrival time of the sprayers in-country. As a result, new processes and protocols had to be followed. Navigating through the new process was challenging and led to several weeks of delays in obtaining vital documents for the VectorLink's clearing agent to proceed with clearing the sprayers that had been procured for the 2021 spray campaign. The delays eventually resulted in truncating the SOPs' trainings and postponing the start date of the spray campaign. VectorLink worked closely with the NMCP/MOHS and USAID Mission and the MOHS was able to work with the Ministry of Foreign Affairs to expedite the clearance of the sprayers at the request of USAID.
- Before and during the training sessions, all participants, including SOPs were informed of the wages to be paid by the project. However, upon the end of the training sessions and on the first couple of days of the spray campaign, hundreds of SOPs across the operations sites refused to show up to work. Some of the SOPs demanded to be paid a daily wage of $10-15USD, which was not feasible due to budget implications, and was not in compliance with the agreed-upon wage with local stakeholders. The proposed wages by the project were in line and even higher than those provided during other in-country public health community activities. Other SOPs simply refused to come back to work after the training. The project had to rapidly recruit, train, and deploy additional spray teams to the field.
- Lack of water: the project experienced a major lack of water in both districts. Therefore, the site had to carry water using jerrycans in the spray vehicles to ensure that water was available to the spray teams in the field for insecticide mixing.
- Difficulty using smartphones: the majority of spray operators struggled to use smartphones despite the trainings that were provided to them before and during the spray campaign. Therefore, the project made the decision to switch to paper forms in order to avoid further delays in data collection and reporting. As large data centers were not set-up and fully staffed in advance of the

IRS campaign to support a paper-based data collection model, including systems to manage and track large volumes of data forms, recruitment and training of data entry personnel was conducted after the start of the IRS campaign, resulting in data entry backlogs that persisted throughout the IRS campaign.

- High refusal cases: the project experienced a significant number of refusals. Reasons for refusal included general fear of spray, as communities attributed the insecticide to the chlorinated solution that was used to spray houses during the Ebola epidemic, which was rumored to have caused deaths. In addition, some politically motivated groups (anti-government parties) sent videos and messages on social media encouraging communities not to accept IRS in Bombali, indicating that the implementation of IRS was meant to kill people. VectorLink worked with the NMCP, Bombali DHMT district councils, paramount chiefs and councilors to address the refusal issues. Some of the mitigation measures included having IRS beneficiaries who already had their houses sprayed, share their positive experiences on interactive radio talk shows in the different local languages. In addition, as a motivation factor, the district Chairman and the paramount chiefs of chiefdoms with high refusal rates sprayed their houses and sent out messages on social media and within the community to encourage the population to also have their structures sprayed. Furthermore, local radios interviewed the community leaders, and the interviews were aired to increase the acceptance rate. With these enhanced sensitization efforts, more communities accepted IRS.

- Missing items: As part of inventory management at the end of the campaign, the Vector Link Sierra Leone team conducted a stock count of IRS materials at each site before the demobilization process and noticed that several items were missing in both Bombali and Bo districts. This was a surprising finding, as the items went missing after spray operations ended. All storekeepers had been trained on proper daily stock management before the start of the spray campaign and were given clear instructions that all project materials ought to be returned back at the end of the campaign. However, the instructions were not respected, and the project lost a large number of spray materials, including coveralls, gloves, boots, head lamps, etc. With the help of local authorities at the district level, the project was able to retrieve some items, but not the totality of what went missing. The value of the missing materials is estimated at around 23,000 USD.

- Payment delays: Payments for a significantly large number of seasonal workers were temporarily withheld after the spray campaign ended to give them the opportunity to bring all project materials back. While this was the agreed-upon approach with NMCP, it created quite a high level of frustration and anger from those seasonal workers. After some seasonal workers returned project materials in order to receive their payments, the VectorLink team unfortunately experienced significant delays in paying those workers per the communicated deadline. This subsequently led to "allegations of fraud" towards the VectorLink project from some of those workers. After an extensive investigation, it was determined that no fraudulent activities took place by the VectorLink project and that these allegations simply stemmed from unhappy workers whose payments were delayed after they returned project materials. All outstanding payments were then made a month after they returned all project materials.

- Challenges finding all community/village-level mobilizers on lists provided at the district level: The project struggled to physically find a large number of village-level mobilizers that were on the lists provided by the district, despite holding three different payment sessions at the chiefdom level. A significant number of mobilizers who were on the payment lists did not show up to the payment locations, and several of them could not be identified within the communities. Thus, as agreed with the districts, the project decided that the third payment session would be the very final one, which was also communicated via radio and through the district and chiefdom level authorities to all relevant communities. VectorLink proceeded with paying all mobilizers who showed up during the communicated final payment session in order to fully close this matter three months after the end of the spray campaign.

Recommendations

- During this year's spray campaign, the team used the approach of recruiting IEC assistants, IEC supervisors and mobilizers (the headman and one additional person within each village) to conduct community mobilization. The project will continue with the approach of using headmen and IEC mobilizers from each community. In addition, VectorLink will work with Catholic Relief Services (CRS) who is responsible for malaria SBC activities at the chiefdom level, to identify and engage influential figures at the community level for IRS acceptance.
- Continue to reinforce the use of PMT reports since this was highly efficient and effective in monitoring spray progress and coverage near real-time and was very useful to track spray team performance and implement mitigation measures.
- Maintain the use of paper data collection forms during the second year of the campaign.
- Assess the availability of water shortages at the district level to ensure proper planning (storage of clean water, etc.) prior to the start of the spray campaign.
- Complete all local procurement at least three months before the IRS campaign.
- Strengthen the material distribution control systems between storekeepers, team leaders and spray operators by establishing a distribution form between team leaders and SOPs, and the strict use of the daily material distribution forms as well as verification every two days of the stock by supervisors. Enhanced security will be also used at the operations site level to prevent any attempted theft.
- Request full reimbursement from any participant who drops out after being fully trained (except for involuntary reasons, such as medical issues, etc). The project will analyze each drop-out case by case to determine whether a reimbursement is necessary.
- Provide cash payments to seasonal workers for every eight days worked during the 2022 campaign (three payments sessions over a 24-day campaign versus two payment sessions in 2021), as a way to mitigate loss of project materials and take actions in a timely/weekly manner. This will allow the team to confirm that all project materials are accounted for from each relevant worker (SOPs, storekeepers, site managers, etc.) before each payment session.
- Remove from the 2022 spray campaign all seasonal workers that failed to comply with project's rules and regulations during the 2021 spray campaign.
- Work with the district officials to ensure that the list of mobilizers communicated to the project is fully accurate with confirmed individuals.
- Establish with NMCP and district-level authorities a system for more government human resources that would allow for more robust leadership in IRS implementation with more on the ground support during trainings, spray operations, and generally problem-solving.
- Continue to promote the transfer of technical capacity to NMCP so that they are able to assume greater responsibility for planning, implementing, and monitoring IRS activities. The project will work in coordination with NMCP/MOH national and district level staff to implement program activities, including training, supervision, and monitoring, in order to eventually lead IRS independently.

ANNEX A: MONITORING & EVALUATION (M&E) PLAN

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Dis-aggregation	Annual Targets and Results									
					Year 1		Year 2		Year 3		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
Objective 1: Implementation of Malaria Vector Control (VC) Interventions														
1.1	**Successfully Execute IRS and Other Integrated Malaria VC Activities**													
1.1.1	Number and %age of completed annual country work plans developed and submitted on-time	X	Project records Annually											
1.1.2	Number of eligible structures targeted for spraying		Project records Annually	Total (All)	N/A	N/A	N/A	N/A	N/A	N/A	147,992	160,919		
1.1.3	Number of eligible structures sprayed with IRS[1]		Project records Annually	Total (All)	N/A	N/A	N/A	N/A	N/A	N/A	125,793	150,895		
1.1.4	%age of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)		Project records Annually	Total %	N/A	N/A	N/A	N/A	N/A	N/A	85%	93.80%		
1.1.5	Number of people protected by IRS					N/A	N/A	N/A	N/A	N/A	706,357	672,696		

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Dis-aggregation	Annual Targets and Results									
					Year 1		Year 2		Year 3		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
			Annually	Sex: Male Sex: Female Pregnant women Children <5			Project records	Total (All) Subtotal: (as necessary)	N/A		355,716 350,641 13,162 106,663	347,281 325,415 26,604 111,103		
1.1.6	Number and %age of vector control project country programs submitting an EOSR within 45 days after the end of spray (including completing MEP and EMMR)	X	Project Annually	Country										
1.1.7	Number and %age of IRS country programs that conduct a Post-Spray Data Quality Audit within 90 days of spray completion	X	Data Collection Forms Annually	Country										
1.1.8	Number of Insecticide Treated Nets (ITNs) distributed, by channel		Project Records Annually	Channel	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0		
1.1.9	Number and %age of countries completing ITN durability monitoring data collection as planned in a given project year	X	Project Records Annually	Country										
1.1.10	Number and %age of PMI-funded durability monitoring surveys with reports submitted within 90 days of the end of data collection	X	Project Records Annually	Country										
1.2	**Strengthen Capacity of NMCPs, VC Personnel, and Other Institutions to Implement and Manage IRS and Other VC Activities**													
1.2.1	Total number of people trained to support VC in target areas		Project Training Records	Total VC Intervention	N/A	N/A	N/A	N/A	N/A	N/A	2,165	6,549 IRS		

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Dis-aggregation	Annual Targets and Results									
					Year 1		Year 2		Year 3		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
			Annually	Sex: Male Sex: Female Job Function		See Table 2						3,734 2,815		
1.2.2	Total number of people trained to support VC in target areas with USG funds[2]		Project Training Records Annually	Total VC Intervention Sex: Male Sex: Female Job Function	N/A	N/A See Table 2	N/A 811	N/A See Table 2	N/A	N/A	727	1,223 IRS 910 313		
1.2.3	Number of people trained during the Master (National) Training and/or IRS Training of Trainers.		Project Training Records Annually	Total Sex: Male Sex: Female Type of Training	N/A	N/A	N/A	N/A See Table 2	N/A	N/A	118	100 77 23		
1.2.4	Total number of people hired to support VC in target areas.		Project Records Annually	Total VC Intervention Sex: Male Sex: Female Job Function	N/A	N/A See Table 2	N/A	N/A See Table 2	N/A	N/A	2,132 See Table 2	1,549 IRS 1,119 430		
1.2.5	Number of VC project training workshops targeting NMCP and other host country staff		Project Training Records	Total Technical Area	2	2 Entomology	1	1 Entomology	4	4 Entomology, enumeration	2 Entomology - Durability monitoring- IRS forecasting	3 Entomology - Durability monitoring- IRS forecasting		

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Dis-aggregation	Annual Targets and Results									
					Year 1		Year 2		Year 3		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
			Annually	Job Function		See Table 2		See Table 2		See Table 2	See table 2			
1.2.6	Number of NMCP and other vector control host country staff who have logged into VectorLink Collect		DHIS2 Logs Annually	Total Job Function	N/A	N/A	N/A	N/A	N/A	N/A	2	0		
1.2.7	Number and %age of technical assistance requests to support ITN distribution planning and/or implementation completed on time as planned in a given project year	X	Project Records Annually	Country Technical Area Channel										
1.2.8	Number and %age of technical assistance requests to support operational routine monitoring systems for continuous ITN distribution completed on time as planned in a given project year	X	Project Records Annually	Country Channel										
1.3	**Environmental Compliance and Safety**													
1.3.1	Number of seasonal vector control personnel trained in environmental compliance and personal safety standards in vector control implementation		Project Training Records Annually	Total Sex: Male (#) Sex: Female (#) Sex: Male (%) Sex: Female (%) Job Function	N/A	N/A	N/A	N/A	N/A	N/A	1,197	1,845 1,240 605 67% 33%		
1.3.2	Number of health workers receiving insecticide poisoning case management training		Project Training Records	Total Sex: Male (#) Sex: Female (#)	N/A	N/A	N/A	N/A	N/A	N/A	217	163 4 159		

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Dis-aggregation	Annual Targets and Results									
					Year 1		Year 2		Year 3		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
			Annually	Sex: Male (%) Sex: Female (%)								2% 98%		
1.3.3	Number of adverse reactions to pesticide exposure documented that resulted in a referral for medical care		Incident Report Forms Annually	Total Type of Exposure	N/A	N/A	N/A	N/A	N/A	N/A	0	1 1		
1.3.4	Number of SEAs and Letter Reports submitted at least 60 days prior to the commencement of VC campaigns	X	Project Records Annually	Country								1		
1.3.5	Number and %age of permanent and mobile soak pits inspected and approved prior to IRS campaigns or before first use		Project Records - PSECAs Annually	Total Number %	N/A	N/A	N/A	N/A	N/A	N/A	26	29 100%		
1.3.6	Number and %age of storehouses inspected and approved prior to IRS campaigns		Project Records - PSECAs Annually Annually	Total Number % Type: Operational Site Store Type: Central Warehouse Type: District Warehouse	N/A	N/A	N/A	N/A	N/A	N/A	16	15 100% 14 1 0		
1.4	**Promote Gender Equality in all Facets of Planning and Implementation**													
1.4.1	Number and %age of women hired to support VC campaigns		Project Records Annually	Number % Job Function	N/A	N/A See Table 2	N/A	N/A See Table 2	N/A	N/A	397	430 28%		

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Dis-aggregation	Annual Targets and Results									
					Year 1		Year 2		Year 3		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.4.2	Number and %age of women hired in supervisory roles in target areas for VC activities		Project Records Annually	Number % VC Intervention Job Function	N/A	N/A	N/A	N/A	N/A	N/A	44	74 26% IRS		
1.4.3	Number and %age of trainees (permanent and seasonal) who have completed gender awareness training		Project Records Annually	Total Sex: Male (#) Sex: Female (#) Sex: Male (%) Sex: Female (%) Job Function	7	7 6 1 86% 14% See Table 2	7	7 6 1 86% 14% See Table 2	24	12 9 3 75% 25%	1,042	1,633 1,182 451 72% 28%		
1.4.4	Number and %age of women in senior leadership roles in VectorLink country offices	X	Project Records Annually	Country Sex (# and %)										
1.5	**Implement and Support SBCC and Mobilization Activities**													
1.5.1	Number of radio spots and talk shows aired		Project Records Annually	Total VC Intervention Talk Show or Radio Spot	N/A	N/A	N/A	N/A	N/A	N/A	16 IRS	969 969		
1.5.2	Number of print materials distributed to or targeted at beneficiaries		Project Records Annually	Total VC Intervention	N/A	N/A	N/A	N/A	N/A	N/A	0	15,965 IRS		
1.5.3	Number of people reached with vector control and/or		Project Records	Total VC Intervention	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Dis-aggregation	Annual Targets and Results									
					Year 1		Year 2		Year 3		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
	SBCC messages via door-to-door messaging		Annually	Sex: Male Sex: Female										
2. Entomological and Epidemiological Data to Drive Decision-Making														
2.1	**Vector Control Activities Monitored via Entomological and Epidemiological Data**													
2.1.1	Number of project-supported entomological sentinel sites established to monitor vector bionomics (vector species, distribution, seasonality, feeding time, and location)		Entomological Reports Annually	Total VC Intervention	8	8 Ento Only	8	8 Ento Only	10	16 Ento Only	16	16 Ento+IRS		
2.1.2	Number and %age of vector bionomics monitoring sites measuring all basic entomological indicators (species composition, indoor and outdoor human biting rates, hourly human biting rates, indoor resting densities)		Entomological Reports Annually	Total Number % VC Intervention	8	8 100% Ento Only	8	8 100% Ento Only	10	16 100% Ento Only	16 100%	16 100% Ento+IRS		
2.1.3	Number and %age of vector bionomics monitoring sites measuring the following all advanced entomological indicators: sporozoite rates and entomological inoculation rates		Entomological Reports Annually	Total Number % IRS or Entomology Only Program	8	8 100% Ento Only	8	8 100% Ento Only	10	16 100% Ento Only	16 100%	16 100% Ento+IRS		
2.1.4	Number and %age of insecticide resistance monitoring sites that tested all priority insecticides for the relevant local vector control intervention		Entomological Reports Annually	Total Number % VC Intervention	4	4 100% Ento Only	4	4 100% Ento Only	5	10 100% Ento Only	10 100%	4[1] 40% Ento+IRS		
2.1.5	Number and %age of houses in which WHO cone bioassays		Entomological Reports	Total Number			N/A	N/A	N/A	N/A	16	20		

[1] Activities are ongoing at the time of EOSR submission.

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Dis-aggregation	Annual Targets and Results									
					Year 1		Year 2		Year 3		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
	were conducted within two weeks of spraying with greater than 98% test mortality recorded for IRS countries		Annually	% Insecticide Type							100%	100% SumiShield™ 50WG		
2.1.6	Number and %age of sites that conducted WHO cone bioassays after the completion of spraying at monthly intervals until test mortality drops below 80% for two consecutive months for IRS countries		Entomological Reports Annually	Total Number % Insecticide Type			N/A	N/A	N/A	N/A	4	2[2] 50% SumiShield™ 50WG		
2.1.7	Number of countries with an integrated vector control analytics dashboard created by PATH, available for decision-making	X	Project Reports Annually	Country										
2.1.8	Number of people trained (VectorLink and non VectorLink staff) in entomological monitoring		Project Records Annually	Total Sex: Male (#) Sex: Female (#) Sex: Male (%) Sex: Female (%)	18	18 17 1 94% 6%	21	21 17 4 81% 19%	18	31 25 6 81% 19%	32	26 21 5 81% 19%		
2.1.9	Number and %age of sites in which WHO cone bioassays were conducted to evaluate bio-efficacy of bed nets		Entomological Records Annually	Total Number %			0	0	2	TBD	2	2 100		
2.1.10	Number of nets in which WHO cone bioassays were conducted to evaluate bio-efficacy of bed nets		Entomological Records Annually	Total			0	0	60	TBD	60	30[3]		

[2] Activities are ongoing at the time of EOSR submission.
[3] Activities are ongoing at the time of EOSR submission.

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Dis-aggregation	Annual Targets and Results									
					Year 1		Year 2		Year 3		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
2.2	**NMCPs Develop Country-Level IRS and Other Malaria VC Strategies**													
2.2.1	Number and %age of countries with an integrated malaria vector control strategy, including a plan for monitoring and managing insecticide resistance supported by the project	X	Project Records Annually	Country										
2.2.2	Number and % of countries with a data and visualization dashboard complete for IRS and/or entomology data in VectorLink Collect for vector control decision making	X	Project Records Annually	Country										
2.2.3	Number of countries that implement sub-national insecticide rotation	X	Project Records Annually	Country										
2.3	**Build capacity of NMCPs and local institutions to collect, analyze, and use data for strategic malaria control decision-making**													
2.3.1	Number of individuals trained from NMCPs and national institutions to review and interpret data for integrated vector control decision making		Project Training Records Annually	Total Job Function Organization	1	1 IVM focal person NMCP	1	1 IVM focal person NMCP	1	2 IVM focal person entomology Unit NMCP&MOHS	2	5 IVM 1, In charge of entomology unit 1, EPA 1, Pharmacy board 1, Directorate of environmental health 1, NMCP M&E 1		
2.3.2	Number and % of targeted individuals that report using new analytical tools and/or skills in their planning, resourcing, implementation, or measurement activities		Capacity Assessments Thrice Over Project Life	Total Job Function Organization	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Dis-aggregation	Annual Targets and Results									
					Year 1		Year 2		Year 3		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
	3. Procurement and Logistics													
3.1	**Cost-Effective Procurement Mechanism Established**													
3.1.1	Number and %age of insecticide procurements that had a pre-shipment QA/QC test, done by a third party, at least 60 days prior to spray campaign	X	Procurement Records Annually	Country Insecticide Type										
3.1.2	Number and %age of insecticide procurements received on-time to allow for the initiation of spray operations as scheduled		Procurement Records Annually	Total Number % Insecticide Type	N/A	N/A	N/A	N/A	N/A	N/A	1	2 100 SumiShield™ 50WG		
3.1.3	Number and %age of targeted countries with international equipment procurements, including PPE, received on-time to allow for the initiation of vector control campaigns as scheduled	X	Procurement Records Annually	Country VC Intervention										
3.1.4	Number of VectorLink staff trained on procurement	X	Project Records Annually	Country										
3.2	**Robust Inventory Management and Logistics Systems Established**													
3.2.1	Number and %age of logistics and warehouse personnel (seasonal and full-time) trained in VC supply chain management		Project Training Records Annually	Total Number VC Intervention Sex: Male (#) Sex: Female (#) Sex: Male (%) Sex: Female (%) Job Function	N/A	N/A	N/A	N/A	N/A	N/A	81	20 IRS 18 2 90% 10%		

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Dis-aggregation	Annual Targets and Results									
					Year 1		Year 2		Year 3		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
3.2.2	Number and %age of operations site warehouses where physical inventories can be verified by daily stock records		Inventory and Stock Records Annually	Total Number %	N/A	N/A	N/A	N/A	N/A	N/A	16	14 100		
3.2.3	Number and %age of IRS countries that successfully completed spray operations without an insecticide stock-out	X	Inventory and Stock Records Annually	Country Insecticide Type										
	4. Innovation													
4.1	**Conduct operational research or monitoring to scale up new tools, methods, and approaches**													
4.1.1	Number of operational research studies on promising new tools or new methods/approaches to existing tools that are implemented		Project Records Annually	Total Number Type of Innovation	0	0	0	0	0	0	1 Co-deployment of IRS	1 Co-deployment of IRS		
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	X	Project Records Annually	Country Technical Area										
4.2.2	Number of individual members who use the Vector Learning Exchange	X	Project Records Annually	N/A										
4.2.3	Number of symposia and/or presentations submitted to and accepted at global conferences		Project Records Annually	Total Technical Area	0	0	1	1 Entomology	2	1 Entomology	1	1 Entomology		
4.2.4	Number of success stories written, or videos produced		Project Records	Total	0	0	1	1	1	0	1	0		

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Dis-aggregation	Annual Targets and Results									
					Year 1		Year 2		Year 3		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
	and shared on the VectorLink project website		Annually											
4.2.5	Number of peer-reviewed journal articles submitted and accepted	X	Project Records Annually	Technical Area										
4.2.6	Number of contributions to vector control global or country policy and/or guidance documents		Project Records Annually	Total Technical Area	1	1 IRMMP (Vector Control/ Entomology)	2	2 IVM Policy and Strategic Plan Review (Vector Control/ Entomology)	1	1 Malaria Program Review (Vector Control)	1	1 Malaria Elimination Plan		
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	Total VC Intervention	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
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	Total VC Intervention	N/A	N/A	N/A	N/A	N/A	N/A	0	0		
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	Total	0	0	0	0	1	0	0	0		

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

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

#	Selected Indicators *with Job Function Disaggregates*	By Job Function	Annual Targets and Results									
			Year 1		Year 2		Year 3		Year 4		Year 5	
			Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.2	**Strengthen Capacity of NMCPs, VC Personnel, and Other Institutions to Implement and Manage IRS and Other VC Activities**											
1.2.1	Total number of people trained to support VC in target areas	Total	N/A	N/A	N/A	N/A	N/A	N/A	2,165	6,549		
		IEC Supervisor								36		
		Master Trainers								24		
		Site Managers								14		
		IEC Coordinator								1		
		Brigade Supervisors								61		
		Finance Assistants								3		
		IEC Coordinator Assistant								14		
		SOPs								984		
		Team Leaders								164		
		IEC Mobilizers/Village Headmen								4556		
		EC Assistants								2		
		Data Cleaners & M&E Assistant								42		
		Clinicians								163		
		Data Entry Clerks								75		
		Logistics Assistants								2		
		Storekeepers								17		
		Security Guards								42		

#	Selected Indicators *with Job Function Disaggregates*	By Job Function	Annual Targets and Results									
			Year 1		Year 2		Year 3		Year 4		Year 5	
			Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
		PPE Washers								97		
		Sprayer Technicians								18		
		Drivers								129		
		Radio Journalist								8		
		Sprayer Washers								97		
1.2.2	Total number of people trained to support VC in target areas with USG funds [2]	Total	N/A	N/A	N/A	N/A	N/A	N/A	727	1,223		
		Brigade Supervisors								61		
		Site Managers								14		
		SOPs								984		
		Team Leaders								164		
1.2.4	Total number of people hired to support VC in target areas.	Total	N/A	N/A	N/A	N/A	N/A	N/A	2,132	1,549		
		IEC Coordinator								1		
		IEC Coordinator Assistants								14		
		Site Managers								14		
		District Coordinator								1		
		Finance Assistants								3		
		Data Entry Clerks								75		
		M&E Assistants								14		
		Data Cleaners								13		
		Central Storekeeper								0		
		Storekeepers								17		

#	Selected Indicators *with Job Function Disaggregates*	By Job Function	Annual Targets and Results									
			Year 1		Year 2		Year 3		Year 4		Year 5	
			Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
		Logistics Assistants								2		
		Bridage Supervisors								61		
		IEC Supervisor								36		
		SOPS								815		
		Team Leaders								163		
		IEC Mobilizers								0		
		Village Headmen								0		
		Security Guards								42		
		PPE Washers								89		
		Sprayer Washers								97		
		Water fetchers								44		
		Sprayer Technicians								18		
		EC Assistants								2		
		Site Cleaners								28		
1.2.6	Number of NMCP and other vector control host country staff who have logged into VectorLink Collect	Total	N/A	N/A	N/A	N/A	N/A	N/A	2	0		
		Assistant NMCP Program Manager								0		
		IVM Focal Person NMCP								0		
		M&E Officer NMCP								0		
1.3	**Environmental Compliance and Safety**											
1.3.1	Number of seasonal vector control	Total	N/A	N/A	N/A	N/A	N/A	N/A	1,197	1,845		
		IEC Coordinator								1		

#	Selected Indicators *with Job Function Disaggregates*	By Job Function	Annual Targets and Results									
			Year 1		Year 2		Year 3		Year 4		Year 5	
			Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
	personnel trained in environmental compliance and personal safety standards in vector control implementation	IECs Coordinator Assistants								14		
		IEC Supervisors								36		
		Site Managers								14		
		Brigade Supervisors								61		
		SOPs								984		
		Team Leaders								164		
		Logistics Assistants								2		
		EC Assistants								2		
		Storekeepers								17		
		Security Guards								42		
		Sprayer Washers								97		
		Drivers								129		
		Sprayer Technician								18		
		District Coordinator								1		
		Finance Assistants								3		
		PPE Washers								97		
		Clinicians								163		
1.4	**Promote Gender Equality in all Facets of Planning and Implementation**											
1.4.1	Number and % of women hired to support VC campaigns	Total	N/A	N/A	N/A	N/A	N/A	N/A	397	430		
		IEC Coordinator								1		
		IEC Coordinator Assistants								3		
		IEC Supervisors								7		
		Data Entry Clerks								23		

#	Selected Indicators *with Job Function Disaggregates*	By Job Function	Annual Targets and Results									
			Year 1		Year 2		Year 3		Year 4		Year 5	
			Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
		M&E Assistants								6		
		Data Cleaners								3		
		Site Managers								3		
		EC Assistants								0		
		Storekeepers								2		
		Logistics Assistants								0		
		Finance Assistants								1		
		Brigade Supervisors								12		
		SOPs								169		
		Team Leaders								47		
		Central Storekeeper								0		
		Security Guards								0		
		Village Headmen										
		IEC Mobilizers										
		Sprayer Washers								35		
		PPE Washers								72		
		Water fetchers								27		
		District Coordinator								0		
		Sprayer Technicians								4		
		Site Cleaners								15		
1.4.2	Number and % of women hired in supervisory roles in target	Total	N/A	N/A	N/A	N/A	N/A	N/A	68	74		
		IEC Coordinator								1		
		M&E Assistants								6		

#	Selected Indicators *with Job Function Disaggregates*	By Job Function	Annual Targets and Results									
			Year 1		Year 2		Year 3		Year 4		Year 5	
			Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
	areas for VC activities	Logistics Assistants								0		
		Storekeepers								2		
		Brigade Supervisors								12		
		IEC Assistants								3		
		Site Managers								3		
		Team Leaders								47		
1.4.3	Number and % of trainees (permanent and seasonal) who have completed gender awareness training	Total	7	7	7	7	24	12	1,042	1,633		
		Permanent Staff		7		7		12		18		
		IEC Coordinator								1		
		IECs Supervisors								36		
		District Coordinator								1		
		IEC Coordinators Assistants								14		
		Brigade Supervisors								61		
		Site Managers								14		
		Sprayer Technicians								18		
		PPE Washers								97		
		Drivers								129		
		Sprayer Washers								97		
		SOPs								984		
		Team Leaders								163		

#	Selected Indicators *with Job Function Disaggregates*	By Job Function	Annual Targets and Results									
			Year 1		Year 2		Year 3		Year 4		Year 5	
			Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
	2. Entomological and Epidemiological Data to Drive Decision-Making											
2.3	**Build capacity of NMCPs and local institutions to collect, analyze, and use data for strategic malaria control decision-making**											
2.3.1	Number of individuals trained from NMCPs and national institutions to review and interpret data for integrated vector control decision making	Total Category/Function	1	1 IVM focal person	1	1 IVM focal person	1	2 IVM focal person/In charge of entomology Unit	2 IVM focal person - In charge of entomology MOHS- Pharmacy board - EPA- Njala University-Ministry of Agriculture	5		
2.3.2	Number and % of targeted individuals that report using new analytical tools and/or skills in their planning, resourcing, implementation, or measurement activities	Total Category/Function	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0		
	3. Procurement and Logistics											
3.2	**Robust Inventory Management and Logistics Systems Established**											
3.2.1	Number and %age of logistics and warehouse personnel (seasonal and full-time) trained in VC supply chain management	Total Central Warehouse Storekeeper District Logistics Asst Site Storekeepers	N/A	N/A	N/A	N/A	N/A	N/A	81	20 1 2 17		

ANNEX B: ENVIRONMENTAL MITIGATION AND MONITORING REPORT

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
1. **Education, Technical Assistance, Training**	Availability of appropriate teaching modules	N/A	N/A
2. Research and Development 2.a. Implement laboratory environmental, health, and safety (EHS) manuals with standard operating procedures (SOPs), or use existing SOPs, for laboratory operations in accordance with country-specific compliance mechanisms. 2.b. Implement SOPs for the safe storage, transport, and use of equipment, chemical reagents, insecticides, and supplies in conformance with international best practices (i.e., WHO, FAO) and host country requirements. Provide training to workers on the approved SOPs or waste management plan (WMP) developed for properly handling and disposing of wastes.	MR4 guidelines and VectorLink SOPs are used for the Vectorborne Diseases Laboratory and Insectary management in Makeni, as well as for the management of the back-up Insectary in Freetown.	N/A	N/A
3. Public Health Commodities	N/A	N/A	N/A
4. Small-Scale Construction	N/A	N/A	N/A
6. Nutrition	N/A	N/A	N/A

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
7. Vector Control 7a. Insecticide selection for any USAID-supported malaria program is subject to the criteria listed in the USAID Programmatic Environmental Assessment, country SEAs, and host country requirements.	During the 2021 spray campaign, the project used SumiShield™ 50WG (neonicotinoid) which met the USAID Programmatic Environmental Assessment selection criteria. The SEA, which was approved in April 2021, provides nationwide coverage for the period 2020-2025. SumiShield™ 50WG is registered in-country	N/A	N/A
7b. Procurement and inventory logs must be maintained.	Procurement and inventory logs are regularly updated. SumiShield™ 50WGsachets received for 2021 campaign: **92,520** SumiShield™ 50WG sachets leftover: **43,631**	N/A	N/A
7c. Ensure storage facility and personal protective equipment are appropriate for the active ingredient used and in accordance with approved SOPs.	1 Central warehouse and 14 site stores were equipped with thermometers, fire extinguishers, spill response kits, wooden pallets, and Material Safety Data Sheets. Stores had adequate ventilation, impermeable floors, secured windows, and doors with double locks. All the storage facilities were guarded 24/7. Before the distribution of insecticides, all the stores were supplied with adequate personal protective equipment for spray operators, field supervisors, storekeepers, and other casual workers. A dress rehearsal was conducted at each site to ensure there were no issues of mismatches with the personal protective equipment. Each SOPs had at least two pairs of coveralls, rubber boots, neck cover, headlamp, daily supply of face masks, and surgical gloves.	N/A	N/A

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
7d. Distribute insecticides to facilities that can manage such commodities safely in storage, use, and disposal (i.e., in a manner generally equivalent to Implementing Partner's own spray operators/waste management plan	All sites were inspected to ensure proper management of insecticide storage, use, and disposal. Only the sites that received the green light received the insecticide for the 2021 IRS campaign.	N/A	N/A
7.f. Inspect and certify vehicles used for insecticide or team transport prior to contract.	129 vehicles used for transportation during the campaign were inspected and certified according to best practices. All vehicles were equipped with spill kits and first aid kits. Pre-contract inspection and certification of vehicles was conducted on May 3, 2021. All drivers had cell phones as a pre-requisite for hiring and were provided with PPE and spill kits after being trained. PMI VectorLink Sierra Leone conducted supervisions for the morning vehicle inspection.	N/A	N/A
7.e. Train drivers	Driver training was conducted on May 04, 2021. A total of 129 drivers were trained for the 2021 spray campaign	N/A	N/A
7.g. Ensure availability of cell phone, personal protective equipment and spill kits during insecticide transportation.	Pre-contract inspection and certification of vehicles was conducted on May 04, 2021. All drivers had cell phones as a pre-requisite for hiring and were provided with PPE and spill kits after being trained.	N/A	N/A
7.h. Initial and 30-day pregnancy testing for female candidates for jobs with potential insecticide contact.	Initial pregnancy tests were conducted before hiring spray operators, washers, supervisors, and seasonal storekeepers from May 03, 2021. All pregnancy tests were negative.	N/A	N/A (campaign was shorter than 30 days)
7.i. Health test all spray team members for duty fitness.	1,453 Medical examinations were conducted from May 03, 2021	N/A	N/A

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
7.j. Procure services of, distribute, and train all workers with potential insecticide contact on the use of personal protective equipment.	Both international and local procurements were completed before training began. The use of PPE was demonstrated during TOTs, cascade, and storekeeper training, before the spray campaign began.	N/A	N/A
7.k. Train operators on mixing insecticides and the proper use and maintenance of application equipment.	The correct insecticide mixing procedure was included in all trainings. The trainings demonstrated the proper use and maintenance of sprayers. A total of 14 Pump technicians were trained for maintenance of spray pumps.	N/A	N/A
7.l. Provide adequate facilities and supplies for end-of-day cleanup.	Wash areas, 20 fixed soak pits and 9 mobile soak pits were constructed according to PMI BMPs.	N/A	Adequate water, barrels, wash basins, soap, and detergents were available at all times at each operations site. Washing facilities for both female and male SOPs and supervisors were provided at all campsites for total compliance.
7.m. Enforce application and clean-up procedures.	End-of-day clean-up was done in designated wash areas and supervised by the ECO, VectorLink IRS coordinators, government district supervisors, and other VectorLink staff. All supervisors stayed at the sites to ensure proper clean-up at the end of the day. A total of 296 end of day clean-up inspections were submitted by national Supervisors through CommCare and 55 were submitted by VL Staff through the ODK application	N/A	N/A

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
7.n. Implement Information, Education and Communication (IEC) campaigns to inform homeowners of responsibilities and precautions, including washing itchy skin and going to health clinic if symptoms develop and do not subside.	IEC mobilizers made the community aware of the behaviors to adopt before, during and after the spraying of structures with the support of village headmen, in charge of PHU and other leaders. Four community radios were also used for mobilization. Most households were aware of the IRS activities and complied with household preparation requirements for IRS.	N/A	N/A
7.o. Ensure health facility staff are aware of insecticide poisoning management.	Health workers were trained by RECM, COP and the ECO on intoxication cases on April 28 in Galiness Paradise and May 8 in State Garden	N/A	N/A
7.p. Storage facilities and transportation vehicles must be physically secured to prevent theft.	All the doors and windows of 14 stores are made of metal with a double lock to prevent theft. All transportation vehicles were locked during transit to prevent pilferage. The Environmental Compliance Officer (ECO) with the Regional Environmental Compliance Manager inspected 129 vehicles prior to the signing of a leasing contract to be sure that they meet all BMP requirements.	N/A	N/A
7.q. Maintain records of all insecticide receipts, issuance, and return of empty containers.	Stock cards tracked insecticide going to and from the central store, with back-up ledger books at central, district, and sub-district stores. Storekeepers and supervisors were trained to perform physical inventory counts during the campaign.	N/A	N/A
7.r. Conduct analysis comparing number of houses treated vs. number of containers used.	A total of 150,895 structures were treated with 48,889 sachets of insecticide: one sachet of SumiShield™ 50WG treated on average 3.09 structures.	N/A	N/A

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
7.s. Examine houses treated to confirm application.	Direct Observation Spraying was conducted by team leaders and supervisors to assess the quality of spray techniques.	N/A	N/A
7.t. Perform physical inventory counts during the application season.	Storekeepers and supervisors were trained to perform physical inventory counts during and after the campaign.	N/A	N/A
7.u. For shipments of insecticide over water, sachets/ bottles will be packed in 220 liter open top barrels with a water-tight top and a locking ring, or in a similar durable container. Waterproof labeling must be affixed to the barrel, with the identity of the pesticide, number of bottles inside, the weight, the type of hazard posed by the contents, and the personal protective equipment to be worn when handling the barrel.	PMI VectorLink Sierra Leone did transport insecticide over water during the 2021 IRS campaign with the sachets packed in locked barrels.	N/A	N/A
7.v. Train applicators on the SEA operational requirements, spray operators, PMI BMPs, and approved waste management plan, developed for the safe and effective storage, distribution, application, and disposal of insecticides.	A total of 984 SOPs were trained on BMP guidelines and Sierra Leone environmental compliance's laws which included standard operating procedures on safe and effective storage, distribution, application of insecticides and the waste management plan.	N/A	N/A

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
7.w. Ensure application equipment and personal protective equipment are appropriate for the active ingredient used and in accordance with approved spray operators and maintain equipment to avoid leaks.	SOPs and other seasonal workers wore the appropriate PPE and used appropriate sprayers for SumiShield™ 50WG use during spraying and clean-up in accordance with manufacturer's instructions and PMI BMP. Before the deployment of SOPs each morning, pump technicians serviced all spray pumps. Observed cases of PPE non-compliance were addressed immediately. Leaking pumps were replaced or fixed immediately.	N/A	N/A
7.x. Maintain application equipment.	All pumps were serviced and stored in accordance with manufacturer's instructions and PMI BMP.	N/A	N/A
7.y. No application of insecticides within 30 yards of beekeeping sites.	Spraying was done indoors only and at least 30 meters away from sensitive areas including beehives.	N/A	N/A
7.z. Handling, treatment, and disposal of nonhazardous (general waste) and hazardous wastes must be in accordance with the approved waste management plan /spray operators and the PMI BMPs. The WMP, which outlines spray operators for managing waste processes, must be in accordance with PMI best practices and host country requirements	Non-hazardous wastes were recorded and stored away from contaminated wastes. Non-contaminated cardboard from the insecticides will be recycled alongside other paper products at NP in 08/01/2021. All hazardous wastes were recorded, labeled, and kept in the stores while awaiting disposal either by incineration or recycling by Premier Enviro Solutions LTD Uncontaminated PPE not appropriate for IRS will be donated.	N/A	N/A
7.aa. Choose sites for disposal of liquid wastes, including fixed and mobile soak pit sites according to PMI BMPs	Selecting the soak pit sites for liquid waste disposal was jointly done by the ECO, VectorLink supervisors in accordance with the PMI BMP. All operations sites were inspected to ensure that they met BMP standards before they were certified for use.	N/A	N/A

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
7.bb. Construct fixed and mobile soak pits with charcoal according to the BMPs to adsorb insecticide from rinse water.	Soak pits were constructed in accordance with recommendations outlined in the PMI BMP manual. VectorLink Sierra Leone used 20 fixed soak pits and 9 mobile soak pits in the 2021 IRS campaign.	N/A	N/A
7.cc. Maintain soak pits as necessary during season.	All 20 fixed soak pits and 9 mobile soak pits were well maintained. All soak pits lasted throughout the spray campaign without any problems. Contaminated water drained properly into the soak pits.	N/A	N/A
7.dd. Monitor waste storage and management during campaign.	All waste materials were stored and managed according to PMI BMPs during the spray campaign. IRS solid waste was separated into categories (contaminated and uncontaminated) and stored in labelled containers.	N/A	N/A
7.ee. Monitor disposal procedures post-campaign	The ECO will monitor the post-spray campaign solid waste disposal. All IRS waste has already been sorted, labelled, collected, and will be transported to the central warehouses in Waterloo before being recycled, incinerated, donated, or landfilled.	N/A	N/A
7.ff. Wastes will only be disposed in incinerators that comply with PMI BMPs Collect and maintain treatment and disposal documents and records on file.	National Petroleum Company's incinerator will be used. An Incineration certificate will be collected as records for filing.	N/A	N/A
7.gg. Country-level USAID EC documentation must contain guidance on proper disposal of wastes	Both liquid and solid waste disposal procedures were aligned with the Safer Use Action Plan and in accordance with the revised PMI BMP guidelines. Country-level USAID EC documentation contains guidance on proper disposal of wastes.	N/A	N/A
8. Emergency Response	N/A	N/A	N/A

ANNEX C: COVID-19 MITIGATION MEASURES DURING THE 2021 IRS CAMPAIGN IN SIERRA LEONE

During the 2021 IRS campaign implementation, the following measures were put in place to secure the intervention from COVID-19.

Activities	Security Measures Taken	Responsible Parties
Trainings	● Adopt a work system in shifts. Form small groups and develop the schedule accordingly. ● Masks must be worn during the entire period of presence at the operational site. ● Mandatory hand washing with soap before entering the site. ● Maximum number of participants per session: between 15 and 30 depending on the size of the training room. A distance of two meters must be maintained between participants in the training to avoid contact. ● Restrict access to training sites according to the schedule. ● Include in the training program a session on information regarding COVID-19: Infectious agent, means of transmission, symptoms, prevention measures and case management. ● Avoid crowds outside training locations. ● Training materials / tools and furniture should be wiped or washed thoroughly at the end of each day.	Trainers, supervisors, team leaders
Morning mobilization	● Staggered arrival: Avoid having groups of more than 10 people. - For sites with sufficient space, design a schedule that ensures adequate separation between groups of 10. - Install handwashing devices at the entrance of operational sites. ● Masks to be worn during the entire period of presence on the site. ● Repeat messages on the transmission of COVID-19 daily ● Avoid gatherings inside and outside of the operational site. ● Keep spray teams physically separated. ● Add COVID-19 symptoms to the team leader's checklist. ● Restrict access to operational sites in accordance with the schedule. ● Have storekeepers and team leaders wear gloves to facilitate record keeping. ● Avoid crowds around the storekeeper. ● Lead morning gatherings by spray team (8-10 people).	Site coordinators, supervisors, team leaders

Activities	Security Measures Taken	Responsible Parties
	• Everyone uses their own pen to sign documents / tools. • Respect the distance of two meters between individuals.	
Moving from the operational site to the field (and back)	• All vehicle drivers must follow the same rules as other seasonal workers. • Masks to be worn at all times by all vehicle occupants. • Specify the maximum number of occupants for each type of vehicle. • Vehicles to transport small groups and make several trips as much as possible to avoid crowding. • Wash vehicles and wipe seats with chlorine disinfectants at the end of each day.	Supervisors, team leaders
Behavior in community and households	• Keep a distance of two meters between people. Avoid physical contact. • Wear mask at all times. • Clean gloves with wet wipes before and after helping with home preparation. • Keep gloves when handling household personal belongings. • Spray operators and team leaders should carry wet wipes in backpacks. • Operators and team leaders must keep a distance of two meters from household occupants when filling out spray data forms and when giving post-spray messages.	Supervisors, team leaders
End of day clean up	• Defer Arrivals. Avoid having groups of more than two teams (± 10 people). • For sites with sufficient space, design a schedule that ensures adequate separation between groups of 10. • Mask to be worn during the entire period of presence on the site. • Avoid gatherings / gatherings outside the operation site. • Keep spray teams physically separated. Respect the guideline of two-meter distance. • Restrict access to operating sites according to schedules. • Hand washing compulsory with soap after leaving the rinsing area. • Avoid congestion around the storekeeper.	Site coordinators, supervisors, team leaders
M&E	• Install handwashing devices in data entry centers; masks to be worn during the entire period of presence at the data entry center. • Maintain a separation of two meters between data entry clerks. • Data entry centers should be limited to a maximum of 10 people working at the same time. • Disinfection of laptops and workstations between work sessions. • Supervisors must wear gloves and masks when transporting data from sites	Site supervisor
Community mobilization	• Avoid direct physical contact between people. No handshake or other greeting involving physical contact • Avoid groups of more than 10. • Masks to be worn when interacting with community members and spray teams. • When possible, use mass media and other channels that do not require close contact with people.	Mobilizers, proximity supervisors, etc.

Each morning, seasonal workers were reminded of the following guidelines/information:

COVID-19 (Corona virus disease) is a respiratory disease.

Symptoms may include:	**What has to be done:**	**What you should not do:**
➢ Cold (runny nose)	➢ Wash your hands often and correctly or use a hydro alcoholic gel	➢ Go to work when you are sick
➢ Headache	➢ Cough in your elbow and sneeze into a tissue - Throw the tissue immediately in the trash	➢ Touch the eyes, nose and mouth
➢ Cough	➢ Take daily precautions to stop the spread of germs; wash surfaces with soap and disinfectant	➢ Traveling if you feel unwell
➢ Irritated throat	➢ Be aware of the latest recommendations from the Government, Centers for Disease Control and Prevention (CDC) and WHO	➢ Close contact with people who are already sick
➢ Fever	➢ Report to the nearest health center	➢ Panicking. Get the facts and follow the advice of government sources and health care professionals
➢ General malaise		➢ Go to work when you are sick

ANNEX D: 2020 ENUMERATION DATA SUMMARY

Bo District						
Chiefdom	**Eligible Structures**	**Eligible Rooms**	**Males**	**Females**	**Children Under-Five**	**Pregnant Women**
Badjia	2,313	4,506	5,560	4,906	1,782	174
Bagbo	4,983	13,254	12,146	11,573	3,878	420
Bagbwe	3,480	7,094	8,167	8,104	2,531	262
Baoma	11,780	25,366	26,669	24,808	7,708	1,109
Bongor	3,747	8,078	8,925	8,450	3,115	318
Bumpeh	9,984	21,604	21,257	21,532	7,322	1,065
Gbo	1,160	2,531	2,339	2,326	1,135	109
Jaiama	2,859	5,545	6,856	6,575	2,033	297
Kakua*	41,942	134,275	110,683	117,077	29,474	4,591
Komboya	3,323	6,825	7,869	7,155	3,073	255
Lugbu	6,019	13,226	12,589	11,276	3,893	432
Niawa Lenga	3,250	6,959	7,928	7,544	2,379	296
Selenga	1,492	2,939	2,868	2,959	864	90
Tikonko	11,237	24,633	25,870	24,904	7,127	864
Valunia	8,258	15,670	19,144	15,959	5,922	817
Wonde	2,411	5,565	6,146	6,414	2,490	368
Total	**118,238**	**298,070**	**285,016**	**281,562**	**84,726**	**11,467**

*Bo Town, located within Kakua Chiefdom and contributes to a significant number of eligible structures, was not sprayed during the 2021 IRS campaign.

Bombali District						
Chiefdom	**Eligible Structures**	**Eligible Rooms**	**Males**	**Females**	**Children Under-Five**	**Pregnant Women**
Biriwa	5,524	21,340	16,465	17,833	6,367	755
Bombali Sebora*	32,082	108,859	90,461	96,291	22,299	3,336
Bombali Sheray	1,685	4,088	4,076	4,076	1,184	143
Gbanti	5,108	13,522	12,469	12,827	3,108	233
Gbendembu	2,631	6,191	5,382	5,245	1,302	136
Kamaranka	2,369	5,743	5,376	5,248	1,609	199
Magbaimba N'Dowahun	2,339	4,920	5,096	4,744	1,433	183
Makari	7,601	17,722	20,547	20,528	5,421	588
Mara	3,689	7,284	8,804	7,981	3,053	417
N'Gowahun	3,355	7,202	5,615	5,956	1,630	208
Paki Masabong	864	3,440	3,852	4,154	1,207	130
Safroko Limba	9,025	17,098	16,013	17,324	4,933	468
Total	**76,272**	**217,409**	**194,156**	**202,207**	**53,546**	**6,796**

*Makeni City, located within Bombali Sebora Chiefdom and contributes to a significant number of eligible structures, was not sprayed during the 2021 IRS campaign

ANNEX E: SELECTED CHIEFDOMS IN BO AND BOMBALI BASED ON 2020 ENUMERATION RESULTS

Bo District						
Chiefdom	**Eligible Structures**	**Eligible Rooms**	**Males**	**Females**	**Children Under-Five**	**Pregnant Women**
Badjia	2,313	4,506	5,560	4,906	1,782	174
Bagbo	4,983	13,254	12,146	11,573	3,878	420
Bagbwe	3,480	7,094	8,167	8,104	2,531	262
Baoma	11,780	25,366	26,669	24,808	7,708	1,109
Bongor	3,747	8,078	8,925	8,450	3,115	318
Bumpeh	9,984	21,604	21,257	21,532	7,322	1,065
Gbo	1,160	2,531	2,339	2,326	1,135	109
Jaiama	2,859	5,545	6,856	6,575	2,033	297
Kakua	14,736	46,312	38,370	40,023	10,391	1,528
Komboya	3,323	6,825	7,869	7,155	3,073	255
Lugbu	6,019	13,226	12,589	11,276	3,893	432
Niawa Lenga	3,250	6,959	7,928	7,544	2,379	296
Selenga	1,492	2,939	2,868	2,959	864	90
Tikonko	11,237	24,633	25,870	24,904	7,127	864
Valunia	8,258	15,670	19,144	15,959	5,922	817
Wonde	2,411	5,565	6,146	6,414	2,490	368
Total	**91,032**	**210,107**	**212,703**	**204,508**	**65,643**	**8,404**

Bombali District						
Chiefdom	**Eligible Structures**	**Eligible Rooms**	**Male**	**Female**	**Under-Fives**	**Pregnant Women**
Biriwa	5,524	21,340	16,465	17,833	6,367	755
Bombali Sebora	12,770	46,283	39,318	40,217	9,773	1,298
Bombali Sheray	1,685	4,088	4,076	4,076	1,184	143
Gbanti	5,108	13,522	12,469	12,827	3,108	233
Gbendembu	2,631	6,191	5,382	5,245	1,302	136
Kamaranka	2,369	5,743	5,376	5,248	1,609	199
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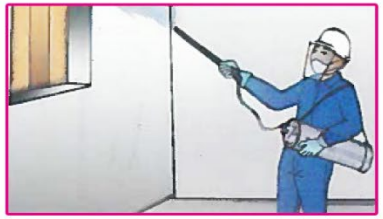
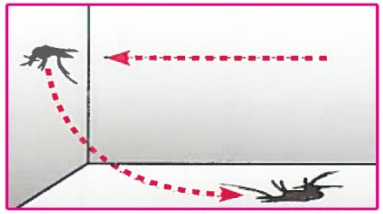
N'Gowahun	3,355	7,202	5,615	5,956	1,630	208
Paki Masabong	864	3,440	3,852	4,154	1,207	130
Safroko Limba	9,025	17,098	16,013	17,324	4,933	468
Total	**56,960**	**154,833**	**143,013**	**146,133**	**41,020**	**4,758**

ANNEX F: FLYERS USED DURING THE 2021 IRS CAMPAIGN



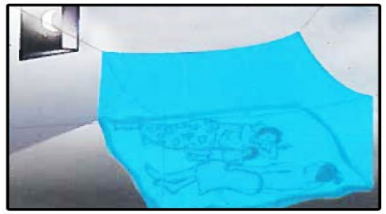
IRS is free of charge!



After IRS, any mosquito in contact of the wall will be knocked off and die.

Avoid painting, washing or covering the sprayed walls for at least 8 months after spraying

For IRS to protect you from malaria, you must sleep inside the sprayed rooms.



Continue to sleep under insecticide treated net every night.

Continue to keep your environment clean Remove grass and container that may be a breeding site for mosquito

Always visit the nearest Health facility or the Community Health Worker if you or your child has fever.

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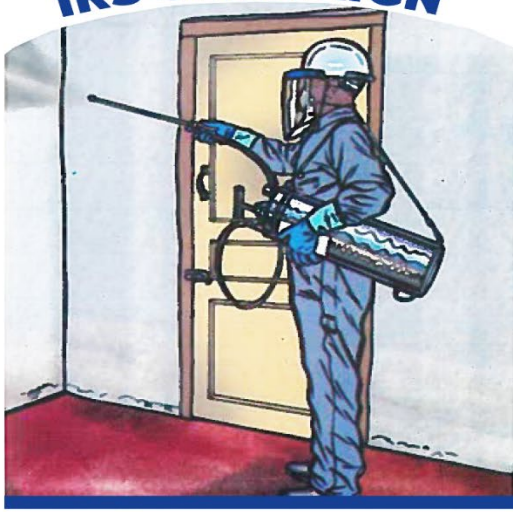

IRS BEATS MALARIA

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STEP 1: The IEC mobilizers have come to visit you to discuss with you about IRS.

STEP 2: ***Before the arrival of the operators,***

- Move out of the house all food products, water, dishes, utensils and children's toys before spraying
- Move out the furniture and put the big furniture in the middle of the room, to allow the operator easy access to the walls of each room.
- Tie up pets or put them in a cage

STEP 3: The spray operators will come to apply an insecticide to the internal wall of your houses, to kill the mosquito that transmits malaria. Please welcome them.

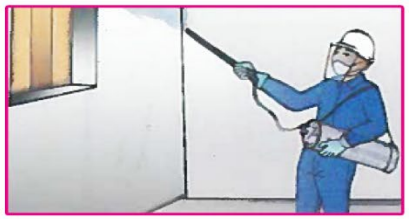
STEP 4: Prepare a bucket of clean water before the arrival of the operator. The operator will need the water to mix the insecticide in the spray pump.

STEP 5: Windows and doors will be closed, and the operator will be alone in the structure during the spray

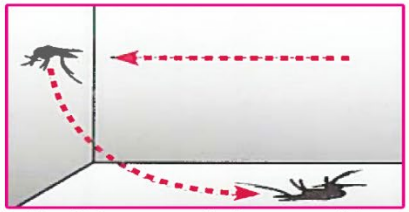
STEP 6: After spraying the house, all household members should stay outside; Keep doors and windows closed for at least two hours

STEP 7: After 2 hours, an adult will go open the door and windows, and keep them opened for one hour

STEP 8: Sweep the floor in all sprayed rooms and bury the garbage in a hole about 50cm deep or dispose in latrine.



IRS is free of charge!



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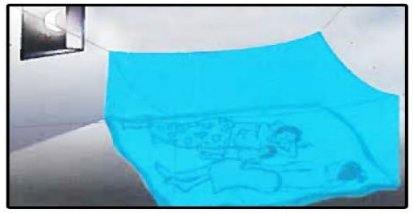

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ANNEX G: SPRAY TEAM ORGANIGRAM