



U.S. PRESIDENT'S MALARIA INITIATIVE



# THE PMI VECTORLINK BENIN 2020 END OF SPRAY REPORT (EOSR)

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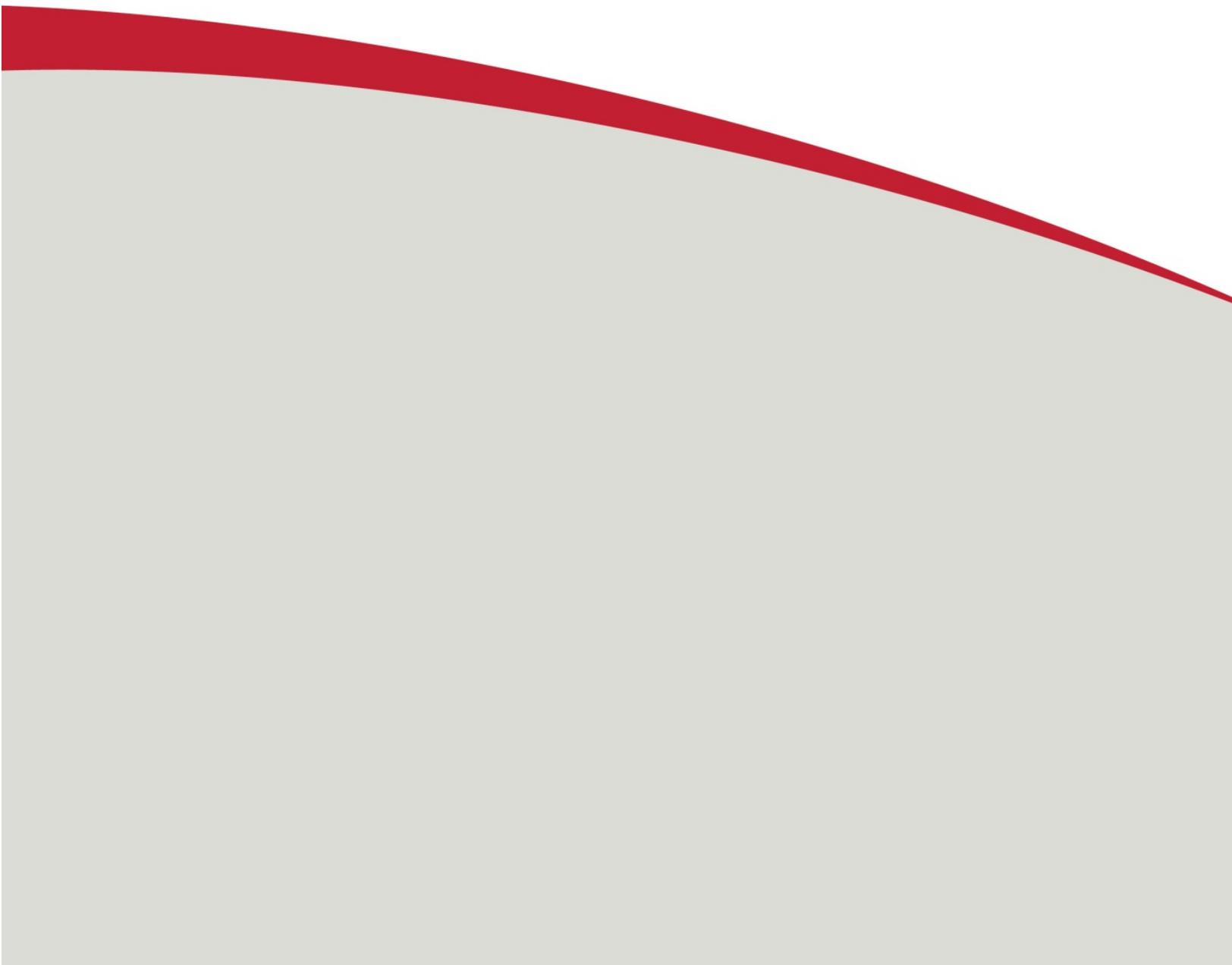
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Abt Associates Inc. | 6130 Executive Boulevard | Rockville, MD 20852  
| T. 301.347.5000 | F. 301.913.9061 | [www.abtassociates.com](http://www.abtassociates.com)

# THE PMI VECTORLINK BENIN 2020 END OF SPRAY REPORT (EOSR)



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# I. ACRONYMS

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<b>BMP</b>	: Best Management Practices
<b>COVID-19</b>	: Coronavirus Disease 2019
<b>CREC</b>	: Entomological Research Center of Cotonou (Centre de Recherche Entomologique de Cotonou)
<b>DAGRI</b>	: Directorate of Agriculture (Direction de l'Agriculture)
<b>DCV</b>	: Data Collection Verification
<b>DDCVDD</b>	: Departmental Directorate of Living Environment and Sustainable Development (Direction Départementale du Cadre de Vie et du Développement Durable)
<b>DDS</b>	: Departmental Health Directorate (Direction Départementale de la Santé)
<b>DEC</b>	: Data Entry Clerk
<b>DHAB</b>	: Directorate of Hygiene and Basic Sanitation (Direction de l'Hygiène et de l'Assainissement de Base)
<b>DOS</b>	: Directly Observed Spraying
<b>ECO</b>	: Environmental Compliance Officer
<b>IEC</b>	: Information, Education and Communication
<b>IRS</b>	: Indoor Residual Spraying
<b>ITN</b>	: Insecticide Treated Net
<b>MoALF:</b>	: Ministry of Agriculture, Livestock and Fishing (Ministère de l'Agriculture, de l'Elevage et de la Pêche)
<b>M&amp;E</b>	: Monitoring and Evaluation
<b>mHealth</b>	: Mobile Health
<b>MOE</b>	: Ministry of Environment
<b>MOH</b>	: Ministry of Health
<b>NMCP</b>	: National Malaria Control Program (Programme National de Lutte Contre le Paludisme)
<b>PMI</b>	: President's Malaria Initiative
<b>PPE</b>	: Personal Protective Equipment
<b>PSECA</b>	: Pre-Spray Environmental Compliance Assessment
<b>SEA</b>	: Supplemental Environmental Assessment
<b>SHAB</b>	: Hygiene and Basic Sanitation Department (Service de l'Hygiène et de l'Assainissement de Base)
<b>SOP</b>	: Spray Operator
<b>SRTM</b>	: Shuttle Radar Topography Mission
<b>TL</b>	: Team Leader
<b>ToT</b>	: Training of Trainers
<b>USAID</b>	: United States Agency for International Development

## 2. EXECUTIVE SUMMARY

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One key objective of the U.S. President’s Malaria Initiative (PMI) VectorLink Project is to limit exposure to malaria vectors and reduce the incidence and prevalence of malaria through indoor residual spraying (IRS). In 2020, PMI VectorLink Benin conducted IRS campaigns in seven districts of Northern Benin (Kouandé in Atacora department, Kandi, Gogounou and Segbana in Alibori department, and Djougou, Copargo and Ouakè in Donga department) using two insecticides: organophosphates (Actellic® 300 CS) and clothianidin & deltamethrin combination (Fludora® Fusion, a newly introduced insecticide to the VectorLink Benin program in 2020). The 2020 spray campaign was conducted from April 13 to May 4, 2020 for 16 operational days, during which 322,710 structures were targeted for spraying. This target was reduced from the original target of 387,711 structures, after removing urban neighborhoods of Djougou and Kandi communes where the acceptance rate was constantly low across campaigns due to the presence of many personal belongings inside households that were difficult to move out. In addition, considering the COVID19 health pandemic, the project developed a risk management plan to safely conduct the implementation of the 2020 IRS campaign (See annex D).

The following are project achievements and key highlights of the Benin’s 2020 spray campaign:

- The project sprayed a total of 350,349 structures out of 375,131 eligible structures found by spray operators (SOPs) in the seven IRS target districts, accounting for a final spray coverage rate of 93.4 percent.
- The project protected 1,104,928 people from the burden of malaria in 2020, including 199,200 (18.0 percent) children under five years old and 44,046 (4.0 percent) pregnant women.
- A total of 3,547 people were trained, of whom 586 (16.5 percent) were women. Out of the total number of people trained, there were 1,634 spray operators (SOPs), of whom 170 (10.4 percent) were women.
- A total of 1,018 bottles of Actellic® 300CS were used in the sub-district of Birni (district of Kouandé) in the department of Atacora; 58,255 sachets of Fludora® Fusion in Alibori and Donga departments. The utilization ratios were: 6.0 structures per Actellic bottle in the Atacora department, 5.9 structures per Fludora® Fusion sachet and 5.9 structures per sachet of Fludora® Fusion in Donga department. The remaining insecticide quantity at the end of the 2020 spray campaign is 2,715 sachets of Fludora® Fusion), set to expire in December 2021. There was no leftover Actellic remaining at the end of the campaign.
- PMI VectorLink Benin utilized mobile soak pits (MSPs) in remote areas to reduce the travel time of SOPs and safely dispose of IRS liquid waste from the field.
- During the first week of the campaign, the project conducted cone bioassays to assess the quality of the spray. The results indicated 100 percent mortality for all insecticides sprayed (Actellic® 300 CS and Fludora® Fusion).
- For the first time this year, the VectorLink Benin team used satellite imagery to monitor the spray coverage, as well as the VectorLink Collect database (DHIS2) to monitor the spray progress electronically on a daily basis.
- The PMI VectorLink Benin team strengthened Information, Education, Communication (IEC) messaging during the campaign in collaboration with local radio stations and organized advocacy meetings in all seven districts with traditional leaders and local authorities prior to the spray campaign to minimize refusal rates.
- The project will incinerate all insecticide-contaminated wastes, including used masks and empty sachets of Fludora Fusion at “Hopital de l’Ordre de Malte”, a local hospital that disposes of a

compliant incinerator and serves Djougou, Copargo and Ouaké districts. In addition, PSS Impact+, a local waste management company, will recycle empty bottles of Actellic® 300CS and other end-of-life materials, including plastics, metal, etc.

Table 1 below summarizes key results obtained during the IRS 2020 campaign.

**Table 1: VectorLink Benin 2020 IRS Campaign Summary Results**

	Atacora department:	Alibori department:	Donga department:	Total
	Kouandé	Kandi, Gogonou, Segbana	Djougou, Copargo, Ouaké	
Insecticide class	Organophosphate	Clothianidin & Deltamethrin	Clothianidin & Deltamethrin	
Number of structures targeted by IRS (based on the number of structures found during the 2019 IRS campaign)	6,413	146,253	170,044	322,710
Number of structures found by IRS teams	6,435	188,556	180,140	375,131
Number of structures sprayed	6,112	178,392	165,845	350,349
Spray coverage (sprayed/found)	95.0%	94.6%	92.1%	93.4%
Population protected	20,049	618,157	466,722	1,104,928
Pregnant women protected	700	25,627	17,719	44,046
Children under five protected	4,565	114,796	79,839	199,200
Number of people receiving training funded by US Government (USG) to conduct IRS	41	1,110	977	2,128*

*\*Includes SOPs, Team Leaders (TLs), Site Coordinators and Site Supervisors*

### 3. COUNTRY BACKGROUND & ACTIVITY SUMMARY

In Benin, PMI has been supporting indoor residual spraying (IRS) since 2008. IRS has been carried out in a total of 19 districts, including four in Southern Benin, nine in Atacora, and six in Alibori and Donga in Northern Benin.

**Table 2: PMI Supported IRS in Benin: 2012-2020**

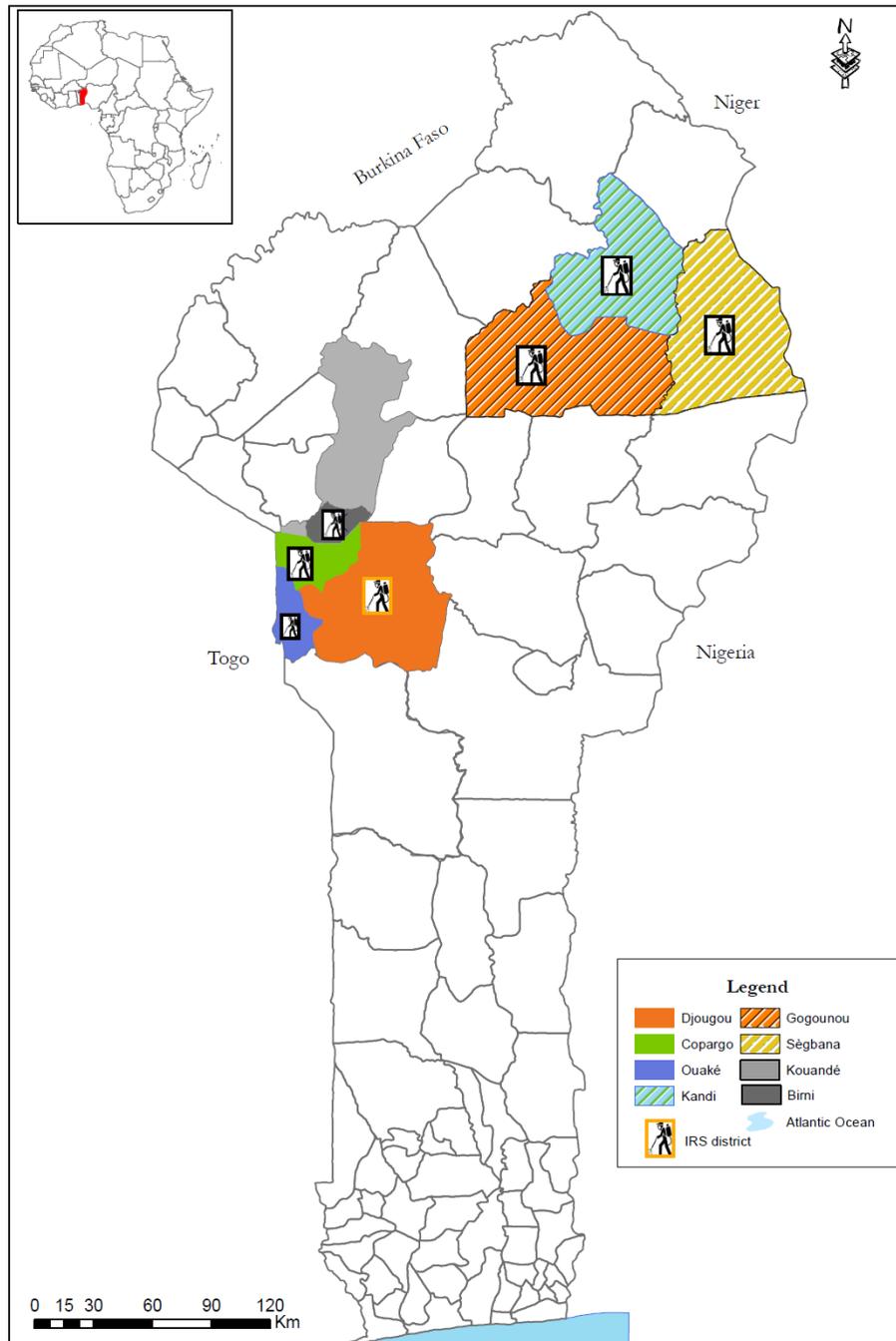
Year	Geographic Area	IRS Strategy <sup>1</sup>	Insecticide	Number of Structures Sprayed	Population Protected
2012	Atacora (9 districts)	Blanket	Bendiocarb (Carbamate)	210,380	652,777
2013	Atacora (9 districts)	Blanket	Actellic EC (Organophosphate)	228,951	694,729
2014	Atacora (9 districts)	Blanket	Actellic® 300 CS (Organophosphate)	254,072	789,883
2015	Atacora (9 districts)	Blanket	Actellic® 300 CS (Organophosphate)	252,706	802,597
2016	Atacora (9 districts)	Blanket	Actellic® 300 CS (Organophosphate)	269,179	858,113
2017	Atacora- Donga -Alibori (8 districts)	Blanket	Actellic® 300 CS (Organophosphate)	384,761	1,227,536
2018	Atacora- Donga -Alibori (8 districts)	Blanket	Actellic® 300 CS (Organophosphate)	400,997	1,321,758
2019	Donga-Alibori (6 districts)	Blanket	Actellic® 300 CS (Organophosphate)	335,207	1,077,411
2020	Atacora- Donga -Alibori (7 districts)	Blanket (Alibori & Donga); Focal (Atacora)	Actellic® 300 CS (Organophosphate); Fludora® Fusion (Clothianidin & Deltametrin combination)	350,349	1,104,928

In 2020, the PMI VectorLink Benin project worked with the Ministry of Health (MOH), National Malaria Control Program (NMCP), Entomological Research Center of Cotonou /Centre de Recherche Entomologique de Cotonou (CREC), Benin’s Departmental Directorate of the Living Environment and

<sup>1</sup> Blanket spraying is defined as the spraying of all houses within a targeted area (e.g., entire provinces or districts); Focal spraying is defined as the spraying of living structures within selected, discrete geographic areas (i.e. town, village, hamlet, etc.) within an area targeted for IRS activities, based on epidemiologic or ecological parameters.

Sustainable Development / Direction Départementale du Cadre de Vie et du Développement Durable (DDCVDD), Benin's Department of Agriculture / Direction de l'Agriculture (DAGRI) and the Departmental Directorate of Health / Direction Départementale de la Santé (DDS) to conduct spray operations in three districts of Donga department (Copargo, Djougou, Ouake), three districts in Alibori department (Kandi, Gogounou and Segbana) using Fludora® Fusion (Neonicotinoid), and one sub-district in Atacora (Birni in the district of Kouandé) with Actellic® 300CS.

**Figure 1: IRS Districts (and sub-district of Birni)<sup>2</sup> of PMI VectorLink Benin**



<sup>2</sup> In the district of Kouandé, only the sub-district of Birni was sprayed.

# 4. IMPLEMENTATION OF IRS ACTIVITIES

## 4.1. IRS PLANNING AND PARTNERS' COLLABORATION

The VectorLink Benin Project met regularly with PMI Benin, NMCP, CREC, DDCVDD, DAGRI and DDS to discuss the 2020 IRS campaign planning and implementation. From March 11 to March 13, 2020, the project and the NMCP supported the micro-planning workshop with all stakeholders where all IRS partners officially adopted the final plans for completing the 2020 IRS campaign. The project implemented the 2020 IRS campaign from April 13 to May 4, 2020 (16 operational days) in seven districts: Copargo, Djougou, Ouaké, Gogounou, Kandi, Segbana and Kouandé. The project managed spray operations out of 20 operational sites (five in Djougou, two in Copargo, two in Ouaké, four in Kandi, three in Gogounou, three in Segbana, and one in Kouandé). Each operational site had a warehouse to store spray materials as well as a permanent soak pit to accommodate the spray teams during the end-of-day clean-up. The project built a total of four mobile soak pits (MSPs) for use in remote or difficult to access areas and 38 permanent soak pits. Additionally, there were 19 secondary stores. The NMCP led supervisory activities for IRS operations in Kandi, Gogounou, and Segbana districts as part of its national IRS leadership and capacity building management. Table 3 below shows the location of operations sites and status of warehouses.

**Table 3: Location of Operations Sites**

Departments/ Regions	Communes	Operations Sites	Type of Facility (Health Center, Municipal Building, etc.)
Donga	Djougou	Barei	Facility provided free of charge by the community
		Bougou	Facility provided free of charge by the health center
		Barienou	A container serving as office and warehouse set in the courtyard of the Ministry of Education
		Partago	Facility provided free of charge by the Community completed with A container
		Kolokonde	Facility provided free of charge by the Community health insurance
	Ouaké	Sèmerè	Private building
		Ouake	Private building
	Copargo	Copargo	Facility provided free of charge by the health center
		Anadana	Private building
Alibori	Kandi	2 <sup>nd</sup> central warehouse	Facility provided free of charge by the health center of Kassakou
		Kassakou	Facility provided free of charge by the health center
		Agaradebou	Facility provided free of charge by the health center
		Sonsoro	Facility provided free of charge by the health center
		Sam	Facility provided free of charge by the Community

Departments/ Regions	Communes	Operations Sites	Type of Facility (Health Center, Municipal Building, etc.)
	Ségbana	Libante	Private building.
		Piami	Facility rented from the community
		Lougou	Private building
	Gogounou	Goumarou	Facility provided free of charge by the local administration
		Sory	Facility rented from the health Center
		Bagou	Facility rented from the health Center
Atacora	Kouande	Birni	Facility provided free of charge by the health center

Each morning during the spray campaign, breakfast was served to SOPs, team leaders (TLs), spray pump technicians and proximity 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, while respecting the necessary social distance amid the 2019 coronavirus disease (COVID-19) pandemic, for important information-sharing (i.e. performance related aspects, recommendations, etc.). Handwashing facilities were also installed at all operations sites for spray workers to practice regular handwashing to limit the risk of disease transmission and insecticide contamination.

The project rented vehicles to transport the spray teams to and from the operational sites to the spray sites. The project also used vehicles for supervision related purposes and to transport spray equipment and insecticide. To comply with the social distancing, an 18-seater minibus carried eight SOPs per trip and thus made the required trips.

At the end of each day, the SOPs handed their smartphones used for mobile data collection to their team leaders who verified the completed forms (completeness and accuracy) and compiled the daily data before submitting them to their site supervisors. After data verification, team leaders proceeded with the synchronization process to the VectorLink Collect database server. The same verification process took place for paper forms, which were used as back-up in the event that teams experienced technical difficulties with smartphones. Physical surfaces of smartphones were also sanitized at the end of each day to minimize the risk of disease transmission during the COVID-19 pandemic. Table 4 below shows the number of spray teams recruited during the 2020 IRS campaign.

**Table 4: Number of Spray Teams Recruited during the 2020 IRS Campaign**

Regions	Districts	Operational Sites	Number of SOPs	Number of Team Leaders	Numbers of Mobilizers	Total
Donga	Copargo	Anandana	68	14	48	130
		Copargo	76	15	44	135
	Djougou	Barei	95	19	36	150
		Barienou	116	23	38	177
		Bougou	57	11	22	90
		Kolokonde	75	15	32	122
		Partago	135	27	36	198
	Ouaké	Ouaké	90	18	60	168
		Semere	106	21	62	189

Regions	Districts	Operational Sites	Number of SOPs	Number of Team Leaders	Numbers of Mobilizers	Total
Atacora	Kouandé	Birni	31	6	35	72
Alibori	Gogounou	Bagou	73	14	36	123
		Gounarou	98	20	48	166
		Sori	89	18	48	155
	Kandi	Angaradebou	61	12	34	107
		Kassakou	56	11	20	87
		Sonsoro	100	20	38	158
		Sam	52	11	24	87
	Segbana	Libante	74	15	28	117
		Piami	78	16	32	126
		Lougou	21	4	20	45
<b>Total</b>			1,551	310	741	2,602

## 4.2. TRAINING

The VectorLink Benin project, in collaboration with the MOH /NMCP, updated the standard training curriculum, training job aids and participants' handbooks to account for changes in the insecticide used and COVID-19 prevention practices. The project shared final training materials among staff and national facilitators, who later facilitated their respective training sessions. The key topics covered during the trainings included the following: IRS concepts and planning, environmental compliance and personal safety, monitoring and evaluation of IRS, gender awareness, social behavior change concepts, communication and information transfer techniques, management of operational sites, insecticide and equipment handling, spray techniques and proper use of personal protective equipment (PPE), logistics, and warehouse management. A special emphasis was placed on team leaders, supervisors and SOP training with the use of GPS-equipped smartphones for IRS data collection, which was being implemented for the first time by the VectorLink Benin project. Training sessions were conducted by VectorLink Benin staff and government counterparts, including staff from NMCP, DDS, Community Hygiene and Sanitation Service / Service de l'Hygiène et de l'Assainissement de Base (SHAB), and Departmental Directorate of Living Environment and Sustainable Development / Direction Départementale du Cadre de Vie et du Développement Durable (DDCVDD). Staff from the Entomological Research Center of Cotonou (CREC) and local firefighter units also helped in leading some specific training sessions. A total of 3,547 people of whom 2,961 (83.5 percent) were men and 586 were women (16.5 percent) attended the trainings. Table 5 below provides details of the types of training and key topics covered.

**Table 5: Number of Training Sessions and People Trained, Disaggregated by Job Title, Spray Zone and Gender.**

Training	Kouande		Copargo		Djougou		Ouake		Gogounou		Kandi		Segbana		Total		
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Total
Mobilizers	30	5	82	8	141	23	100	22	108	24	93	24	74	7	628	113	741
Team Leaders	5	1	26	3	77	18	33	6	41	11	48	6	33	2	263	47	310
District Coordinators/Site Supervisors	0	1	2	0	6	1	2	1	3	1	5	0	3	0	21	4	25
Supervisors (Head of Health Centers)	0	0	4	1	11	3	3	3	7	3	5	8	7	3	37	21	58
Clinicians (Doctors)	0	1	1	0	2	1	1	0	2	0	4	1	2	0	12	2	14
Supervisors (Community)	3	0	11	3	42	8	18	2	24	2	24	5	15	2	137	22	159
Spray Operators	31	1	127	11	461	45	183	21	246	32	242	51	174	9	1464	170	1634
Data Clerks	0	0	0	0	1	0	0	0	0	0	8	3	0	0	9	3	12
Spray Pump Technicians	3	0	9	5	41	4	14	5	20	5	15	7	12	5	114	31	145
Washers	0	3	0	14	0	50	0	19	0	26	0	27	0	17	0	156	156
Storekeepers	1	0	1	1	8	3	2	2	5	0	3	5	5	0	25	11	36
Drivers	3	0	14	0	70	0	20	0	26	0	27	0	17	0	177		177
Guards	0	0	4	0	10	0	4	0	6	0	9	0	6	0	39	0	39
Assistants Logistics (4), Environmental Compliance (ECO) (3), Monitoring and Evaluation (M&E) (9), Maintenance (4) and IEC (8)	2	0	4	0	5	3	2	0	2	0	5	2	3	0	23	5	28
Others people (Master training and Training of Trainers (ToI))	0	0	0	0	5	1	0	0	0	0	7	0	0	0	12	1	13
Total	78	12	285	46	880	159	382	81	490	104	495	139	351	45	2961	586	3,547
Percentage of women	13.3		13.9		15.3		17.5		17.5		21.9		11.4		16.5		

### Health and Safety of Seasonal Workers and Beneficiaries

Prior to the start of the spray campaign, seasonal workers and district health staff were trained by the VectorLink project on the management of potential health risks of using Fludora® Fusion to. In addition, all seasonal workers (3,211 persons) went through the general pre-campaign medical checkup, including the female workers who took a pregnancy test (before and mid-campaign).

### COVID-19 Risk Management during the Campaign

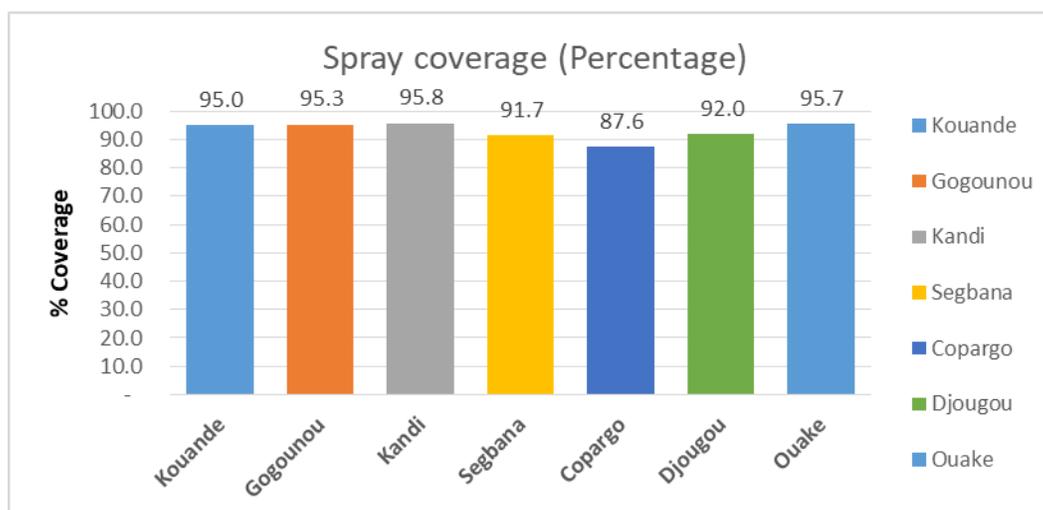
The 2020 spray campaign took place in a context of the COVID19 pandemic. Therefore, to safely implement the campaign, the project developed a COVID mitigation plan, which included preventive measures at all levels of project implementation, control mechanism and management of possible suspected cases of COVID-19 at all the operational sites. Field supervisions enabled the project to ensure the compliance to the various safety and health measures put in place for safe implementation of activities. The complete list of recommended measures is provided in Annex D.

### 4.3. SPRAY OPERATIONS & SUPERVISION

#### Number of Eligible Structures Found and Spray Coverage

During the 2020 IRS campaign, the project found a total of 375,131 structures (180,140 in Donga, 188,556 in Alibori and 6,435 in Atacora). The project sprayed 350,349 structures (165,845 in the Donga, 178,392 in the Alibori and 6,112 in Atacora's departments) out of 375,131 found structures. The overall coverage rate achieved for all seven districts was 93.4 percent as indicated in Figure 2 below.

Figure 2: 2020 IRS Spray Coverage (Number of Structures Sprayed / Number of Structures Found)



#### 4.3.1. TABLE OF PEOPLE HIRED TO SUPPORT CAMPAIGN BY CADRE & SEX

The PMI VectorLink Benin project hired 3,211 seasonal workers (1,672 seasonal workers in Donga, including 1,397 men and 275 women; 1,457 seasonal workers in Alibori, including 1,199 men and 258 women, and 82 seasonal workers in Atacora, including 68 men and 14 women). All recruitments were made in collaboration with the MoH / NMCP and local administrative and health authorities. Table 6 provides details on the seasonal workers recruited.

Table 6: Distribution of Seasonal Workers Hired for Each Position by Gender and Spray District

Seasonal Staff Category	Kouande		Copargo		Djougou		Ouake		Gogounou		Kandi		Segbana		Total		
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Total
Team Leaders	5	1	26	3	75	20	32	7	41	11	48	6	33	2	260	50	310
Supervisors (Community)	3	0	11	3	40	8	18	2	24	2	21	6	15	2	132	23	155
Spray Operators	30	1	133	11	438	40	175	21	235	25	229	40	164	9	1,404	147	1,551
Spray Pump Technicians	3	0	9	5	41	7	14	6	20	6	17	10	12	5	116	39	155
Washers	0	3	0	14	0	48	0	20	0	26	0	27	0	17	0	155	155
Mobilizers	27	8	77	15	140	24	111	11	107	25	94	22	72	8	628	113	741
District Coordinators	0	0	1	0	2	0	1	0	1	0	1	0	1	0	7	0	7
Site Supervisors	0	1	1	0	4	1	1	1	2	1	4	0	2	0	14	4	18
Storekeepers	0	0	2	1	7	2	2	2	5	0	3	3	5	0	24	8	32
Guards	0	0	4	0	10	0	4	0	6	0	9	0	6	0	39	0	39

Seasonal Staff Category	Kouande		Copargo		Djougou		Ouake		Gogounou		Kandi		Segbana		Total		
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Total
Assistants : Finance Assistants, Logistics Assistants, Environmental Compliance, Monitoring & Evaluation Assistants , Maintenance Technicians, IT Assistants, IEC Assistants	2	0	5	0	7	3	2	0	2	0	7	2	4	0	29	5	34
Community Animator	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1
SBCC Manager	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1
Data Clerks	0	0	0	0	1	0	0	0	0	0	8	3	0	0	9	3	12
Total	70	14	269	52	766	153	360	70	443	96	442	119	314	43	2,664	547	3,211
Percentage of Women	16.7		16.2		16.6		16.3		17.8		21.2		12.0		17.0		

### 4.3.2. KEY OPERATIONAL DETAILS

#### Mobile payment

Seasonal workers hired for the 2020 spray campaign were paid through the mobile payment system (MTN and Moov). The mobile payment system has proven to be very effective as it was cost efficient, secure and allowed the project to make payments remotely in a timely manner. In terms of cost efficiency, the project paid a small transfer fee per transaction and did not have to incur the additional expenses (per diems, fuel, car rental costs, security forces presence, etc.) associated with in-person payments by the project staff.

### 4.4. INSECTICIDE

The project conducted spray activities using Fludora Fusion, an odorless and powdered insecticide. Performance tests on Fludora Fusion conducted in 16 countries with different climatic conditions and habitat, including Benin, have shown that the product provides improved and prolonged control of malaria vectors.

The project had 1,018 bottles of Actellic left over from the 2019 spray campaign, which were set to expire in January 2021. The project procured for the 2020 IRS campaign a total of 60,970 sachets of Fludora® Fusion and used 58,255 sachets (28,079 sachets in Donga department and 30,176 sachets in Alibori department). The project used the remaining 1,018 bottles of Actellic® 300CS insecticide. One bottle of Actellic in Kouandé sprayed 6.0 structures, while spray operators in Alibori and Donga sprayed 5.9 structures per sachet of Fludora® Fusion. At the end of the spray campaign, the project had 2,715 sachets of Fludora® Fusion left, which will expire in December 2021.

**Table 7: Average Number of Structures Sprayed by Bottle or Sachet of Insecticide, by District, Benin IRS campaign, 2020**

Region	District	No. of Structures Sprayed	No. of Bottles or Sachets of Insecticide		Average number of Structures Sprayed per Bottle or Sachet of Insecticide	Insecticide Type
			Bottles	Sachets		
Alibori	Gogounou	60,281		11,710	5.1	Fludora® Fusion
	Kandi	75,609		12,195	6.2	Fludora® Fusion
	Segbana	42,502		6,271	6.8	Fludora® Fusion

Region	District	No. of Structures Sprayed	No. of Bottles or Sachets of Insecticide		Average number of Structures Sprayed per Bottle or Sachet of Insecticide	Insecticide Type
			Bottles	Sachets		
Donga	Copargo	26,307		5,129	5.1	Fludora® Fusion
	Djougou	101,297		16,604	6.1	Fludora® Fusion
	Ouaké	38,241		6,346	6.0	Fludora® Fusion
Atacora	Kouandé	6,112	1,018		6.0	Actellic® 300 CS
<b>Total</b>		<b>350,349</b>	<b>1,018</b>	<b>58,255</b>	<b>6</b>	

## 4.5. IEC / SBC ACTIVITIES & OUTCOMES

PMI VectorLink Benin, in collaboration with the Benin NMCP and other stakeholders, supported a range of Information, Education, Social and Behavior Change Communication (IEC/SBCC) activities to ensure full support to IRS activities and to promote acceptance of this intervention by the community. The project, in close collaboration with Benin MoH / NMCP, updated existing IEC materials and developed others to suit the 2020 IRS campaign needs. IEC materials and tools that the project updated / developed included: training manual and PowerPoint presentations, IRS posters and banners for awareness against theft of IRS commodities and data falsification by SOPs, as well as partner radio contracts. The project held three training sessions before launching the IEC activities, including:

- Guidance to local radio managers on March 17-20, 2020
- Training of trainers held on March 24, 2020
- Training of mobilizers held from March 27 to April 5, 2020

IEC/SBCC activities focused on positive benefits of IRS in preventing and controlling malaria, on addressing common prevalent myths, and misconceptions about IRS. To safely implement the IRS campaign amid the COVID-19 pandemic, seasonal workers were required to comply with prevention measures (safe distance, handwashing, and PPE on at all times) put in place at the operational site and in the community.

The project team worked with media channels to broadcast radio spots and inform communities of the IRS campaign schedule and its benefits for malaria prevention and control.

### Advocacy meetings

In collaboration with Benin NMCP and partners, VectorLink Benin conducted advocacy meetings at different levels (department and district) from April 6 to April 10, 2020: in Donga department, meetings took place from April 6 to April 7, 2020; and in Alibori from April 9 to April 10, 2020. These meetings involved administrative authorities and community leaders. Following these advocacy meetings, the project's IEC Officer helped village leaders conduct public meetings in IRS district villages. The meetings at the village level and the higher level advocacy meetings at the department level and district (Commune) level had the same objective in ensuring that communities were adequately informed about the 2020 IRS campaign and increasing community engagement before the start of IRS operations. During these advocacy meetings, the project also presented to administrative and health authorities, the contingency plan that was put in place to safely implement IRS activities in the era of COVID-19.

### Community mobilization

The project used the community mobilization as an approach to address factors preventing or supporting IRS acceptability and promote malaria-related behaviors.

In each district, the IEC assistant, in collaboration with the site coordinator, met with village leaders and town criers one or two days before the arrival of SOPs in their localities. Village leaders who accepted to take part directly in the implementation of IRS activities were hired as mobilizers. In total, the project trained and engaged 741 mobilizers who resided in the target communities and shared key messages with beneficiaries before the start of the spray campaign. This enabled them to visit every household with IRS messages (i.e.,

explaining how insecticide application impacts malaria, the fact that spray operators are responsible individuals who will handle people’s household belongings with care, demystifying and correcting any misconceptions about IRS and educating households on their roles and responsibilities before, during, and after their house is sprayed). Similar to the 2019 spray campaign, IRS cards were distributed by spray teams at the time of spray. Town criers reminded beneficiaries of safety precautions and household preparation during IRS operations.

All mobilizers participated in a one-day training in March 2020 that focused on key messaging and effective communication techniques, door marking, and correctly filling in mobilization data collection cards.

### **Town Criers**

As in previous years, each village used one or two town criers depending on its size. When IRS was not conducted in a village on a given day for any reason, including weather, the scattering of households in the village, etc., the town crier, in collaboration with the village leader and mobilizer of the village, the IEC assistant and site coordinator, informed household owners of date changes. Town criers and heads of villages reminded the need for the participation of householders in preparing their houses for spraying and complying with instructions, including safety precautions before and after the spray.

### **Mass Media Communication**

Seven community radio stations, four in Donga, and three in Alibori, were contracted to cover the IRS campaign. Activities included the broadcast of messages in French and in local languages covering the following:

- Dissemination of IRS operations schedules in each location
- Talk shows, roundtables and radio plays
- Regular spot on malaria prevention measures
- Best practices during IRS operations, etc.

In addition, a song on the IRS best practices produced this year by the project was used as a generic message in all outreach broadcasts. The song was created to socially market the service and encourage houses to be prepared for SOPs. VectorLink Benin staff, district and department officials participated in interactive call-in shows and on-air presentations.

The radio station contracts covered the period from April 1 to May 31, 2020. Four weeks after the IRS campaign, radio stations continued to broadcast educational information to communities on malaria prevention aspects, including the continued use of insecticide-treated nets (ITNs) every night, and the need to not repaint houses before the end of the effective period of the insecticide (+/- 10 months). See Table 8 for radio station activities.

**Table 8: IEC Activities Conducted by Radio Stations (April 1 to May 31, 2020)**

Activities	Number of Broadcasts
Disseminating short radio spots and messages (French and national languages)	2,973
IRS schedule announcements/invitations for local leaders to attend IRS planning meetings (French and national languages)	293
Debates and (interactive) discussion shows	34
Animated radio question and answer games on IRS	3
Interviews and testimonials of beneficiaries	61
Interviews on IRS conducted in communities	133

## IEC / SBC outcomes

With IEC / SBC strategies deployed during the 2020 IRS campaign, the project experienced an improvement in IRS acceptance at the household level. The average rate of refusals represented 10.0 percent of all non-sprayed structures. Table 9 shows the proportion of refusal cases.

**Table 9: Proportion of refusal cases among untreated structures**

Districts	Structures Found #	Non-sprayed Structures*	Structures Not Sprayed due to Refusals	
			#	%
Kouande	6,435	323	24	7.4
Gogounou	63,252	2,971	330	11.1
Kandi	78,939	3,330	369	11.1
Segbana	46,365	3,863	433	11.2
Copargo	30,045	3,738	408	10.9
Djougou	110,124	8,827	816	9.2
Ouake	39,971	1,730	100	5.8
Total	375,131	24,782	2,480	10.0

*\* In 2019, there were 52,504 unsprayed structures out of 387,711 structures found, (13.5 percent). In 2020, there were 24,782 unsprayed structures out of 375,131 structures found (6.6 percent). It appears that the proportion of unsprayed structures decreased by around half in 2020 compared to the situation in 2019. This can be explained by the fact that the project further reinforced its IEC/SBCC strategy through innovative ways (i.e. song that easily grabbed the population's attention), as well as odorless nature of the Fludora Fusion insecticide, which was newly used in Benin this year.*

## 4.6. NATIONAL CAPACITY BUILDING AND COLLABORATION EFFORTS

During the 2020 IRS campaign, VectorLink Benin continued to promote the transfer of technical capacity to the national government to enable them to assume greater responsibility in planning, implementing, and monitoring IRS activities. The project worked in coordination with NMCP/MOH national and departmental level staff to implement program activities, including environmental compliance, community mobilization, training, logistics management, supervision and coordination of IRS field operations.

As part of a hands-on approach to capacity building, NMCP / vector control officers were fully involved in the supervision of IRS in three districts that they selected directly: Kandi, Gogounou and Segbana. In addition, to strengthen ownership, Environmental Health Officers from the National Directorate of Hygiene (DHAB), accompanied by their respective medical officers at districts and departmental levels, participated in IRS supervision in their respective districts.

At the departmental/DDS level, capacity building included the following areas:

- Micro-planning for IRS activities
- Training of personnel to conduct IRS activities
- Recruitment of spray personnel
- Supervision of spray activities using smartphones
- Community mobilization for IRS operations and community meetings and dialogues

## 4.7. GENDER MAINSTREAMING

In the context of the IRS campaign, PMI VectorLink Benin's strategies for gender mainstreaming included:

- A high-level advocacy meeting with political & administrative authorities and opinion leaders to discuss the different barriers observed in the intervention areas, including those that prevented

women from participating fully in all components of the IRS implementation. The objective of this meeting was to sensitize these stakeholders on the importance of increasing female participation in IRS campaigns.

- VectorLink Benin has incorporated gender awareness and sexual harassment training in all the trainings conducted prior to the campaign. Participants learned about the importance of gender equity and equality for the success of the spray campaign, and for women’s empowerment in society.
- Ensuring women have accommodations in operational sites where they feel safe and comfortable, including separate restrooms for male and female workers, properly labeled and well separated for privacy.
- Ensuring that every woman received the appropriate size for coveralls and boots.
- Creating a buddy system so that at least two women are together on each spray team.
- Continuing to promote a respectful working environment through the project’s sexual harassment policy for all employees, including seasonal workers.
- Providing disposable and reusable sanitary pads for use while in the field.
- Displaying posters on gender awareness guidelines in all operational sites, as well as anti-harassment posters and encourage women to report any sexual harassment.
- Ensuring that recruitment, mobilization, and training include women and respect women’s time constraints when feasible.
- Explicit inclusion of gender issues in all training modules.
- Ensuring that women who are pregnant or breastfeeding and recruited during the campaign are assigned to roles without exposure to insecticide.
- Providing sex-disaggregated data for all indicators, as appropriate.

During the 2020 IRS campaign, women represented 17.0 percent of the seasonal staff for the 20 operational sites versus 19.83 percent in 2019 for 21 operational sites. Table 10 presents the female participation in different positions of the IRS implementation during the 2020 spray campaign.

**Table 10: Female Participation during the 2020 IRS Campaign.**

Category	Female	Male	Total	% Female
Mobilizers	113	628	741	15.2
Team Leaders	50	260	310	16.1
District Coordinators	0	7	7	0.0
Supervisors (Community)	23	132	155	14.8
Spray Operators	147	1,404	1,551	9.5
Data Clerks	3	9	12	25.0
Site Supervisors	4	14	18	22.2
Spray Pump Technicians	39	116	155	25.2
Washers	155	0	155	100.0
Storekeepers	8	24	32	25.0
Guards	0	39	39	0.0
IEC Leaders	0	2	2	0.0
Seasonal Assistants (Finance (5), Logistics (4), ECO (3), M&E (9), Spray pump technicians assistants (4), IT specialist (1) and IEC specialist (8)	5	29	34	14.7
<b>Total</b>	<b>547</b>	<b>2,664</b>	<b>3,211</b>	<b>17.0</b>

## 4.8. OVERVIEW & RESULTS OF SATELLITE IMAGERY OF TARGET DISTRICTS OF THE 2020 IRS CAMPAIGN

### Context

To strengthen the geographical reconnaissance of the IRS target areas during the 2020 IRS campaign, PMI VectorLink Benin used satellite imagery to visualize the details of the target areas related to different themes (habitat, roads, hydrography, land cover, topography, etc.) as well as their geographic coordinates (Longitude, Latitude and altitude). This activity, which was conducted in close coordination with NMCP, allowed the project to improve geographical reconnaissance and to have a more comprehensive database of the appropriate location and quantification of existing structures, as well as for any verification / audit of coverage (after the campaign).

### Methodology

- High spatial resolution images of the ArcGIS Online World Imagery service were downloaded from the SAS.Planet application. In addition to these images and in order to have the details of each sub district (arrondissement), the Shuttle Radar Topography Mission (SRTM) type radar images covering all of the intervention districts were downloaded from the site <https://earthexplorer.usgs.gov/>
- Analysis of the downloaded satellite images allowed the project to identify different inhabited areas based on clusters of houses (hamlets, villages and quarters) of targeted districts for the 2020 IRS campaign. Once inhabited areas were identified, the geographic coordinates of hamlets, villages and urban neighborhoods were generated from the Google Earth website. Satellite imagery was accompanied by a field visit for the quantification of eligible structures.
- Since it is impossible to know the names of hamlets, villages and neighborhoods of cities identified on the various downloaded satellite images, a field reconnaissance was carried out following the satellite imagery activity. The geographical reconnaissance team used the GPS navigation function "Garmin Etrex 10" and "Garmin Etrex 30" to find these hamlets villages and city neighborhoods. With the support of guides, heads of villages and other resource persons, the names of each locality were identified and recorded.
- The hydrographic network of each sub-district was extracted using the "Generate Watershed" module of the Global Mapper v18 software. The road network of each sub-district (Arrondissement) was obtained by digitizing ESRI ArcGis Imagery images and using ArcGIS 10.4 software. This information allowed to project to assess some operational details, including accessibility, identification of sensitive areas or areas prone to flooding, etc. in order to refine the implementation plan.
- A database in Excel format has been created with the following variables: departments, districts, cities, villages, hamlets, geographic coordinates, IRS intervention last year (Yes or No answer), number of households / houses, name (s) of the existing mobile telephone networks, health centers and observations. The data collected was then entered into this database.
- The database of all geographic features was imported into ArcGIS 10.4 software, where it was first converted to "shapefile" and Keyhole Markup Language (KML) files. Vector data (hydrography and road network) and raster (elevation and land use) of the sub districts enabled the production of dynamic maps using ArcGIS 10.4 software.

### Results

The satellite imagery carried out as part of the 2020 IRS campaign's implementation allowed to:

- Realize geo-referenced database of 1,769 hamlets and city districts located in six out of seven target districts of the 2020 IRS campaign;
- Obtain satellite images of 1,574 visible hamlets, and city's quarters, 43 digitalized sub-district maps with their elevation models;

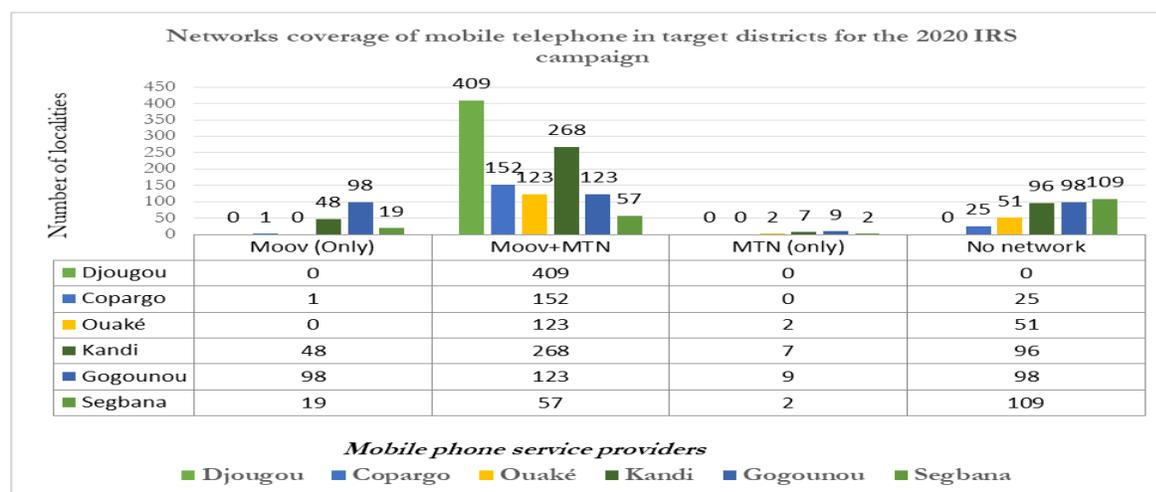
- Obtain the coverage rate of the mobile telephone network by mobile service provider; which is an important factor in the selection of mobile service providers for project activities, where mobile technology is used.

Satellite imagery identified 20.5 percent of inhabited areas (villages and hamlets) unknown by the national statistics service and therefore not taken into account in the spray target denominator. However, it should be noted that these are relatively remote villages and hamlets with accessible routes only via motorbike or by foot and which have a small number of dwellings. Table 11, Figures 3, 4 and 5 present the main outcomes of satellite imagery.

**Table 11: Results of Geographical Reconnaissance of Villages (Agglomerations) using Satellite Imagery**

District	Number of Localities (Hamlets and Cities' Quarters) in 2019 Using Information from the National Statistical Service (INSAE)	Number of Localities (Hamlets and Cities' Quarters) Observed by Satellite Imagery*	Percentage Increase
Djougou	413	481	16.5 % ↑
Copargo	138	179	29.7 % ↑
Ouake	142	176	23.94 % ↑
Kandi	322	418	29.8 % ↑
Gogounou	286	328	14.7 % ↑
Segbana	167	187	12 % ↑
Total	1,468	1,769	20.5 % ↑

**Figure 3: Mobile Network Coverage in Target Districts of the 2020 IRS Campaign in Benin\***



Overall, the IRS targeted districts have a good mobile network coverage. The district of Ségbana is the only district to be poorly served.

Figure 4: Satellite Imagery of Nassabara Village, Gogounou District (Department of Alibori, Benin)

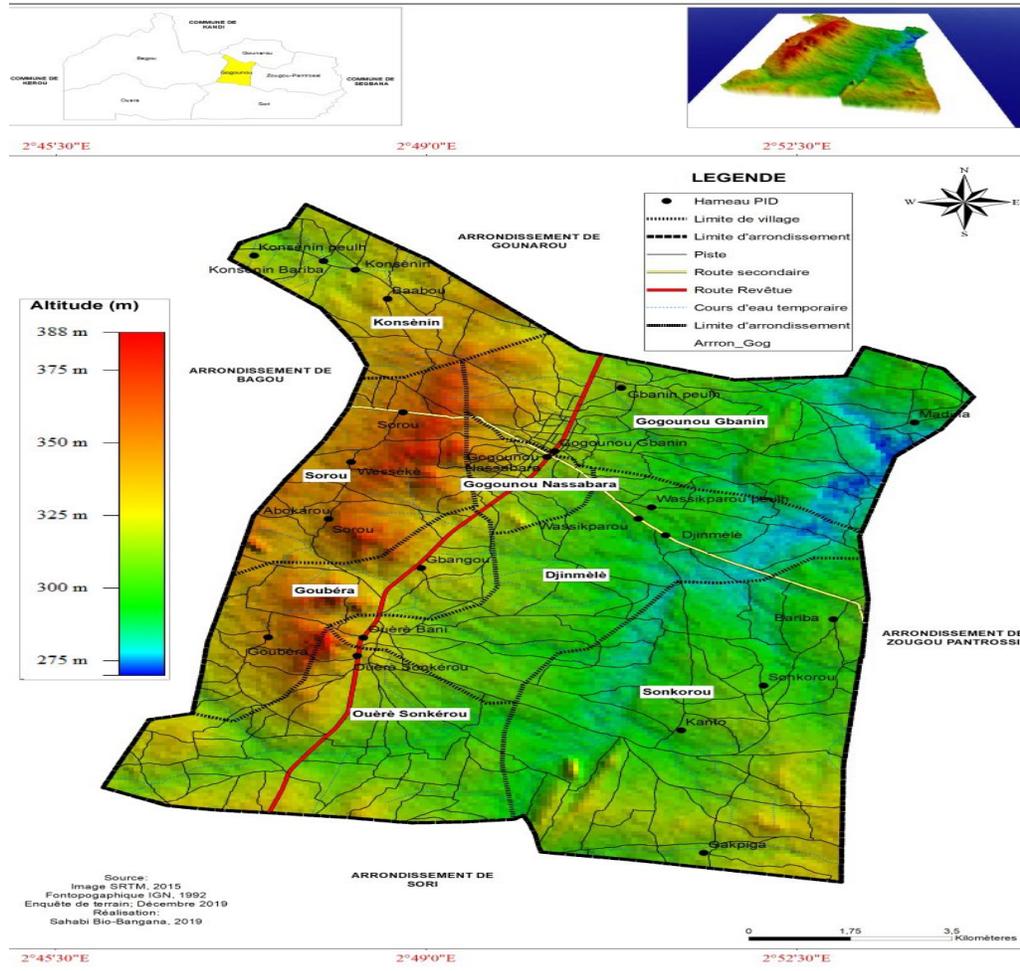


Figure 5: Satellite Imagery of Pariki Village, Gogounou District (Department of Alibori, Benin)



The orange arrows indicates the direction of villages or hamlets that are well known by the territorial administration and thus facilitated ground trothing /reconnaissance of the residential area identified by satellite imagery

Figure 6: Digital Land Elevation of Gogounou District (Department of Alibori, Benin)



## 5. ENTOMOLOGY

Entomological surveillance is a key component of IRS programming, providing information on the impact of IRS on vector density and behavior in IRS areas. Entomological activities also help assess the quality of IRS operations, the decay rates of insecticide applied, and the vector susceptibility to insecticides used for malaria vector control.

### 5.1. INSECTICIDE SUSCEPTIBILITY

Susceptibility tests for local strains of *Anopheles* from Benin to the mixture of deltamethrin and clothianidin have not yet been performed in routine entomological surveillance, as this formulation is still new to public health. However, in a study carried out in Benin by Corine Ngufor et al. in 2016, Fludora® Fusion has shown an impressive residual longevity in experimental hut trials with different local wall substrates, lasting for at least eight months on mud and cement walls. CDC bottle bioassays performed by Augustin Fongnikin et al. (manuscript in preparation), as part of Fludora Fusion hut trials, to investigate the susceptibility of the Cove (Southern Benin) vector population to clothianidin alone showed full susceptibility to clothianidin.

### 5.2. RESIDUAL EFFICACY

Vector Link Benin is supported by the Entomological Research Center of Cotonou (CREC) to generate data on key entomological indicators, including spray quality assessment through the cone bioassay tests. The full report of this evaluation is sent directly to the United States Agency for International Development (USAID) / PMI by CREC. Table 12 below presents the results received on the quality of IRS, one week after the intervention in the sampled villages.

**Table 12: Wall Bioassay Results For Fludora® Fusion in Donga / Benin (April 2020) in villages of Djougou and Copargo**

Villages	Djougou		Copargo	
	Anoum	Gondessar	Kataban	Tchoutchou
	% (N)	% (N)	% (N)	% (N)
Cement	100 (226)	100 (217)	100 (218)	100 (234)
Mud	100 (221)	100 (230)	100 (209)	100 (219)

According to the results above, researchers from CREC found that, seven days after the treatment of houses, the mortality rate of *Anopheles gambiae* (Kisumu susceptible strain) exposed to the treated walls was 100 percent, regardless of the position of the WHO cones on the wall, respectively on cement and mud walls in the selected villages of Djougou and Copargo. This generally testifies to the homogeneity of the insecticide on the wall surfaces and the good quality of spray. Due to government restrictions on travel following the COVID-19 pandemic, the tests were only performed in the Donga department.

# 6. ENVIRONMENTAL COMPLIANCE

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## 6.1. IRS CAMPAIGN ASSESSMENTS

### Environmental Compliance

The PMI VectorLink Benin project operated under a supplemental environmental assessment (SEA) approved by USAID in 2020, which authorizes the use of pyrethroids, organophosphates, carbamates, neonicotinoids, clothianidin/deltamethrin combination and pyrrole (chlorfenapyr) (when listed by WHO PQ). During the 2020 IRS campaign, the project used the leftover stock of Actellic 300CS (an organophosphate) from the 2019 IRS campaign to spray in the sub-district of Birini (Kouande district), and Fludora® Fusion in Donga and Alibori departments.

### Challenges and Considerations

In 2020, the project intervened in seven districts in Northern Benin (Djougou, Copargo, Ouake in Donga department, Kandi, Gogounou, Segbana in Alibori Department, and Kouande in Atacora department). New operational sites have been created in the sub-district of Sam (Kandi) and the sub-district of Lougou (Segbana) as part of the decongestion of the sites and to bring SOPs closer to villages in these sub-districts. PMI VectorLink Benin conducted an environmental geographical reconnaissance in these sub-districts to identify new appropriate sites for storerooms, the safest method of SOPs transport and insecticide, and environmental measures required to protect communities during the spray campaign.

The geographical reconnaissance discovered many protected areas in the commune of Kandi especially villages near W National Park. Structures within 500 meters of W National Park area were not sprayed. Vector control in these protected areas is ensured by LLIN routine or mass distribution conducted by the NMCP.

In addition to the measures taken for sensitive areas, the team communicated information and guidelines on spraying methods regarding individual protection measures for spray teams before, during and after spraying.

### Pre-Season Environmental Compliance Assessments

Prior to the 2020 campaign, the PMI VectorLink Benin team conducted initial Pre-Season Environmental Compliance Assessments (initial PSECA) that provided the basis for the detailed estimate of all sites' rehabilitation work, accessibility of structures to be sprayed for the final deployment of transport, and other operational aspects to ensure a successful campaign. This field assessment also helped identify villages that needed mobile soak pits because of their remoteness from vehicle-accessible roads.

Approximately two weeks before the commencement of spray activities, the project performed another inspection (PSECA 2) to verify that all necessary work was completed, and that the facilities were ready to receive insecticide shipments prior to starting spray operations. Based on the outcome of the inspections, all necessary repairs were made to soak pits prior to the launch of the spray campaign. PMI VectorLink Benin also has made available all documents, data sheets, guide to first aid, recommendations in case of spillage and warning signs. In addition, before the campaign, all seasonal staff underwent medical checkups, as well as pregnancy tests for women.

Although the VectorLink project ECO is principally responsible for environmental compliance of the VectorLink project, the Environmental Technical Committee (MOH, NMCP, Ministry of Environment (MOE), Ministry of Agriculture, Livestock and Fisheries / Ministère de l'Agriculture, de l'Élevage et de la Pêche (MoALF), DDEGCC, Benin Agency for Environment, and DDS participated in environmental inspections. This team used smartphones with PMI standard environmental compliance checklists.

During this exercise, the project continued to strengthen the capacity of IRS counterparts in environmental compliance for IRS activities, and ensure that they are cognizant with PMI’s Best Management Practices guidelines.

### Environmental Compliance Activities during the Campaign

PMI VectorLink Benin’s staff supervised spray operations and ensured that environmental compliance standards as specified in the Best Management Practices (BMPs) are met, including the proper use of PPE, progressive rinsing of spray pumps, condition of vehicles used to transport spray teams and insecticides, storage conditions of IRS materials, as well as the display of warning signs at warehouses. The staff also closely monitored the proper management and storage of IRS waste, accuracy of the stock cards at the warehouse level and use of proper spray techniques by SOPs. In addition, the supervision team ensured that beneficiaries had received clear information about the IRS campaign and knew how to prepare their structures for spraying. PMI VectorLink Benin monitored the condition of fixed and Mobile Soak Pits on a regular basis to ensure proper flow and drainage.

### Mobile Soak Pit (MSPII)<sup>3</sup>

In Barienou, Bougou, Partago, and Bagou operational sites, PMI VectorLink Benin used a new generation of mobile soak pit (larger capacity than the original mobile soak pit) to accommodate large spray teams that could not use the existing permanent soak pits that and to adhere to the maximum number of spray operators per wash area.

### Post-Spray Environmental Compliance Activities

At the end of the 2020 spray campaign, VectorLink Benin cleaned all IRS materials. The project then transported materials from IRS sites to the central warehouses (Kandi and Natitingou) for use during the 2021 IRS campaign. The VectorLink team, with support from government stakeholders, conducted post-spray site decontamination and decommissioning. After the VectorLink Benin project restored the sites to a well-maintained state and made them safe for the surrounding communities, the VectorLink team formally handed the sites back to the local authorities for safekeeping until the next IRS campaign.

From May 5 to May 14, 2020, the VectorLink Benin team, along with representatives from DDEGCC, NMCP, MOE and the Ministry of Agriculture, Livestock and Fisheries / Ministère de l’Agriculture, de l’Elevage et de la Pêche (MoALF), performed a post-spray inspection of the central warehouse and all operations sites in Atacora, Alibori and Donga. The post-spray inspection ensured that leftover pesticides were inventoried and removed from all operations sites and the Kandi warehouse (Alibori), and that the soak pits were properly closed and secured. The inspection team reported on the compliance of the 2020 IRS campaign with IRS standardized best practices for warehousing, human safety and environmental protection.

## 6.2. INCIDENT REPORTS

Two incidents (table 13) took place during the implementation of the 2020 IRS campaign and were reported within the 48-hour incident reporting deadline. Anyone involved in cases of pilferage and data falsification was immediately dismissed from any further engagement in the IRS campaign and the matter was reported to the police for investigation.

**Table 13: Summary of Incidents Recorded during the 2020 IRS Campaign**

	Incidents	Location	Date
1.	Incident related to an attempted theft of insecticide and data falsification by two spray operators	Village of Koukoulbendi, Donga department	April 20, 2020

<sup>3</sup> The U.S. President’s Malaria Initiative (PMI) Best Management Practices (BMP) Manual for Indoor Residual Spraying (IRS) in Vector Control Interventions. Rockville, Maryland. The PMI VectorLink Project, Abt Associates Inc February 2020

	Incidents	Location	Date
2.	Incident involving a spray operator who was bitten by a dog in Onklou village, Donga Department	Village of Onklou, Donga department	April 24, 2020

### 6.3. WASTE MANAGEMENT

Under the supervision of the Project Environmental Compliance Officer and the Warehouse Manager, all solid wastes generated from the 2020 spray campaign were collected and segregated. The logistics team collected all empty insecticide sachets and bottles, and reconciled the numbers using ledger books and stock cards. The majority of waste will be disposed of properly by PSSP IMPACT+, a Government institution equipped with the latest generation technologies for waste management. All contaminated waste paper materials, empty sachets of insecticide and used masks will be incinerated at “Ordre de Malte” Hospital in Djougou. Other wastes will be sent to the Cotonou landfill site. The project will keep records of the recycling and disposal certificates issued for all categories of waste. Table 14 shows the different categories of waste generated and their respective management methods.

**Table 14: Waste Generated during the 2020 Spray Campaign and Planned Management Methods**

Designation	Type	Disposal Method	Estimation Date of Transfer to Disposal Site
Plastic materials	Plastic	Recycling	June 2020
Empty bottles	High-Density Polyethylene (HDPE)	Recycling (production of paving stone)	June 2020
Fludora Empty sachets	Aluminum sachet	Incineration	June 2020
Batteries for flashlights	Alkaline	Landfilling	June 2020
Sponges	Sponges	Incineration	May 2020
Used Masks	Synthetic polymer fibers	Incineration	June 2020
Chemical-resistant Gloves	Polyvinyl Chloride (PVC)	Landfilling / Donating	June 2020
Others (garbage bag, absorbent paper, empty boxes, etc.)	Paper based, biodegradable materials, latex	Incineration, Repurposing	June 2020

# 7. MONITORING AND EVALUATION

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## 7.1. DATA COLLECTION/ENTRY/QUALITY ASSURANCE

Building on the success of the mobile data pilot that took place in Burkina Faso, the VectorLink Benin team adopted mobile data collection for the 2020 IRS campaign. It was implemented at the primary point of collection through spray operators (SOPs). The electronic data collection forms were developed to ensure the collection of all PMI-requested indicators. Before the beginning of the 2020 spray campaign, the project trained those involved in data collection on the data collection process and in completing all appropriate forms. Spray data was collected on smartphones using the ODK Collect application. SOPs were also authorized to report the IRS data on the paper forms, as a back-up, in case of any issues encountered with the smartphones.

At the end of the day, the team leader verified the data collected by the SOPs to ensure that the forms were properly filled out before being synchronized to the server. The summary table generated by smartphone was used by the team leader to fill team leaders' form. Figure 7 shows an SOP filling out a form.

**Figure 7: Spray Operators Filling out a Spray Form on a Smartphone**



### **VectorLink Collect Database**

To improve spray data entry, cleaning, and reporting, the PMI VectorLink Benin team transitioned from the Microsoft Access database to the new VectorLink Collect (VLC) database using the District Health Information Software 2 (DHIS-2) system. This new system has multiple advantages, including the ability to have real time view of data entry progress, development of powerful dashboards, and pivot tables to track performance and remote interaction with the system from any location.

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.

A total of 12 data entry clerks (DECs) were recruited, trained and employed. For data collected on paper forms, DECs entered spray data first by the summarized totals per SOP form to allow a quick insight into the spray campaign. DECs then entered the details line by line to ensure accuracy of the data recorded.

## Data Quality Assurance and Verification

In addition to the routine data recording checks built into the data collection process, PMI VectorLink Benin implemented data quality assurance activities using the project supervision tools and standard database audit control, including the Data Collection Verification (DCV) form, directly observed spray (DOS) form and Data Entry Verification form.

The team visited and interviewed residents from 1,122 structures (0.3 percent of structures found) during the campaign. Areas where the DCV was implemented were chosen based on the spray coverage rate as reported by the daily summary report on key IRS indicators (number of SOPs having worked, number of structures found, number of structures treated and number of bottles of insecticides used).

On a weekly basis, the PMI VectorLink Benin M&E Manager and Database Manager provided feedback regarding errors found on SOP forms and gave recommendations to the operations team to minimize future errors on the SOP forms. Table 15 shows DCVs carried out.

**Table 15: Completed DCV Using Smartphone and Paper Forms**

Districts	DCV using smartphone			DCV using paper form		
	Number of villages visited	Number of DCV forms filled	Number of structures verified	Number of villages visited	Number of DCV forms filled	Number of structures verified
Copargo	7	54	235	0	0	0
Djougou	9	50	165	52	52	511
Gogounou	6	42	209	29	29	290
Kandi	8	63	298	7	12	120
Kouandé (Birni)	0	0	0	3	7	78
Ouaké	4	40	148	13	10	92
Ségbana	2	11	67	16	16	160
<b>Total</b>	36	260	1,122	120	126	1,251

## 7.2. MHEALTH

To support rapid decision making across the various program components, the project continued to use mobile health (m-Health) applications to complement the CommCare tools used throughout the project. The complementary mHealth tools have been designed in Open Data Kit (ODK). The mHealth reporting tools for data collection and verification, which VectorLink-Benin used throughout the spray campaign, included the Performance Monitoring Tracker (PMT), the job aids, and the mobile supervisory forms, including the digitization of Data Collection Verification (DCV) form.

### Performance Monitoring Tracker (PMT)

On a daily basis, team leaders summarized key operations data on a performance-tracking sheet. Storekeepers submitted those key operations data, via PMT SMS, to CommCare HQ via Telerivet to generate key indicators on campaign progress and performance through automated email reports. 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 number of insecticide bottles/sachets used during the campaign.

### Job Aid Messages

VectorLink Benin sent out daily SMS messages as alerts to coordinators, supervisors, team leaders, and storekeepers to remind them about topics such as compulsory breakfast, wearing personal protective equipment, gender awareness, the number of targeted structures on a daily basis, and any other instructions preventing the recurrence of any anomaly observed the previous days. Throughout the same channel, updates were made to spray teams based on the supervision observations. A total of 19,830 SMS messages (for an average of three reminders per day) were sent to 505 seasonal staff during the IRS campaign.

## Supervision tools

A total of 260 DCV forms were completed and 325 supervision forms successfully completed by national supervisors and site coordinators through the CommCare application. Table 16 below provides a breakdown of the submitted forms.

**Table 16: Submitted Supervisory Forms during the Spray Campaign**

Supervisory Form	ODK	CommCare
	Submitted	Submitted
Morning Mobilization	50	77
Transportation Vehicle Inspection	28	77
Homeowner Preparation and Spray Operator Performance	46	92
End of Day Cleanup	36	27
Storekeeper Performance	58	52
Data Collection Verification (DCV)	N/A	260

## 7.3. RESULTS

### Key Spray Results

The M&E plan tracks performance and progress across the different components of the project based 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 Benin 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 number of people protected. This included the total population disaggregated by gender and special groups, such as pregnant women and children under five. Table 17 provides a summary of key results.

**Table 17: Summary of 2020 Key IRS Results**

Department	Commune	Structures Found by SOPs	Structures Sprayed	Structures not Sprayed	Spray coverage	Population Found	Population Protected	Pregnant Women Protected	Children <5 years old Protected	Population not Protected	Pregnant Women not Protected	Children under 5 years old not Protected
Atacora	Kouande	6,435	6,112	323	95.0	20,873	20,049	700	4,565	824	27	132
	<b>Total Atacora</b>	<b>6,435</b>	<b>6,112</b>	<b>323</b>	<b>95.0</b>	<b>20,873</b>	<b>20,049</b>	<b>700</b>	<b>4,565</b>	<b>824</b>	<b>27</b>	<b>132</b>
Alibori	Gogounou	63,252	60,281	2,971	95.3	223,022	214,185	9,654	38,894	8,837	310	1,432
	Kandi	78,939	75,609	3,330	95.8	266,903	257,882	11,155	47,486	9,021	324	1,381
	Segbana	46,365	42,502	3,863	91.7	157,201	146,090	4,818	28,416	11,111	350	2,005
	<b>Total Alibori</b>	<b>188,556</b>	<b>178,392</b>	<b>10,164</b>	<b>94.6</b>	<b>647,126</b>	<b>618,157</b>	<b>25,627</b>	<b>114,796</b>	<b>28,969</b>	<b>984</b>	<b>4,818</b>

Department	Commune	Structures Found by SOPs	Structures Sprayed	Structures not Sprayed	Spray coverage	Population Found	Population Protected	Pregnant Women Protected	Children <5 years old Protected	Population not Protected	Pregnant Women not Protected	Children under 5 years old not Protected
Donga	Copargo	30,045	26,307	3,738	87.6	82,887	74,363	3,300	14,350	8,524	271	1,294
	Djougou	110,124	101,297	8,827	92.0	311,616	291,126	11,943	51,032	20,490	610	2,950
	Ouake	39,971	38,241	1,730	95.7	105,117	101,233	2,476	14,457	3,884	54	566
	<b>Total Donga</b>	<b>180,140</b>	<b>165,845</b>	<b>14,295</b>	<b>92.1</b>	<b>499,620</b>	<b>466,722</b>	<b>17,719</b>	<b>79,839</b>	<b>32,898</b>	<b>935</b>	<b>4,810</b>
<b>Total</b>		<b>375,131</b>	<b>350,349</b>	<b>24,782</b>	<b>93.4</b>	<b>1,167,619</b>	<b>1,104,928</b>	<b>44,046</b>	<b>199,200</b>	<b>62,691</b>	<b>1,946</b>	<b>9,760</b>

### Insecticide Usage and SOP Performance

SOPs were given a daily target of 13 structures per day at the start of the spray 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 58,255 insecticide sachets of Fludora® Fusion and 1,018 bottles of Actelic 300cs to spray 350,349 structures (Table 18).

**Table 18: 2020 IRS Results by District**

Department	Commune	Structures Sprayed	Spray Coverage (%)	Number of Insecticide Bottles/Sachets Used	Average Number of Structures per Bottle	Average Number of Structures Sprayed per SOP per day
Atacora	Kouande	6,112	95.0	1,018	6.0	12.3
	<b>Total Atacora</b>	<b>6,112</b>	<b>95.0</b>	<b>1,018</b>	<b>6.0</b>	<b>12.3</b>
Alibori	Gogounou	60,281	95.3	11,710	5.1	14.5
	Kandi	75,609	95.8	12,195	6.2	17.6
	Segbana	42,502	91.7	6,271	6.8	15.4
	<b>Total Alibori</b>	<b>178,392</b>	<b>94.6</b>	<b>30,176</b>	<b>5.9</b>	<b>15.9</b>
Donga	Copargo	26,307	87.6	5,129	5.1	11.4
	Djougou	101,297	92.0	16,604	6.1	13.2
	Ouake	38,241	95.7	6,346	6.0	12.2
	<b>Total Donga</b>	<b>165,845</b>	<b>92.1</b>	<b>28,079</b>	<b>5.9</b>	<b>12.7</b>
<b>Total</b>		<b>350,349</b>	<b>93.4</b>	<b>59,273</b>	<b>5.9</b>	<b>14.1</b>

### Reasons for Non-Spray

During the 2020 IRS campaign, VectorLink Benin did not spray 24,782 found structures (6.6 percent of all found structures, compared to 13.5 percent in 2019). The key reasons for non-sprayed structures were: locked structures (9,844; 39.7%), structures with bags that were hard to remove (6,982; 28.2%), and temporary food stores/granaries (3,393; 13.7%).

Table 19 below gives the breakdown for the reasons for non-spraying of sleeping space structures by district

**Table 19: Reasons for Non-Spray by District**

Reasons for Non-Spray of sleeping space structures	Atacora	Donga			Alibori			Total
	Kouande	Copargo	Djougou	Ouake	Gogounou	Kandi	Segbana	
Locked	68	1,483	3,093	804	1,162	1,553	1,681	<b>9,844</b>
Other	1	76	168	17	72	39	71	<b>444</b>
Refused*	24	408	816	100	330	369	433	<b>2,480</b>
Sick	15	223	549	87	145	186	197	<b>1,402</b>
Temporary Food Store	121	536	1,521	196	207	376	436	<b>3,393</b>
Funeral	3	62	76	2	34	33	27	<b>237</b>
Bags hard to move	91	950	2,604	524	1,021	774	1,018	<b>6,982</b>
<b>Total</b>	<b>323</b>	<b>3,738</b>	<b>8,827</b>	<b>1,730</b>	<b>2,971</b>	<b>3,330</b>	<b>3,863</b>	<b>24,782</b>

\* May result from the presumption of odor (in allusion to insecticides used in previous campaigns where Actellic, which has a strong smell, was used), rumors on potential side effects, general false rumors, categorical refusals without any specific reasons, etc.

# 8. CHALLENGES, LESSONS LEARNED AND KEY RECOMMENDATIONS

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## Challenges

The 2020 IRS campaign was carried out in a particular context marked by many challenges, including:

- Securing the IRS campaign against the risks of the COVID-19 pandemic and its implications
  - Adjusting the number of seasonal workers in vehicles to comply with the social distancing (eight persons in the minibus instead of 18) for travel on the field and for return to the operation sites required more than one trip per vehicle per day, which was time consuming.
  - Greater need of water supply than usual, especially at operational sites where there is no tap water, to enable hand washing and disinfection of toilets, showers, changing rooms, rinsing areas, data entry centers and inside of vehicles.
  - Change of implementation strategies to comply with preventive measures against the spread of COVID-19, including the respect of physical/social distancing. For example, the trainings were subdivided into several sessions to accommodate the number of participants in relations to the workspace and the distance (two meters) between participants.
  - Logistical challenges due to restrictions put in place in-country, including the late arrival of certain IRS equipment (i.e. mobile data collection phones) purchased internationally due to the closure of airports due to COVID-19 and limited in-country travel.
  - Few synchronization issues with the transmission of data from the smartphones to the online database early on; however, these issues were not major issues and were addressed progressively.
  - For places inaccessible by road, operators used motorcycles or walked
  - Change of the length (from 21 days to 16 days) and the start date of the campaign (from May 4, 2020 to April 13, 2020) in light of the elections at the district level, simultaneous implementation of the ITN distribution mass campaign and the indoor residual spraying campaign. Considering that these two interventions share the same actors at the national and district level for supervision of vector control activities during the implementation phase, the project had to increase the number of non-government supervision teams.

## Lessons learned

At the end of the campaign, the project team learned a number of lessons, including:

- The IRS campaign in a context of the COVID-19 pandemic is feasible through good planning and preparation, the establishment of alternative approaches, the interdisciplinary effort and support from partners (communities, stakeholders, opinions leaders, etc.).
- SBC / IEC is a very important strategy to obtain the desired behaviors, especially during the implementation of the IRS campaign in a context of health crisis.
- IRS community mobilization provides a platform for local government health authorities to simultaneously disseminate important health messages for protecting communities from COVID-19.
- Satellite imagery has proven to be a powerful method in geographic recognition as it enabled the discovery of 301 hamlets unknown by the national and departmental services with access details. The spray teams were therefore able to access those areas and spray. This resulted in improved coverage.

## Recommendations

- The project recommends building on the experience of this year's IRS campaign, which took place in a context of a global health crisis, in order to adopt all appropriate strategies to mitigate the risk of disease transmission for future campaigns.
- Closely coordinate activities with NMCP to avoid the simultaneous planning and implementation of vector control interventions (ITNs and IRS) that generally use the same actors during the supervision of activities.
- Health system's partners / staff seconded to IRS activities to support IEC activities should remain involved throughout the duration of the IRS campaign in order to avoid recurrent issues related to mobilization gaps.
- Follow recommendations from the environmental field evaluation conducted in April 2020 by the Cadmus Group, L.L.C., contracted by USAID. These recommendations include:
  - Systematically engage with key influencers in the community to improve existing mobilization efforts and to increase beneficiary acceptance and preparation
  - Present SOPs with different challenging scenarios and encourage them to discuss how to address those scenarios, supported with definitive instruction on handling the scenarios. For instance, utilizing common problems around proximity of livestock, or emptying structures to be sprayed, could provide impactful teaching moments.

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

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
					Year 1(2018)		Year 2(2019)		Year 3 (2020)		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
<b>Objective 1: Implementation of Malaria Vector Control (VC) Interventions</b>														
<b>1.1</b>	<b>Successfully Execute IRS and Other Integrated Malaria VC Activities</b>													
1.1.1	Number and percentage of completed annual country work plans developed and submitted on-time	X	Project records Annually	Country	N/A	N/A	N/A	N/A	N/A	N/A				
1.1.2	Number of eligible structures targeted for spraying		Project records Annually	Country	432,379	442,528	348,978	387,711	322,710	375,131				
1.1.3	Number of eligible structures sprayed with IRS <sup>4</sup>		Project records Annually	Country	367,522	400,997	296,632	335,207	274,304	350,349				
1.1.4	Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)		Project records Annually	Country	85.0%	90.6%	85.0%	86.5%	85.0%	93.4%				
1.1.5	Number of people protected by IRS		Project records Annually	Country Sex Pregnant women Children <5	1,270,500 M:689,431 F: 632,327 Pregnant women: 58,086 <5: 269,164	1,321,758 M:561,025 F:516,386 Pregnant women: 51,872 Children <5: 243,648	1,112,610 M:561,025 F:516,386 Pregnant women: 51,872 Children <5: 243,648	1,077,411 M:561,025 F:516,386 Pregnant women: 51,872 Children <5: 243,648	1,013,392 M: 567,237 F: 537,691 Pregnant women: 44,046 Children <5: 199,200	1,104,928 M: 567,237 F: 537,691 Pregnant women: 44,046 Children <5: 199,200				

<sup>4</sup> Target based on 85% of estimated eligible structures in indicator 1.1.2

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
					Year 1(2018)		Year 2(2019)		Year 3 (2020)		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.1.6	Number and percentage of vector control project country programs submitting an EOSR within 45 days after the end of spray (including completing MEP and EMMR)	X	Project Annually	Country	N/A	N/A	N/A	N/A	100%	100%				
1.1.7	Number and percentage of IRS country programs that conduct a Post-Spray Data Quality Audit within 90 days of spray completion	X	Data Collection Forms Annually	Country	N/A	N/A	N/A	N/A	N/A	N/A				
1.1.8	Number of Insecticide Treated Nets (ITNs) distributed, by channel		Project Records Annually	Country Channel	N/A	N/A	N/A	N/A	N/A	N/A				
1.1.9	Number and percentage of countries completing ITN durability monitoring data collection as planned in a given project year	X	Project Records Annually	Country	N/A	N/A	N/A	N/A	N/A	N/A				
1.1.10	Number and percentage of PMI-funded durability monitoring surveys with reports submitted within 90 days of the end of data collection	X	Project Records Annually	Country	N/A	N/A	N/A	N/A	N/A	N/A				
1.2	<b>Strengthen Capacity of NMCPs, VC Personnel, and Other Institutions to Implement and Manage IRS and Other VC Activities</b>													

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
					Year 1(2018)		Year 2(2019)		Year 3 (2020)		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.2.1	Total number of people trained to support VC in target areas		Project Training Records Annually	VC Intervention  Sex  Job Function	4,303	4,230	2,457	2,607	3,545	3,547				
						M:3,391 F:839		M:2,096 F:511		M: 2,961 F: 586				
					District Coordinators:22 Supervisors (Community): 172 TLs:327 SOPs:1,664 TLs Mobilizers:91 Mobilizers:120 0 Clinicians:10 Data clerck:55 Pump technicians: 175 Washers:162 Stoerekeepers: 42 Guards:39 Dirvers:242 Assistants :29		District Coordinators :20 Supervisors (Community): 89 TLs:256 SOPs:1,278 TLs Mobilizers:80 Mobilizers:413 Clinicians:6 Data clerck:42 Pump technicians: 65 Washers:132 Stoerekeepers: 29 Guards:36 Dirvers:139 Assistants :22		District Coordinators: 25 Supervisors (Community): 159 TLs: 310 SOPs: 1,634 Mobilizers: 741 Clinicians: 14 Head of health center: 58 Data clerks: 12 Pump technicians: 145 Washers: 156 Stoerekeepers:36 Guards: 39 Drivers: 177 Assistants: 28 Other: 13					

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
					Year 1(2018)		Year 2(2019)		Year 3 (2020)		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.2.2	Total number of people trained to support VC in target areas with USG funds <sup>5</sup>		Project Training Records Annually	VC Intervention  Sex  Job Function	4,180	2,229  M:1931 F:298  SOPs:1664 TLs:327 Supervisors:17 2	1,766	1,623  M:1,373 F:250  SOPs:1278 TLs:256 Supervisors:89	1,945	2,128  M: 1,885 F: 243  SOPs:1491 TLs:284 Supervisors: 149 Site supervisors/ coordinators: 25				
1.2.3	Number of people trained during the Master (National) Training and/or IRS Training of Trainers.		Project Training Records Annually	Country  Sex  Type of Training	196	234  M:190 F:44  MT <sup>6</sup> :24 TOT <sup>7</sup> :210	168	133  M:105 F:28  MT:21 TOT:112	181	217  M:138 F:43  MT: 21 TOT:160				

<sup>5</sup> For IRS programs, this includes spray operators, team leaders, and supervisors.

<sup>6</sup> Master training

<sup>7</sup> Training of Trainers

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
					Year 1(2018)		Year 2(2019)		Year 3 (2020)		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.2.4	Total number of people hired to support VC in target areas.		Project Records Annually	VC Intervention Sex Job Function	3,764	3,764 M:2995 F:769	3,104	2,429 M:1,946; F: 483	3,217	3,211 M: 2,664 F: 547				
						-District or site Coordinators: 23 -Supervisors (Community): 157 -TLs:317 -SOP:1583 Mobilizers:110 8 TLs Mobilizers:91 Data Clerks:52 -Pump Technicians:15 7 -Washers:157 - Storekeepers:4 0 - Guards:45 -Assistants:34								
1.2.5	Number of VC project training workshops targeting NMCP and other host country staff		Project Training Records Annually	Country Technical Area Job Function	N/A	N/A	N/A	N/A	5	7				

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
					Year 1(2018)		Year 2(2019)		Year 3 (2020)		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.2.6	Number of NMCP and other vector control host country staff who have logged into VectorLink Collect		DHIS2 Logs Annually	Country  Job Function	N/A	N/A	N/A	N/A	5	36				
										NMCP Coordination- Staff: 2  NMCP-SLAVI- Staff: 2  NMCP M&E Staff: 3  NMCP Logistics Staff: 2  NMCP-Social Mobilization Staff: 2  NMCP EC Staff: 1  DDS Alibori Staff: 7 DDS Donga Staff: 8  CREC staff : 3  DDS Atacora staff : 2				
1.2.7	Number and percentage of technical assistance requests to support ITN distribution planning and/or implementation completed on time as planned in a given project year	X	Project Records Annually	Country Technical Area Channel	N/A	N/A	N/A	N/A	N/A	N/A				

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
					Year 1(2018)		Year 2(2019)		Year 3 (2020)		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.2.8	Number and percentage of technical assistance requests to support operational routine monitoring systems for continuous ITN distribution completed on time as planned in a given project year	X	Project Records Annually	Country Channel	N/A	N/A	N/A	N/A	N/A	N/A				
<b>1.3</b>			<b>Environmental Compliance and Safety</b>											
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	Country Sex (# and %) Job Function	2,537	2,986 M: 2450 F: 536	3,386	2,491 M: 2,020 F: 471	3,355	2,494 M: 2,079; 834% F: 415; 16.4%				
					Government staff: 24 District or site Coordinators: 22 Supervisors (Community): 172 TLs: 327 SOP: 1,664 Mobilizers: 92 Mobilizer TLs: 92 Pump Technicians:175 Washers:162 Storekeepers: 42 Guards: 39 Assistants: 25 drivers: 242		Government staff: 14 District or site Coordinators: 20 Supervisors (Community): 89 Teams Ls:256 SOP: 1,278 Mobilizers: 413 Pump Technicians:65 Washers: 132 Storekeepers: 29 Guards: 36 Assistants: 20 Drivers: 139		Government staff: 17 District or site Coordinators: 25 Supervisors (Community): 159 Teams Ls: 310 SOP: 1,634 Washers: 156 Assistants: 16 Drivers: 177 Pump technicians : 145; Storekeepers:36; Guards:39; Mobilizers: 741					
1.3.2	Number of health workers receiving insecticide poisoning case management training		Project Training Records Annually	Country Sex (# and %)	93	101 M:64 F:36	78	86 M:55 F:31	84	68 M: 45; 66.2% F:23; 33.8%				

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
					Year 1(2018)		Year 2(2019)		Year 3 (2020)		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.3.3	Number of adverse reactions to pesticide exposure documented that resulted in a referral for medical care		Incident Report Forms Annually	Country  Type of Exposure	0	0	0	0	0	0				
1.3.4	Number of SEAs and Letter Reports submitted at least 60 days prior to the commencement of VC campaigns		Project Records Annually	Country	N/A	N/A	N/A	N/A	1; 100%	1; 100%				
1.3.5	Number and percentage of permanent and mobile soak pits inspected and approved prior to IRS campaigns or before first use		Project Records - PSECAs Annually	By Spray campaign  Type Soak Pit	39; 100%	38; 100%	46; 100%	35; 100%	42; 100%	42; 100%				
1.3.6	Number and percentage of storehouses inspected and approved prior to IRS campaigns		Project Records - PSECAs Annually	Country  Storehouse Type	22; 100%	23; 100%	23; 100%	20; 100%	25; 100%	21; 100%				
<b>1.4</b>	<b>Promote Gender Equality in all Facets of Planning and Implementation</b>													
1.4.1	Number and percentage of women hired to support VC campaigns		Project Records Annually	By spray campaign	1,317; 35%	769; 20.4%	1,242; 40%	483; 19.9%	786; 25%	547; 17.0%				
1.4.2	Number and percentage of women hired in supervisory roles in target areas for VC activities		Project Records Annually	By spray campaign  VC Intervention  Job Function	253; 100%	132; 21.7%	2,137; 50%	83; 17%	118; 25%	83; 17.8%				
					District coordinators: 4 Community Supervisors: 28 IEC TLs: 60 IEC Mobilizers TLs: 34 Assistants: 6		District coordinators: 1 Community Supervisors: 18 IEC TLs: 43 IEC mobilizers TLs: 16 Assistants: 5		District coordinators: 4 Community Supervisors: 23 IEC TLs: 50 IEC Assistants: 5 Secondary warehouse manager: 1					

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
					Year 1(2018)		Year 2(2019)		Year 3 (2020)		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.4.3	Number and percentage of trainees (permanent and seasonal) who have completed gender awareness training		Project Records Annually	By spray campaign Sex (# and %) Job Function	4,181; 100%	2,547; 100% M: 2,173; 85.3% F: 374; 14.7% Permanent: 1 Seasonal: 2,547		2,141; 85% M: 1,728; 0.7% F: 413; 19.3% Permanent: 1 Seasonal: 2,140	3,385; 100%	3,547; 100% M: 2,962; 83.5% F: 585; 16.5% Permanent: 2 Seasonal: 3,547				
1.4.4	Number and percentage of women in senior leadership roles in VectorLink country offices	X	Project Records Annually	Country Sex (# and %)	N/A	N/A	N/A	N/A	N/A	N/A				
<b>1.5</b>	<b>Implement and Support SBCC and Mobilization Activities</b>													
1.5.1	Number of radio spots and talk shows aired		Project Records Annually	Country VC Intervention	8,217	5,760	2,880	2,378	2,880	2,973				
						IRS	IRS	IRS	IRS	IRS				
1.5.2	Number of print materials distributed to or targeted at beneficiaries		Project Records Annually	Country VC Intervention	265,136	255,681 Leaflets: 100,737 IRS cards: 154,944	132,634	105,074 IRS cards: 105,074	150,000	140,838 IRS cards: 140,838				
						IRS	IRS	IRS	IRS	IRS				
1.5.3	Number of people reached with vector control and/or SBCC messages via door-to-door messaging		Project Records Annually	Country VC Intervention Sex	671,631	682,536 IRS M: 326,186 F: 356,350	610,529 IRS	N/A <sup>8</sup>	N/A	N/A				
<b>2. Entomological and Epidemiological Data to Drive Decision-Making</b>														
2.1	<b>Vector Control Activities Monitored via Entomological and Epidemiological Data</b>													

<sup>8</sup> The mobilization strategy was changed after the 2019 targets were set. The new strategy does not include traditional door-to-door mobilization

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
					Year 1(2018)		Year 2(2019)		Year 3 (2020)		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
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	Country VC Intervention	N/A	N/A	N/A	N/A	N/A	N/A				
2.1.2	Number and percentage of vector bionomics monitoring sites measuring all basic entomological indicators (species composition, indoor and outdoor human biting rates, hourly human biting rates, indoor resting densities)		Entomological Reports Annually	Country VC Intervention	N/A	N/A	N/A	N/A	N/A	N/A				
2.1.3	Number and percentage of vector bionomics monitoring sites measuring the following all advanced entomological indicators: sporozoite rates and entomological inoculation rates		Entomological Reports Annually	Country IRS or Entomology Only Program	N/A	N/A	N/A	N/A	N/A	N/A				
2.1.4	Number and percentage of insecticide resistance monitoring sites that tested all priority insecticides for the relevant local vector control intervention		Entomological Reports Annually	Country VC Intervention	N/A	N/A	N/A	N/A	N/A	N/A				
2.1.5	Number and percentage of houses in which WHO cone bioassays were conducted within two weeks of spraying with greater than 98% test mortality recorded for IRS countries		Entomological Reports Annually	Country Insecticide Type	N/A	N/A	N/A	N/A	N/A	N/A				

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
					Year 1(2018)		Year 2(2019)		Year 3 (2020)		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
2.1.6	Number and percentage of sites that conducted WHO cone bioassays after the completion of spraying at monthly intervals until test mortality drops below 80% for two consecutive months for IRS countries		Entomological Reports Annually	Country  Insecticide Type	N/A	N/A	N/A	N/A	N/A	N/A				
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	N/A	N/A	N/A	N/A	N/A	N/A				
2.1.8	Number of people trained (VectorLink and non VectorLink staff) in entomological monitoring		Project Records Annually	Country  Sex (# and %)	N/A	N/A	N/A	N/A	N/A	N/A				
2.1.9	Number and percentage of sites in which WHO cone bioassays were conducted to evaluate bio-efficacy of bed nets		Entomological Records Annually	Country	N/A	N/A	N/A	N/A	N/A	N/A				
2.1.10	Number of nets in which WHO cone bioassays were conducted to evaluate bio-efficacy of bed nets		Entomological Records Annually	Country	N/A	N/A	N/A	N/A	N/A	N/A				
<b>2.2</b>	<b>NMCPs Develop Country-Level IRS and Other Malaria VC Strategies</b>													
2.2.1	Number and percentage of countries with an integrated malaria vector control strategy, including a plan for monitoring and managing insecticide resistance supported by the project	X	Project Records Annually	Country	N/A	N/A	N/A	N/A	N/A	N/A				

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
					Year 1(2018)		Year 2(2019)		Year 3 (2020)		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
2.2.2	Number and percentage of countries with a data and visualization dashboard complete for IRS and/or entomology data in VectorLink Collect for vector control decision making	X	Project Records Annually	Country	N/A	N/A	N/A	N/A	N/A	N/A				
2.2.3	Number of countries that implement sub-national insecticide rotation	X	Project Records Annually	Country	N/A	N/A	N/A	N/A	N/A	N/A				
<b>2.3</b>	<b>Build capacity of NMCPs and local institutions to collect, analyze, and use data for strategic malaria control decision-making</b>													
2.3.1	Number of individuals trained from NMCPs and national institutions to review and interpret data for integrated vector control decision making		Project Training Records Annually	Country Job Function Organization	N/A	N/A	N/A	N/A	5	36				
2.3.2	Number and percent of targeted individuals that report using new analytical tools and/or skills in their planning, resourcing, implementation, or measurement activities		Capacity Assessments Thrice Over Project Life	Country Job Function Organization	N/A	N/A	N/A	N/A	5; 100%	36;				
<b>3. Procurement and Logistics</b>														
<b>3.1</b>	<b>Cost-Effective Procurement Mechanism Established</b>													
3.1.1	Number and percentage of insecticide procurements that had a pre-shipment QA/QC test, done by a third party, at least 60 days prior to spray campaign	X	Procurement Records Annually	Country Insecticide Type	N/A	N/A	N/A	N/A	N/A	N/A				
3.1.2	Number and percentage of insecticide procurements received on-time to allow for the initiation of spray operations as scheduled		Procurement Records Annually	Country Insecticide Type	1; 100%	1; 100%	1; 100%	1; 100%	1; 100%	2; 100%				
					Actellic 300CS	Actellic 300CS	Actellic 300CS	Actellic 300CS	Fludora Fusion	Fludora Fusion:1 Actellic 300CS:1				

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
					Year 1(2018)		Year 2(2019)		Year 3 (2020)		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
3.1.3	Number and percentage 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	N/A	N/A	N/A	N/A	N/A	N/A				
3.1.4	Number of VectorLink staff trained on procurement	X	Project Records Annually	Country	N/A	N/A	N/A	N/A	N/A	N/A				
<b>3.2</b>	<b>Robust Inventory Management and Logistics Systems Established</b>													
3.2.1	Number and percentage of logistics and warehouse personnel (seasonal and full-time) trained in VC supply chain management		Project Training Records Annually	Country VC Intervention Sex Job Function	45;100% IRS M: 34 F: 12 Seasonal: 46 Full-time: 0	46; 100% IRS M: 25 F: 7 Seasonal: 32 Full-time: 0	28; 100% IRS M: 29 F: 11 Seasonal: 40 Full-time: 0	32; 100% IRS M: 29 F: 11 Seasonal: 40 Full-time: 0	37; 100% IRS M: 29 F: 11 Seasonal: 40 Full-time: 0	40; 100% IRS M: 29 F: 11 Seasonal: 40 Full-time: 0				
3.2.2	Number and percentage of operations site warehouses where physical inventories can be verified by daily stock records		Inventory and Stock Records Annually	Country	22; 100%	22; 100%	21; 100%	20; 100%	21; 100%	21; 100%				
3.2.3	Number and percentage of IRS countries that successfully completed spray operations without an insecticide stock-out	X	Inventory and Stock Records Annually	Country Insecticide Type	N/A	N/A	N/A	N/A	N/A	N/A				
<b>4. Innovation</b>														
<b>4.1</b>	<b>Conduct operational research or monitoring to scale up new tools, methods, and approaches</b>													
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	Country Type of Innovation	N/A	N/A	N/A	N/A	N/A	N/A				
<b>4.2</b>	<b>Create and share knowledge through dissemination of best practices and lessons learned</b>													

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
					Year 1(2018)		Year 2(2019)		Year 3 (2020)		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
4.2.1	Number of innovations, best practices, and other data or lessons learned shared with other partners or international institutions for global reporting on the Vector Learning Exchange	X	Project Records Annually	Country Technical Area	N/A	N/A	N/A	N/A	N/A	N/A				
4.2.2	Number of individual members who use the Vector Learning Exchange	X	Project Records Annually	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
4.2.3	Number of symposia and/or presentations submitted to and accepted at global conferences		Project Records Annually	Country Technical Area	N/A	N/A	N/A	N/A	N/A	N/A				
4.2.4	Number of success stories written or videos produced and shared on the VectorLink project website		Project Records Annually	Country	1	0	2	1	1	7				
4.2.5	Number of peer-reviewed journal articles submitted and accepted	X	Project Records Annually	Technical Area	N/A	N/A	N/A	N/A	N/A	N/A				
4.2.6	Number of contributions to vector control global or country policy and/or guidance documents		Project Records Annually	Country Technical Area	N/A	N/A	N/A	N/A	N/A	N/A				
<b>4.3</b>	<b>Develop and deploy cost-savings approaches</b>													
4.3.1	Number of innovative or novel approaches implemented to achieve cost savings in IRS and integrated malaria vector control programs		Project Records Annually	Country VC Intervention	1	0	1	0	3	2				
4.3.2	Number of cost effectiveness assessments of existing approaches in the implementation of IRS and integrated malaria vector control programs		Project Records Annually	Country VC Intervention	1	0	1	0	1	2				
<b>4.4</b>	<b>Cultivate public-private partnerships</b>													

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
					Year 1(2018)		Year 2(2019)		Year 3 (2020)		Year 4		Year 5	
					Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
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	Country	0	0	0	0	0	0				

<sup>1</sup> Target based on 85% of estimated eligible structures in indicator 1.1.2

# ANNEX B: ENVIRONMENTAL MITIGATION AND MONITORING REPORT

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List each Mitigation Measure from Column 3 in the EMMP	Status of Mitigation Measures	List Any 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 <ul style="list-style-type: none"> <li>• 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.</li> <li>• Implement SOPs for the safe storage, transport, and use of equipment, chemical reagents, insecticides, and supplies in conformance with international best practices (e.g., WHO, FAO) and host country requirements. Provide training to workers on the approved SOPs or Waste Management Plan (WMP) developed for properly handling and disposing of wastes.</li> </ul>	Entomology activities are entrusted to the CREC-Entomology Research Center of Cotonou (Center complying with international guidelines) through their direct funding mechanism with PMI.	N/A	N/A
3. Public Health Commodities	N/A	N/A	N/A
4. Small-Scale Construction <ul style="list-style-type: none"> <li>• Obtain all needed authorizations prior to construction: permits, environmental and social impact assessments, etc.</li> <li>• Retain competent, licensed professionals to design and supervise construction</li> <li>• Establish health, safety and environmental obligations in all contracts.</li> <li>• Complete a site emergency action plan</li> </ul>	N/A	N/A	N/A

List each Mitigation Measure from Column 3 in the EMMP	Status of Mitigation Measures	List Any Outstanding Issues Relating to Required Conditions	Remarks
<ul style="list-style-type: none"> <li>• Provide safety training to all workers using construction equipment</li> <li>• Identify closest health care facility to handle injuries</li> <li>• Asbestos, lead based paints and other toxic materials will not be used under any circumstances. If the presence of asbestos is suspected in a facility to be renovated, the facility must be tested before rehabilitation works begins. Should asbestos be present, then the work must be carried out in conformity with host country requirements and with guidance to be provided by the Implementing Partner. All results of the testing for asbestos shall be communicated to the COR</li>   <li>• Develop and follow a waste management plan (WMP). Identify authorized recycling or disposal facilities prior to generation of waste.</li>   <li>• Minimize the generation of waste by: <ul style="list-style-type: none"> <li>- Correctly assessing material needs (not over-buying)</li> <li>- Reducing amount of packaging used by suppliers</li> <li>- Reusing material on site, such as use of discarded materials for leveling ground and filling trenches, etc.</li> </ul> </li> <li>• Designate secure on-site waste storage facilities</li> <li>• Ensure all workers are trained and dispose of wastes properly.</li> <li>• Complete and track hazardous waste manifests for all shipments</li> <li>• Source all construction material from an ecologically safe provider.</li> <li>• Contractor must provide and all workers must use personal protective equipment (PPE) such as</li> </ul>			

List each Mitigation Measure from Column 3 in the EMMP	Status of Mitigation Measures	List Any Outstanding Issues Relating to Required Conditions	Remarks
<p>hardhats, footwear, dust mask, safety glasses and reflective vests, as needed.</p> <ul style="list-style-type: none"> <li>• Ensure first aid and spill clean-up kits are easily available</li> <li>• Contractors must comply with the “Small-Scale Construction” chapter of the USAID Sector Environmental Guidelines (<a href="http://www.usaidgems.org/sectorGuidelines.htm">www.usaidgems.org/sectorGuidelines.htm</a>).</li> <li>• Contractor will provide drinking water, latrine and a handwashing station to workers.</li> <li>• Contractors will arrange working hours to minimize disruption to the community.</li> <li>• If needed, construct drainage canals and infiltration pits for management of storm water and prevention of soil erosion.</li> <li>• Post-construction: ensure leftover materials have been properly disposed of.</li> </ul>			
5. Small-Scale Water and Sanitation	N/A	N/A	N/A
6. Nutrition	N/A	N/A	N/A
<p>7. Vector Control</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• Procurement and inventory logs must be maintained.</li> <li>• Ensure storage facility and personal protective equipment (PPE) are appropriate for the active ingredient used and in accordance with approved SOPs.</li> <li>• Distribute insecticides to facilities that can</li> </ul>	<ul style="list-style-type: none"> <li>• In addition to the organophosphate, PMI VectorLink Benin, during the 2020 spray campaign, used a new class of insecticide: Neonicotinoid. A new SEA was validated by USAID in 2020.</li> <li>• Procurement and inventory logs are regularly updated.</li> <li>• 19 storage facilities were refurbished and inspected by the ECO to ensure environmental compliance prior to the start of IRS operations. Appropriate PPE was provided to all staff involved in IRS operations.</li> <li>• All sites were inspected to ensure proper</li> </ul>		<ul style="list-style-type: none"> <li>• Pirimiphos Methyl 300 CS has been used in Koaunde (Birni) and Fludora Fusion in all other communes.</li> </ul>

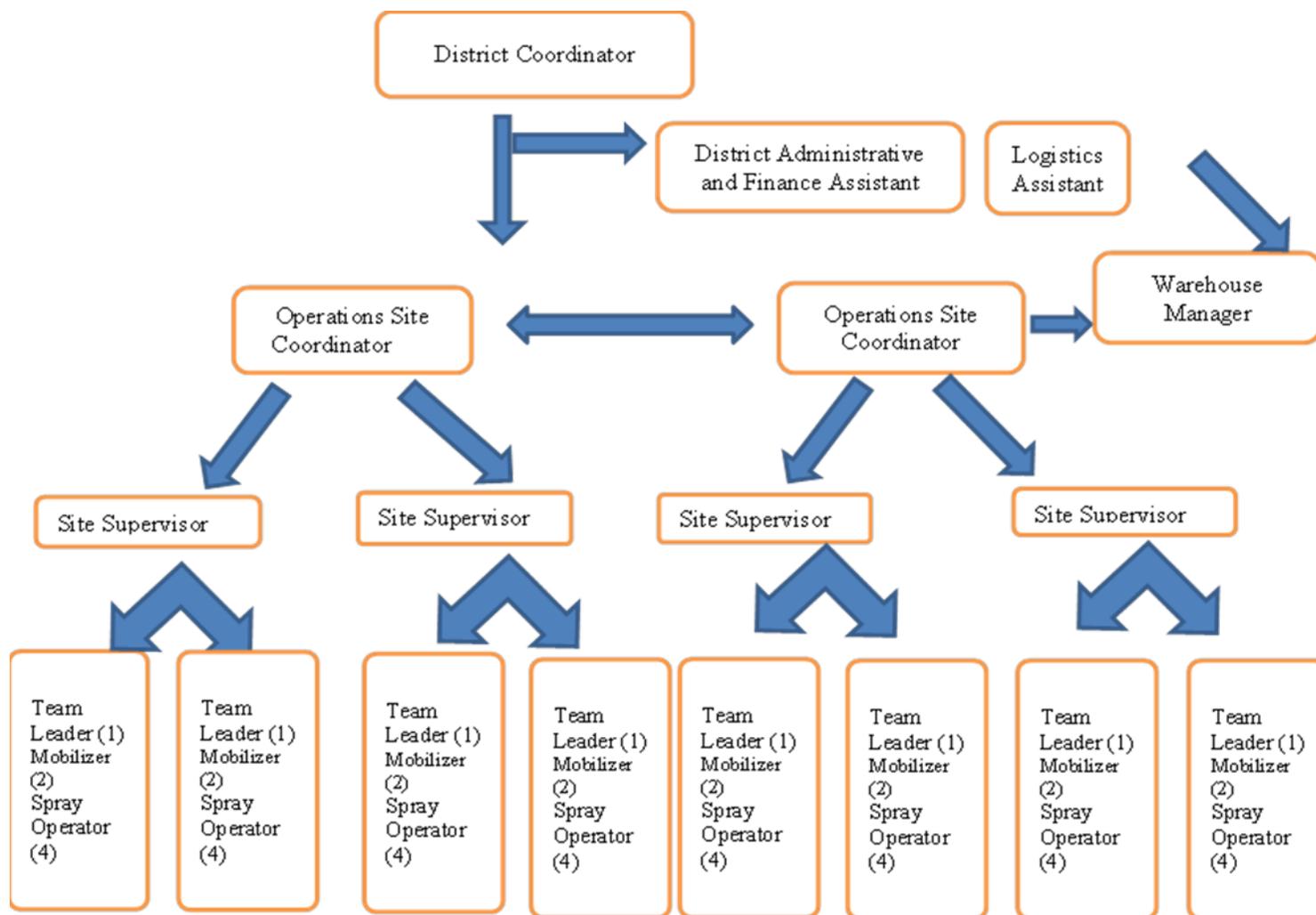
List each Mitigation Measure from Column 3 in the EMMP	Status of Mitigation Measures	List Any Outstanding Issues Relating to Required Conditions	Remarks
<p>manage such commodities safely in storage, use, and disposal (i.e. in a manner generally equivalent to Implementing Partner's own SOPs/WMP)</p> <ul style="list-style-type: none"> <li>• Inspect and certify vehicles used for insecticide or team transport prior to contract.</li> <li>• Train drivers</li> <li>• Ensure availability of cell phone, personal protective equipment (PPE) and spill kits during insecticide transportation.</li> <li>• Initial and 30-day pregnancy testing for female candidates for jobs with potential insecticide contact.</li> <li>• Health test all spray team members for duty fitness.</li> <li>• Procure, distribute, and train all workers with potential insecticide contact on the use of PPE.</li> <li>• Train operators on mixing insecticides and the proper use and maintenance of application equipment.</li> </ul>	<p>management of insecticide storage, use, and disposal.</p> <ul style="list-style-type: none"> <li>• 177 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.</li> <li>• Driver training was conducted on April 12, 2020. About 177 drivers were trained for the 2020 spray campaign.</li> <li>• Pre-contract inspection and certification of vehicles was conducted on April 12, 2020. All drivers had cell phones as a pre-requisite for hiring and were provided with PPE and spill kits after being trained. PMI VectorLink Benin conducted supervisions for the morning mobilization vehicle inspection.</li> <li>• Initial pregnancy tests were conducted before hiring Spray Operators, Washers and Store Assistants from March 23 to March 27, 2020</li> <li>• Second pregnancy tests were conducted for storekeeper by from April 20 to April 23, 2020</li> <li>• Medical examinations were conducted from March 23 to March 27, 2020</li> <li>• Both International and local procurement were carried out successfully prior to all trainings.</li> <li>• The correct insecticide mixing procedure was included in all trainings. Particular emphasis was placed on triple rinsing for operators who used the Actellic bottles. Pump technicians have been trained for maintenance of spray pumps.</li> </ul>		

List each Mitigation Measure from Column 3 in the EMMP	Status of Mitigation Measures	List Any Outstanding Issues Relating to Required Conditions	Remarks
<ul style="list-style-type: none"> <li>• Provide adequate facilities and supplies for end-of-day cleanup.</li> <li>• Enforce application and clean-up procedures.</li> <li>• 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</li> <li>• Ensure health facility staff are aware of insecticide poisoning management</li> <li>• Storage facilities and transportation vehicles must be physically secured to prevent theft.</li> <li>• Maintain records of all insecticide receipts, issuance, and return of empty containers.</li> <li>• Conduct analysis comparing number of houses treated vs. number of containers used.</li> <li>• Examine houses treated to confirm application</li> <li>• Perform physical inventory counts during the application season.</li> <li>• 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</li> </ul>	<ul style="list-style-type: none"> <li>• Adequate facilities and supplies were acquired for end-of-day cleaning.</li> <li>• Clean-up procedures were enforced</li> <li>• 741 mobilizing agents made the community aware of the behaviors to adopt before, during and after the spraying of structures with the support of town criers, village chiefs, post chiefs and other leaders. Seven community radios were also used for mobilization.</li> <li>• 68 health workers were trained on intoxication cases, from April 27, 2020 in Alibori and April 31 in Donga.</li> <li>• 19 stores had double locks as a way to reinforce security measures.</li> <li>• Storekeeper performance forms are regularly completed to ensure the insecticide stock records are up to date and to assess the movement of insecticides.</li> <li>• A total of 348,637 houses were treated with 58,255 sachets of insecticide: one sachet of Fludora Fusion treated on average 5.9 structures, and 5.7 structures were treated with one bottle of Actellic 300 CS</li> <li>• Direct Observation Spraying was conducted by supervisors to assess the quality of spray techniques.</li> <li>• Storekeepers and supervisors were trained to</li> </ul>		<ul style="list-style-type: none"> <li>• A special song designed for IRS was shared with beneficiaries through social networks. 2,973 disseminating short radio spot messages.</li> </ul>

List each Mitigation Measure from Column 3 in the EMMP	Status of Mitigation Measures	List Any Outstanding Issues Relating to Required Conditions	Remarks
<p>of hazard posed by the contents, and the personal protective equipment to be worn when handling the barrel.</p> <ul style="list-style-type: none"> <li>• Train applicators on the SEA operational requirements, SOPs, PMI BMPs, and approved WMP, developed for the safe and effective storage, distribution, application, and disposal of insecticides</li> <li>• Ensure application equipment and PPE are appropriate for the active ingredient used and in accordance with approved SOPs, and maintain equipment to avoid leaks.</li> <li>• Maintain application equipment.</li> <li>• No application of insecticides within 30 yards of beekeeping sites</li> <li>• Handling, treatment, and disposal of nonhazardous (general waste) and hazardous wastes must be in accordance with the approved WMP/SOPs and the PMI BMPs.</li> <li>• The WMP, which outlines SOPs for managing waste processes, must be in accordance with PMI best practices and host country requirements</li> <li>• Choose sites for disposal of liquid wastes, including fixed and mobile soak pit sites according to PMI BMPs</li> <li>• Construct fixed and mobile soak pits with charcoal according to the BMPs to adsorb insecticide from rinse water</li> </ul>	<p>perform physical inventory counts during the campaign. 110 storekeeper’s performance forms were completed.</p> <ul style="list-style-type: none"> <li>• PMI VectorLink Benin did not transport insecticide over water during the course of the campaign for IRS.</li> <li>• 1,634 SOPs were trained on BMP guidelines and Benin environmental compliance’s laws which included SOPs and the waste management plan.</li> <li>• SOPs and other seasonal workers wore the appropriate PPE suited for use of Organophosphates and Neonicotinoid during spraying and clean-up in accordance with approved standard operating procedures.</li> <li>• All pumps were packed and stored at the end of each day of spraying according to the standard operating procedures for pump maintenance.</li> <li>• Beekeeping sites and other protected areas were not sprayed.</li> <li>• The project has a contract with non-governmental organizations specialized in the management of wastes generated during IRS operations (empty boxes, and empty bottles of insecticides, used masks and gloves, etc.).</li> <li>• Benin waste management plan has met all requirements of the country and the USAID 22 CFR regulation.</li> <li>• All soak pits were constructed in compliance with standards requirements for proper disposal of liquid waste during the campaign.</li> </ul>		

List each Mitigation Measure from Column 3 in the EMMP	Status of Mitigation Measures	List Any Outstanding Issues Relating to Required Conditions	Remarks
<ul style="list-style-type: none"> <li>• Maintain soak pits as necessary during season</li> <li>• Monitor waste storage and management during campaign</li> <li>• Monitor disposal procedures post-campaign</li> <li>• Wastes will only be disposed in incinerators that comply with PMI BMPs Collect and maintain treatment and disposal documents and records on file</li> <li>• Country-level USAID EC documentation must contain guidance on proper disposal of wastes</li> </ul>	<ul style="list-style-type: none"> <li>• All fixed and mobile soak pits contained charcoal according to BMPs to adsorb the insecticide from rinsing water.</li> <li>• Soak pits were maintained as necessary. Weeds were removed near the rinsing areas.</li> <li>• Waste management was monitored during the campaign</li> <li>• Waste disposal procedure was monitored after the campaign</li> <li>• Ordre de Malte hospital incinerator will be used. Incineration certificate is available.</li> <li>• Country-level USAID EC documentation contains guidance on proper disposal of wastes</li> </ul>		
8. Emergency Response	N/A	N/A	N/A

# ANNEX C: SPRAY TEAM ORGANIGRAM



# ANNEX D: COVID-19 MITIGATION MEASURES DURING THE 2020 IRS CAMPAIGN IN BENIN

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During the 2020 IRS campaign implementation, the following measures were put in place to secure the intervention from COVID-19.

Activities	Security measures taken	Responsible Parties
Trainings	<ul style="list-style-type: none"> <li>• Adopt a work system in shifts. Form small groups and develop the schedule accordingly.</li> <li>• Masks must be worn during the entire period of presence at the operational site.</li> <li>• Mandatory hand washing with soap before entering the site.</li> <li>• 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.</li> <li>• Restrict access to training sites according to the schedule.</li> <li>• Include in the training program a session on information regarding COVID-19: Infectious agent, means of transmission, symptoms, prevention measures and case management.</li> <li>• Avoid crowds outside training locations.</li> <li>• Training materials / tools and furniture should be wiped or washed thoroughly at the end of each day.</li> </ul>	Trainers, supervisors, team leaders
Morning mobilization	<ul style="list-style-type: none"> <li>• Staggered arrival: Avoid having groups of more than 10 people.               <ul style="list-style-type: none"> <li>- For sites with sufficient space, design a schedule that ensures adequate separation between groups of 10.</li> <li>- Install handwashing devices at the entrance of operational sites.</li> </ul> </li> <li>• Masks to be worn during the entire period of presence on the site.</li> <li>• Repeat messages on the transmission of COVID-19 daily</li> <li>• Avoid gatherings inside and outside of the operational site.</li> <li>• Keep spray teams physically separated.</li> <li>• Add COVID-19 symptoms to the team leader's checklist.</li> <li>• Restrict access to operational sites in accordance with the schedule.</li> <li>• Have storekeepers and team leaders wear gloves to facilitate record keeping.</li> <li>• Avoid crowds around the storekeeper.</li> <li>• Lead morning gatherings by spray team (8-10 people).</li> </ul>	Site coordinators, supervisors, team leaders

Activities	Security measures taken	Responsible Parties
	<ul style="list-style-type: none"> <li>Everyone uses their own pen to sign documents / tools.</li> <li>Respect the distance of two meters between individuals.</li> </ul>	
Moving from the operational site to the field (and back)	<ul style="list-style-type: none"> <li>All vehicle drivers must follow the same rules as other seasonal workers.</li> <li>Masks to be worn at all times by all vehicle occupants.</li> <li>Specify the maximum number of occupants for each type of vehicle.</li> <li>Vehicles to transport small groups and make several trips as much as possible to avoid crowding.</li> <li>Wash vehicles and wipe seats with chlorine disinfectants at the end of each day.</li> </ul>	Supervisors, team leaders
Behavior in community and households	<ul style="list-style-type: none"> <li>Keep a distance of two meters between people. Avoid physical contact.</li> <li>Wear mask at all times.</li> <li>Clean gloves with wet wipes before and after helping with home preparation.</li> <li>Keep gloves when handling household personal belongings.</li> <li>Spray operators and team leaders should carry wet wipes in backpacks.</li> <li>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.</li> </ul>	Supervisors, team leaders
End of day clean up	<ul style="list-style-type: none"> <li>Defer Arrivals. Avoid having groups of more than two teams (<math>\pm 10</math> people).</li> <li>For sites with sufficient space, design a schedule that ensures adequate separation between groups of 10.</li> <li>Mask to be worn during the entire period of presence on the site.</li> <li>Avoid gatherings / gatherings outside the operation site.</li> <li>Keep spray teams physically separated. Respect the guideline of two-meter distance.</li> <li>Restrict access to operating sites according to schedules.</li> <li>Hand washing compulsory with soap after leaving the rinsing area.</li> <li>Avoid congestion around the storekeeper.</li> </ul>	Site coordinators, supervisors, team leaders
M&E	<ul style="list-style-type: none"> <li>Install handwashing devices in data entry centers; masks to be worn during the entire period of presence at the data entry center.</li> <li>Maintain a separation of two meters between data entry clerks.</li> <li>Data entry centers should be limited to a maximum of 10 people working at the same time.</li> <li>Disinfection of laptops and workstations between work sessions.</li> <li>Supervisors must wear gloves and masks when transporting data from sites</li> </ul>	Site Supervisor
Community mobilization	<ul style="list-style-type: none"> <li>Avoid direct physical contact between people. No handshake or other greeting involving physical contact</li> <li>Avoid groups of more than 10.</li> <li>Masks to be worn when interacting with community members and spray teams.</li> <li>When possible, use mass media and other channels that do not require close contact with people.</li> </ul>	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, CDC and WHO	➤ Close contact with people who are already sick
➤ Fever		➤ Panicking. Get the facts and follow the advice of government sources and health care professionals
➤ General malaise		➤ Go to work when you are sick