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THE PMI VECTORLINK CÔTE D'IVOIRE 2020 END-OF-SPRAY REPORT

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ACRONYMS

BMP	Best Management Practices
COVID-19	Coronavirus Disease 2019
DOS	Directly Observed Spraying
ECO	Environmental Compliance Officer
EHS	Environmental, Health, and Safety
IEC	Information, Education, and Communication
INHP	National Hygiene Public Institute (*Institut National Hygiène Publique*)
IRS	Indoor Residual Spraying
M&E	Monitoring and Evaluation
MOH	Ministry of Health
NMCP	National Malaria Control Program
ODK	Open Data Kit
PMI	President's Malaria Initiative
PMT	Performance Monitoring Tracker
PPE	Personal Protective Equipment
PSECA	Pre-Season Environmental Compliance Assessment
SBC	Social Behavior Change
SEA	Supplemental Environmental Assessment
SOP	Spray Operator
SOP	Standard Operating Procedure
TOT	Training of Trainers
USAID	United States Agency for International Development
VCSC	Vector Control Steering Committee
WHO	World Health Organization
WMP	Waste Management Plan

EXECUTIVE SUMMARY

The US President's Malaria Initiative (PMI) VectorLink Côte d'Ivoire project worked closely with the National Malaria Control Program to implement the country's first large-scale indoor residual spraying (IRS) campaign in two districts, Nassian and Sakassou, in 2020. A total of 56,601 structures were targeted to be sprayed, protecting approximately 200,168 people including 3,193 pregnant women and 28,523 children under 5 years.

In preparation for the campaign, the VectorLink Côte d'Ivoire team established 19 operations sites, delivered an IRS Boot Camp to national- and district-level health and environmental officials, developed relationships with local authorities, and created a robust monitoring and evaluation system. Spraying was conducted over 30 operational days between August 10 and September 12, 2020, in both districts. The project ultimately sprayed 53,949 structures (out of the 58,682 eligible structures found) using SumiShield® 50WG (clothianidin) in Nassian and Fludora® Fusion (clothianidin and deltamethrin) in Sakassou. Key results are summarized in Table ES-1.

TABLE ES-1: VECTORLINK CÔTE D'IVOIRE 2020 IRS CAMPAIGN SUMMARY

	Sakassou	Nassian	Total
Insecticide used (sachet)	Fludora® Fusion: 13,584	SumiShield®: 8,231	21,815
Total targeted structures	32,796	23,805	56,601
Cumulative structures found by spray operators	33,808	24,887	58,695
Cumulative structures sprayed	30,467	23,495	53,962
Population in sprayed structures	120,838 Female (60,252) Male (60,586)	73,097 Female (37,003) Male (36,094)	193,935 Female (97,255) Male (96,680)
Population of pregnant women in sprayed structures	2,600	1,749	4,349
Population of children under five in sprayed structures	17,509	12,544	30,053
Spray progress (%) based on targeted structures	92.9	98.7	95.3
Spray coverage (%) (based on structures found by spray operators)	90.1	94.4	91.9
Total number of people trained to deliver IRS in targeted areas*	239 Female (22) Male (217)	114 Female (23) Male (91)	353 Female (45) Male (308)

*Number of people trained is based on the indicator 1.2.2 definition, which only includes spray operators, team leaders, and site managers.

Within the first two weeks of the campaign, the project conducted cone bioassays in three sites (one in Nassian and two in Sakassou) to assess the quality of the spray. Exposure to sprayed surfaces resulted in 100% mortality for both insecticides within the indicated holding period.

I. Country Background and Activity Summary

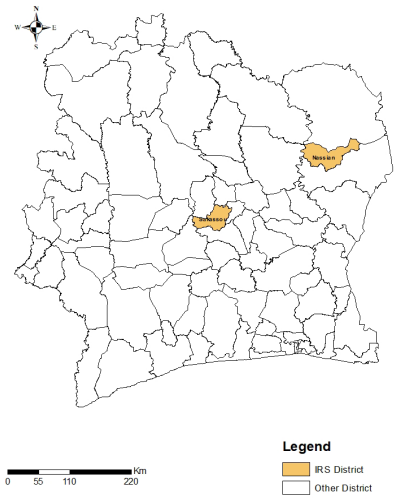
Malaria is a leading public health challenge in Côte d'Ivoire. It accounts for about 43% of outpatient visits in health facilities. Malaria incidence in 2017 was 134 cases per 1,000 in the general population, and 247 per 1,000 among children under 5 years (per the National Malaria Control Program (NMCP) 2018 annual report).

Until 2020, the main malaria vector control method used in Côte d'Ivoire was the distribution and use of standard pyrethroid insecticide-treated nets. Net distribution is typically carried out through mass campaigns for universal coverage, and through routine distribution during antenatal visits and immunization of children under 1 year. The 2016–2020 National Malaria Strategic Plan included indoor residual spraying (IRS) as an additional vector control method to reduce morbidity and mortality from malaria.

Under the leadership of the NMCP, VectorLink facilitated the creation of a Vector Control Steering Committee (VCSC) to facilitate government engagement in and commitment to IRS. The VCSC included technical experts such as members of the scientific advisory group (*groupe d'appui scientifique*) and insecticide resistance monitoring and management technical working group; the Ministry of Agriculture, Ministry of Environment, Ministry of Health (MOH); all private sector entities involved in vector control activities using insecticide; and district-level health authorities. The objective of the VCSC is to monitor and guide decision making regarding IRS implementation, ideally in coordination with broader vector control decision making. The project strengthened the capacity of the VCSC including providing district leadership and local partners with the knowledge, skills, and tools required to plan for, implement, supervise, and monitor high-quality IRS campaigns.

In 2020, VectorLink Côte d'Ivoire implemented the first-ever large-scale IRS campaign in the country. The NMCP, President's Malaria Initiative (PMI), and the National VCSC selected two health districts to receive IRS in 2020 (Nassian and Sakassou, shown in Figure 1) based on entomological and epidemiological data collected in 2018 and 2019 as well as a rapid feasibility study.

FIGURE 1: PMI VECTORLINK COTE D'IVOIRE 2020 IRS DISTRICTS



2. IMPLEMENTATION OF IRS ACTIVITIES

2.1 IRS PLANNING AND PARTNERS' COLLABORATION

The VectorLink Côte d'Ivoire project met regularly with staff members from PMI Côte d'Ivoire, the NMCP, and other stakeholder organizations to discuss 2020 IRS campaign planning and implementation. Before the National Planning Meeting (December 11-12, 2019), VectorLink facilitated a meeting (on October 15, 2019) with NMCP, PMI, VCSC, and other stakeholders to share enumeration results and IRS quantification updates including insecticides and equipment. The project hosted an IRS Boot Camp for Master Trainers in November 2019 to develop country capacity on IRS and obtain a critical mass of trainers at the national level. A total of 37 participants (16 staff from VectorLink and 21 from government), including 10 women, were trained to deliver the Training of Trainers (TOT). The project also facilitated a workshop with 21 participants from NMCP's Information, Education and Communication (IEC) unit, the Breakthrough Action project, and other stakeholders in December 2019 to develop the IRS IEC plan and tools. The project carried out full geographical reconnaissance and enumeration exercises in 2019 to quantify the insecticides, materials, and equipment needed for the 2020 campaign. Finally, in January 2020, the project facilitated a meeting with the VCSC to validate the IRS Operational Plan and timeline of activities.

The project, in collaboration with the NMCP and PMI Côte d'Ivoire, conducted advocacy visits in Sakassou (January 23-24, 2020) and in Nassian (February 8-9 2020) with the objective of meeting the regional- and district-level health directors and community leaders to discuss the importance of the communities' engagement and disseminate information about the benefits of IRS. The project trained and deployed one full-time district coordinator and seasonal logistics and finance assistants to each of the districts to provide full-time oversight of the planning process at the district level.

The project facilitated a microplanning workshop in Sakassou on February 5-6, 2020, and in Nassian on March 12-13, 2020, to develop and validate the spray calendar and communication plan with local stakeholders. The original start dates were planned for April 22, 2020, in Sakassou and June, 19 2020, in Nassian, but the campaign was postponed due to restrictions related to the coronavirus disease 2019 (COVID-19) pandemic. VectorLink Côte d'Ivoire, in collaboration with the NMCP, developed a plan of detailed mitigation measures that would ensure the safest possible conditions for all personnel, partners, and beneficiaries during training and implementation of spray activities. Based on World Health Organization (WHO)[1] and PMI/United States Agency for International Development (USAID) recommendations and epidemiological and entomological data, the NMCP, VCSC, and PMI ultimately decided to conduct the IRS campaign simultaneously in both districts from August 10 to September 12, 2020.

2.2 TRAINING

The Côte d'Ivoire team leveraged the VectorLink project's pre-existing IRS training modules tools (standard training curriculum, training job aids and participants' handbooks, etc.) and adapted them as needed to the Côte d'Ivoire context before sharing with local stakeholders. The project invited all of the national-level facilitators to orientation sessions in March 2020 before launching the district-level TOT.

[1] Tailoring malaria interventions in the COVID-19 Reponse, WHO, 9 April 2020

The TOT sessions were held, under the leadership of the NMCP, on July 13-18, 2020, in Nassian and on July 20-25, 2020, in Sakassou and involved 55 participants (including 5 women).

The key topics covered during the TOT were the following: IRS concepts and planning, environmental compliance and personal safety, monitoring and evaluation (M&E) of IRS, gender awareness including Abt policy on sexual harassment, social behavior change (SBC) concepts, communication and information transfer techniques, management of operations sites, insecticide and equipment handling, spray techniques and proper use of personal protective equipment (PPE), logistics, and warehouse management, as well as developing training and facilitation skills. Team leaders, supervisors, and SOPs were trained on the use of GPS-equipped smartphones for mobile IRS data collection (see section 5.1). Training sessions were conducted by VectorLink Côte d'Ivoire staff under the lead of the MOH, with staff from the NMCP, Regional Health Directorates, Districts Health Directorate, National Institute of Public Hygiene (INHP), and Ministry of Environment.

The SOP training took place at the district level under the supervision of VectorLink, NMCP, and INHP staff from August 2 to 7, 2020. Site managers and team leaders received one additional day of training on aspects of operations management such as the roles and responsibilities of actors, code of conduct, and the supervision approach in the field. The number of people trained for various components of IRS operations is shown in Table 1.

TABLE 1: NUMBER OF TRAINING SESSIONS AND PEOPLE TRAINED, DISAGGREGATED BY JOB TITLE AND GENDER

Category of Persons Trained	Boot Camp		TOT		SOP Training		M&E Assistant Training		Logistics Training		Washer Training		Transport Safety and Security Training		Finance Training		Pump Repair Training		IEC Training		Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
National supervisors	27	10																			37
District supervisors*			50	5																	55
SOPs (including 26 substitutes)					263	41															304
Team leaders					49	7															56
Site managers					19	0															19
Data cleaners							3	1													4
M&E assistants							9	12													21
Logistic assistants									1	1											2
Storekeepers									14	9											23
Washers											1	38									39
Drivers													127	0							127
Security guards													45	0							45
Finance assistants															0	2					2
Pump technicians																	19	0			19
Mobilizers																			289	87	376
Subtotal M/F	27	10	50	5	331	48	12	13	15	10	1	38	172	0	0	2	19	0	289	87	1129
Total	37		55		379		25		25		39		172		2		19		376		1129

Clinicians are included in district supervisors, and they have also been trained in poison management

2.3 SPRAY OPERATIONS & SUPERVISION

2.3.1 OPERATIONS SITES

PMI VectorLink Côte d'Ivoire conducted an environmental geographical reconnaissance in both spray districts to identify appropriate sites for storerooms, the safest method of transport and insecticide, and environmental measures required to protect communities during the spray campaign.

During the campaign, VectorLink Côte d'Ivoire worked in a total of 19 operations sites, 17 with fixed soak pits and two with mobile soak pits (Lambira and Kakpin). All 19 operations sites, including one office site (in Nassian), were provided to the project free of charge by the district health authorities.

VectorLink Côte d'Ivoire did an initial pre-season environmental compliance assessment two months before the spray campaign to evaluate the needs for site rehabilitation. The project rehabilitated 19 operations sites including stores, soak pits, and washing area. The project used 22 warehouses (19 site warehouses, 2 district warehouses, and 1 central warehouse). The project rented only the central warehouse, in Bouake, which also serves as the Sakassou district office. During the IRS campaign (August 10-September 12), the health districts provided free in charge to the project a temporary office so that project staff could closely manage the spray operations in collaboration with the district and local authorities.

2.3.2 HUMAN RESOURCES

VectorLink Côte d'Ivoire hired 882 spray actors, including 687 men and 195 women (Table 2). All recruitments were conducted through a formal advertisement and committee selection process in collaboration with local authorities.

TABLE 2: SEASONAL WORKERS HIRED FOR THE SPRAY DISTRICTS

Category	Number of Staff Hired to Support IRS						Total	Total (% Female)
	Spray Ops		Data Capture		Other			
	M	F	M	F	M	F		
Spray operators	240	38					278	38(14%)
Team Leaders	49	7					56	7(13%)
Site Managers	19	0					19	0(0)
Data Cleaners			3	1			4	1(25%)
M&E assistant			9	12			21	12(57%)
Ops Storekeepers					11	9	20	9(45%)
Washers					1	38	39	38(97%)
Pump Technicians					19	0	19	0(0%)
Districts Storekeepers					2	0	2	0(0%)
Central storekeeper					1	0	1	0(0%)
Ops Site Security guards					39	0	39	0(0%)
District Security guards					4	0	4	0(0%)
IEC Mobilizer					289	87	376	87(23%)
Logistic Assistant					1	1	2	1(50%)
Finance Assistant					0	2	2	2(100%)
Total M/F	308	45	12	13	367	137	882	195 (22%)
Total	353		25		504		882	

2.3.3 KEY OPERATIONAL DETAILS AND SUPERVISION

VectorLink Côte d'Ivoire implemented the 2020 IRS campaign during the COVID-19 pandemic with strong adherence to risk-mitigating measures recommended in the PMI and Government guidelines. The project thoroughly cleaned the 19 operations sites before the IRS campaign started. The project equipped all operations sites with handwashing facilities and contact-free thermometers, and enforced social distancing. Spray teams practiced frequent handwashing to limit the risk of disease transmission and insecticide contamination. The team leaders and supervisors conducted a daily physical health check of all SOPs. If an SOP didn't feel well, they immediately informed the district coordinator for a medical consultation and action.

The project arranged for breakfast to be served to all IRS personnel before starting the day's spray operations. Right after breakfast, the spray actors changed into their project-issued PPE and gathered their equipment (mobile phone, sprayer, insecticide, etc.) Before departure for the field, a daily morning mobilization meeting took place, where the spray teams were brought together, while respecting the necessary social distance amid the COVID-19 pandemic, for important information sharing related to performance, recommendations, and so forth. During the morning assemblies, site managers and field supervisors addressed SOPs and team leaders on lessons learned and expectations for the day. Team leaders conducted daily health checks for each SOP. After the SOPs retrieved the previous day's rinsate from the designated barrels, they departed to the communities. Site managers assigned spray teams to communities and allocated vehicles for transport.

On a typical spray day, field supervisors and team leaders supervised the distribution of SOPs to compounds designated for spraying. Team leaders conducted Directly Observed Spraying (DOS) while field supervisors observed homeowner preparation and SOP performance. SOPs recorded spray data using the Daily Spray Operator form. At the end of each day's activities, all field supervisors and site managers supervised end-of-day clean-up procedures. Field supervisors and team leaders observed end-of-day procedures at operations sites with a mobile soak pit. Team leaders also summarized all SOP data on the Team Leader Summary forms and submitted them to their field supervisor, who further verified the data and submitted the forms to the site managers. Site managers summarized the data to complete the Spray Performance Tracking Sheet, which was posted on a wall at each operations site.

To support supervision in the field, the national and regional partners (NMCP, INHP) used a weekly rotation system during the spray campaign while the VectorLink deployed one full-time technical staff to each of the 19 operations sites to conduct close supervision and take immediate corrective action as challenges arose. Over the 30 operations days, VectorLink Côte d'Ivoire held daily evening meetings under the leadership of district health authorities to discuss issues encountered including spray refusals, and spray calendar changes due to events. Regional health authorities and local administrative authorities were invited to participate in these meetings as needed. The VectorLink Chief of Party, NMCP Coordinator, and PMI local team had regular consultative meetings or phone calls during the campaign to update and share challenges for immediate action and support.

For data collection, a total of 345 smartphones were procured, 278 of which SOPs used do mobile data collection at the household level. Two were used as a gateway to the data center for the management of job aids SMS and PMTs. The 65 remaining phones were used by site managers for PMT reporting and supervisors including Vectorlink staff and NMCP for supervision.
At the end of each day, the SOPs handed their smartphones to their team leaders who verified the completed forms (for completeness and accuracy) and compiled the daily data before submitting them to the site coordinators. After data verification, team leaders proceeded with the synchronization process to the VectorLink Collect database server. Smartphones were also cleaned at the end of each day to minimize the risk of disease transmission during the COVID-19 pandemic. Table 3 shows the number of spray teams recruited during the 2020 IRS campaign.

TABLE 3: STRUCTURE OF SPRAY TEAMS DURING THE 2020 IRS CAMPAIGN

District	Number of SOPs	Number of Team Leaders	Number of Site Managers	Number of Supervisors	Substitutes
Sakassou	**189**	**38**	**12**	**12**	**17**
Nassian	**89**	**18**	**7**	**7**	**9**
Total	**278**	**56**	**19**	**19**	**26**

The project rented 28 buses (15 in Nassian and 13 in Sakassou) and 76 tricycles (44 in Nassian and 32 in Sakassou) to transport the spray teams from the operations sites to the spray sites. The project also increased the number of vehicles for supervision and transport of spray equipment and insecticide from 7 to 27 (12 in Sakassou and 15 in Nassian) as a result of the COVID-19 pandemic. To comply with the social distancing requirement, a six-seater tricycle carried three SOPs per trip and twelve-seater bus carried eight SOPs per trip.

Personnel hired for the 2020 spray campaign were paid through the mobile banking payment system (Orange and MTN). The mobile payment system has proven to be very effective as it allows the project to make payments remotely in a timely, secure, and cost-efficient manner. Although the project paid a small transfer fee per transaction, it avoided the expenses (per diems, fuel, car rental, security personnel, etc.) it incurred with in-person payments by the project staff.

2.4 INSECTICIDE

Susceptibility studies conducted by the VectorLink Côte d'Ivoire project since 2018 supported the selection of clothianidin for IRS for the 2020 campaign. In consultation with the NMCP, the project procured SumiShield® 50WG (clothianidin) for Nassian and Fludora® Fusion (clothianidin and deltamethrin) for Sakassou.

Based on the structure enumeration exercise on September 16-26, 2019, and considering population data provided by the NMCP, 50,111 units of insecticide (29,057 sachets of Fludora® Fusion and 21,054 sachets of SumiShield® 50WG) were procured to spray 56,601 targeted structures (Table 4).

Ultimately, 21,815 units of insecticide were used to spray 53,962 structures (30,467 in Sakassou and 23,495 in Nassian), indicating an overall utilization rate of 2.5 structures per unit of insecticide (2.2 in Sakassou and 2.9 in Nassian). A total of 15,457 sachets of Fludora® Fusion, expiring in December 2021, and 12,823 sachets of SumiShield® 50WG, expiring in April 2022, remained after the completion of the 2020 campaign.

TABLE 4: INSECTICIDE QUANTIFICATION AND USE PER DISTRICT

	Sakassou	Nassian	Total
Insecticide selected	Fludora® Fusion	SumiShield®	--
Number of targeted structures	32,796	23,805	56,601
Expected insecticide utilization rate	1.3	1.3	1.3
Number of insecticide units procured for 2020 IRS	29,057	21,054	50,111
Number of structures sprayed	30,467	23,495	53,962
Number of insecticide units used in 2020	13,584	8231	21,815
Actual insecticide utilization rate	2.2	2.9	2.5
Number of insecticide units remaining for 2021*	15,457	12,823	28,280

* Remaining quantities account for 52 damaged units of Fludora® Fusion, for which the project was reimbursed, as well as four units of Fludora® Fusion and six units of SumiShield® reserved for entomological monitoring purposes.

2.5 Information, Education, and Communication Activities & Outcomes

PMI VectorLink Côte d'Ivoire, in collaboration with the NMCP and other stakeholders, supported a range of IEC activities to ensure full support for IRS activities and to promote acceptance of this intervention by the community. The project, in collaboration with key partners, conducted a four-day workshop to revise and validate a communication plan, develop tools (picture boxes, posters, banners, radio spots, etc.), and update the existing IEC training manuals and PowerPoint presentation. The group also designed posters to raise awareness about the legal consequences of theft of IRS commodities and data falsification. The project produced 406 tee-shirts, caps, and pictures boxes, 354 banners, and 39 posters for distribution and dissemination of information.

As noted in section 2.1, the VectorLink, NMCP, and PMI teams conducted joint advocacy trips to both IRS districts to meet with regional- and district-level health directors and other community leaders to discuss the importance of the communities' engagement in IRS activities and to share information on the benefits of IRS (Figure 2).

IEC activities focused on promoting the benefits of IRS in preventing and controlling malaria and addressing common myths and misconceptions about IRS that could impede acceptance and ultimately the intervention's effectiveness. In order to safely implement the IRS campaign amid the COVID-19 pandemic, all mobilizers and supervisors were required to comply with prevention measures (safe distance, handwashing, and use of masks at all times) put in place at the operations site and community levels.

The project used public town criers (primarily in Sakassou) and worked with the village mutual groups, youth associations, women's groups, heads of districts, religious leaders, etc. to disseminate information throughout the community. To manage refusals, the project occasionally organized meetings with small groups of local community members to improve communication with the beneficiaries.

FIGURE 2: ASSIRIKRO (SAKASSOU DISTRICT) LOCAL ADMINISTRATIVE SUPERVISION

Before and during the IRS campaign, the project team worked with local radio channels to broadcast radio spots to inform communities of the IRS campaign schedule and the benefits of IRS for malaria prevention and control according to the messages contained in the picture boxes. It also organized interactive radio talks during which health sector representatives answered the questions that local community members had about IRS. A summary of radio broadcasts is shown in Table 5.

TABLE 5: IEC ACTIVITIES CONDUCTED OVER THE RADIO

Type of Radio Show	Number of Broadcasts
Short radio spots and messages (in French and four main languages: Malinke, Koulango, Baoule, and Lobi)	430
Debates and (interactive) discussion shows	22
Interviews and testimonials of beneficiaries	2

Before the campaign started, the project in collaboration with the NMCP organized three high-profile activities:

- Two advocacy meetings conducted respectively in Sakassou and in Nassian with political and administrative authorities, community leaders, religious leaders and all the stakeholders for better involvement in all components of IRS implementation.
- A press conference chaired by the Minister of Health and the United States Ambassador on August 6, 2020 (Figure 3)
- A press release was issued by the United Stated Embassy prior to the launch of the campaign.
- Meetings between Administrative authorities and Village Chiefs was held on August 12, 2020 in Sakassou to prepare the official national launch ceremony
- Mass communication meetings organized by administrative and health authorities with village chiefs
- An official national launch ceremony in Sakassou on August 13, 2020. The ceremony was attended by representatives from the MOH, USAID, and WHO, administrative authorities, and regional and district health directors (Figures 4 and 5), all of whom expressed support for IRS. Some 200 local residents observed the ceremony.

FIGURE 3: PRESS CONFERENCE HELD AT THE MOH, WITH THE PARTICIPATION OF THE MOH, U.S. AMBASSADOR, AND VECTORLINK

FIGURE 4: USAID REPRESENTATIVE AND VECTORLINK CHIEF OF PARTY

FIGURE 5: MINISTER OF HEALTH AND NMCP DIRECTOR

Table 6 summarizes the scope of IEC activities that VectorLink Côte d'Ivoire and its strategic partners implemented to encourage acceptance of IRS.

TABLE 6: SUMMARY OF MOBILIZATION EFFORTS

District	Mobilizers Deployed to Target Communities	Town Criers	Radio Broadcasts	Religious Places (announce-ments)	Number of People Reached by Door to Door Mobilization
Sakassou	256	175	208	12	53,045
Nassian	120	1	222	0	31,389
Total	376	176	430	12	84,434

In addition to the political situation and the sudden onset of Covid-19, some refusals cases came from the community members who live outside the village. Despite the project's enormous efforts to disseminate information on the benefits and expectations around IRS, the project faced large-scale refusals in parts of Sakassou (see section 5.3).

To convince families and community leaders to accept IRS, local administrative authorities organized meetings with all the household heads and village chiefs. VectorLink team members involved religious leaders in IRS message dissemination during churches and mosques preaching. Other important groups, like the village association group based in Abidjan, were contacted and involved in the communication strategies to face refusals cases.

2.6 CAPACITY BUILDING

In October 2019, VectorLink Côte d'Ivoire's sent the newly hired Operations Manager to Madagascar to observe an IRS campaign, and learn to use the project's many IRS planning, management, and monitoring tools.

In November 2019, the project organized a Boot Camp / Master Training to develop national capacity to plan, implement, and monitor IRS in accordance with PMI standards. Thirty-seven participants (27 men, 10 women) were trained including 16 VectorLink staff and 21 employees of government agencies. Those 21 government employees were trained in the use of VectorLink Collect for IRS.

Due to the COVID-19 pandemic, all short-term technical assistance trips planned for the lead-up to the 2020 IRS campaign had to be suspended, a major obstacle for the VectorLink Côte d'Ivoire team, many of whose members had never before participated in any IRS campaign. To ensure the team would be able to conduct all planned activities regarding PMI standards, the VectorLink Côte d'Ivoire team developed an internal capacity-building plan to reinforce staff knowledge and competencies so that any staff members would be able to serve as the lead trainer and manager in an operations site. The VectorLink Côte d'Ivoire team leveraged all available resources for remote training and skill building such as pre-recorded videos and live video-conference training with colleagues from other VectorLink country programs.

VectorLink Côte d'Ivoire also built the NMCP's institutional capacity to do entomological monitoring, the results of which inform vector control decision making, in particular evaluation of the different methods of controlling the malaria vector population. The project arranged for its partner institution in Burkina Faso, the Institute for Research in the Health Sciences (*Institut de Recherche en Sciences de la Santé*) to train two NMCP staff in medical entomology. The institute trained and supervised the NMCP staff from February to August 2020.

2.7 GENDER MAINSTREAMING

PMI VectorLink Côte d'Ivoire has developed special strategies to involve women in all IRS activities. It has set a target of 30% women's participation, in line with the country's objective of having women generate income to support family development and especially children's wellbeing. The project's gender mainstreaming initiatives include:

- Assigning a project gender focal point to better ensure and promote women's roles in IRS.
- Establishing and enforcing an anti-sexual harassment policy for all employees, including seasonal personnel, to promote a safe and respectful working environment.
- Revising training and mobilization documents to include more pictures and information about women.
- Conducting a high-level advocacy meeting with political and administrative authorities, as well as opinion leaders, to discuss the different barriers observed in the intervention areas, including those that prevent women from fully participating in all components of IRS implementation. The objective of this meeting, held during microplanning, was to sensitize these stakeholders on the importance of increasing female participation in IRS campaigns.
- Incorporating gender awareness and anti-sexual harassment training into all 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 operations sites where they feel safe and comfortable, including separate restrooms for male and female workers that are properly labeled. Ensuring that every woman receives appropriately sized for coveralls and boots.
- Discretely providing disposable and reusable sanitary pads for use while the women are in the field.
- Displaying posters on gender awareness guidelines in all operational sites, as well as anti-harassment posters encouraging all worker to report any sexual harassment.
- Ensuring that recruitment, mobilization, and training include women and respect women's time constraints when feasible.
- Ensuring that women who are pregnant or breastfeeding and recruited during the campaign are assigned to positions that will not expose them to insecticide.
- Providing sex-disaggregated data for all indicators, as appropriate.

As a result of these initiatives, the project hired women in 75% of seasonal logistic and finance assistant roles In addition, 57% of M&E assistants, 45% of operational site storekeepers, and 23% of mobilizers were women. Across the campaign, 21% of supervisory roles in the campaign were women, including government national and district supervisors. (Tables 1 & 2).

3. ENTOMOLOGY

Entomological activities help assess vector susceptibility to the insecticides used for malaria vector control, the quality of IRS operations, and the residual efficacy of insecticide applied.

3.1 IRS SUSCEPTIBILITY

In 2020, the project collected larvae in Nassian and Sakassou (IRS sites) and in 15 non-IRS sites located across different ecological zones of Côte d'Ivoire. *An. gambiae* s.l. larvae were reared at the district laboratories, and WHO susceptibility tests for pirimiphos-methyl (0.25%) and clothianidin (2%) were conducted on emergent adults aged 2-5 days following the PMI Standard Operating Procedures (SOPs). *An. gambiae* s.l. mortality against pirimiphos-methyl was 98.2% in Nassian and 51.8% in Sakassou at 24 hours after exposure. The mortality rate against clothianidin (2%) was 91.8% in Nassian and 92.1% in Sakassou 72 hours after exposure, and 98.0% in Nassian and 100.0% in Sakassou 168 hours after exposure. Clothianidin was the insecticide sprayed in the form of Fludora® Fusion WG-SB (which also contains deltamethrin) in Sakassou and SumiShield® 50WG in Nassian.

3.2 RESIDUAL EFFICACY

Spray quality was assessed using wall cone bioassay tests as a proxy indicator of quality. Cone bioassays were conducted in three sprayed villages of the two IRS districts (one in Nassian and two in Sakassou) within 2-4 days of spraying.

In addition, three houses were selected in three centrally located villages for a total of nine houses per district for quality assurance and fumigant effect test. In Nassian, the tests were conducted in Parhadi, Lande, and Nassian city. In Sakassou, the tests were conducted in Adjekro, Kpatanou, and Kpetebonou.

In addition, three centrally located villages were selected per district for the quality assurance and fumigant effect test; these villages will be used for subsequent monthly insecticide decay rate monitoring.

3.3 CONE BIOASSAYS

Mud and cement are the two main types of wall surface in Nassian; in Sakassou, all wall surfaces are cement. In Nassian, three sprayed structures made of cement and two made of mud were randomly selected for the cone bioassays. In Sakassou, all sprayed surfaces selected were cement. One unsprayed structure (which was not eligible for IRS) was used for control bioassays in each of the sites.

The susceptible mosquito colony (*An. gambiae* Kisumu strain) reared in insectaries of all the local entomological institute partners (*Centre Suisse de Recherches Scientifiques, Institut Pierre Richet*, and *Centre d'Entomologique Medicale et Veterinaire*) was used for the quality assurance cone bioassays, conducted following PMI SOP 09/01.

Exposure to Fludora® Fusion-treated cement walls in Sakassou produced mortality rates of 100% in all three villages after a 24-hour holding period (Figure 6). Exposure to SumiShield®-treated walls (mud and cement) produced 100% mortality within 24 to 48 hours (Figure 7) in Nassian.

FIGURE 6: RESULTS OF FLUDORA® FUSION-SPRAYED WALL CONE BIOASSAY IN SAKASSOU USING *AN. GAMBIAE* KISUMU

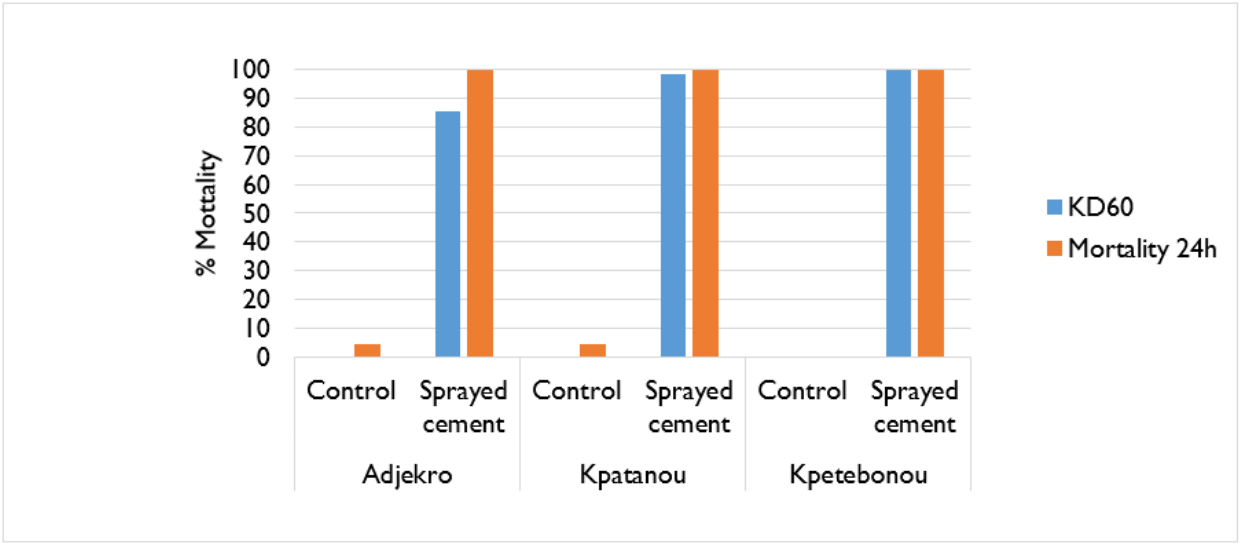
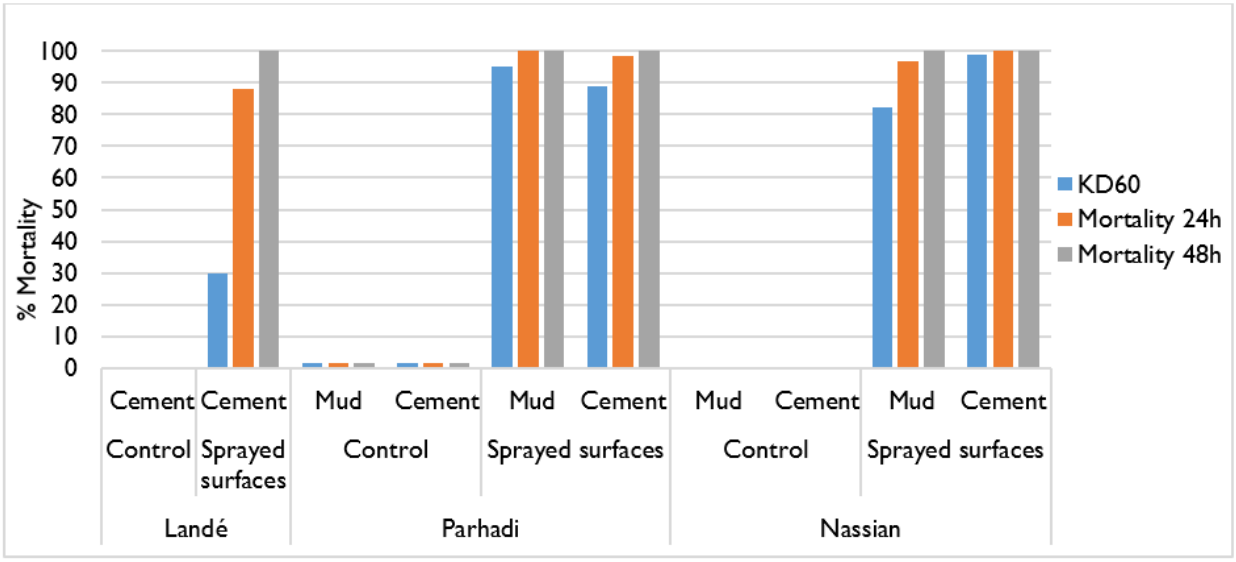


FIGURE 7: RESULTS OF SUMISHIELD®-SPRAYED WALL CONE BIOASSAY IN NASSIAN USING *AN. GAMBIAE* KISUMU



3.4 FUMIGANT EFFECT

Fumigant bioassays were also conducted in each house to assess the contribution of airborne effects to mortality in cone bioassays, according to PMI SOP 09/01.

In Sakassou 100% mortality was observed to the Fludora® Fusion-sprayed structures 24 hours post exposure (Figure 8). In Nassian, 100% mortality was observed to the SumiShield®-sprayed structures after 48 hours (Figure 9).

FIGURE 8: RESULTS OF FLUDORA® FUSION-SPRAYED WALL FUMIGANT EFFECT IN SAKASSOU USING *AN. GAMBIAE* KISUMU

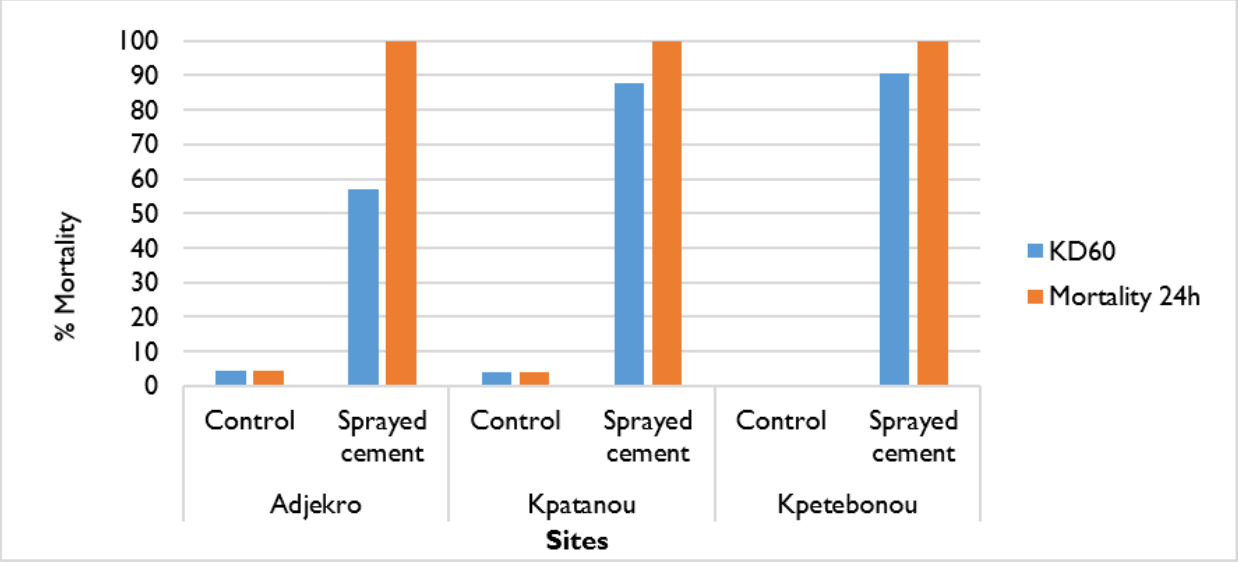
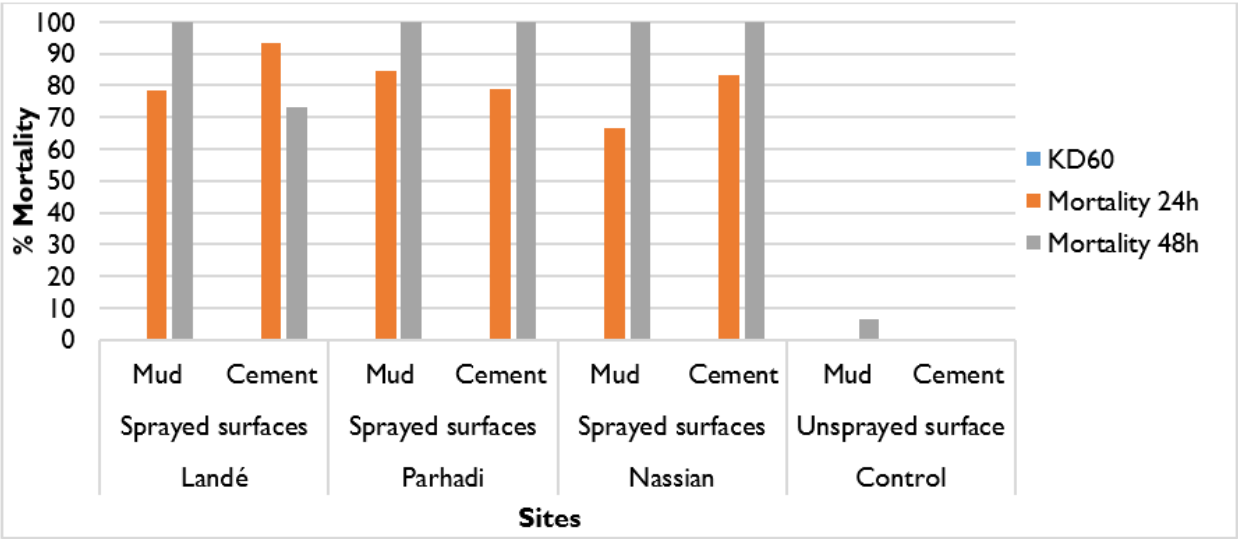


FIGURE 9: RESULTS OF SUMISHIELD®-SPRAYED WALL FUMIGANT EFFECT IN NASSIAN USING *AN. GAMBIAE* KISUMU



The fact that 100% mortality was recorded after one or two days for both insecticides on both wall types in the houses tested in both IRS districts indicates that spray application met quality standards (no indication of under dosing). Monthly monitoring of residual efficacy will be performed using susceptible *An. gambiae* Kisumu and wild collected *An. gambiae* from each locality until mortality is <80% for two consecutive months.

4. ENVIRONMENTAL COMPLIANCE

The PMI VectorLink Côte d'Ivoire project operated under a supplemental environmental assessment (SEA) approved by USAID in 2020. The SEA 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 SumiShield® WG50 (clothianidin) to spray in Nassian district, and Fludora® Fusion in Sakassou.

Prior to the spray campaign, the Environmental and Social Impact Assessment (ESIA) was approved by the National Agency of Environment of Côte d'Ivoire, which authorizes nationwide IRS activities.

4.1 IRS CAMPAIGN ASSESSMENTS

PRE-SEASON ENVIRONMENTAL COMPLIANCE ASSESSMENTS

Prior to the 2020 campaign, the VectorLink Côte d'Ivoire team conducted initial Pre-Season Environmental Compliance Assessments (PSECA) and other operations using smartphones with PMI standard environmental compliance checklists. This was to ensure the readiness of the operations sites and receive insecticide on time for a successful campaign. PSECA findings dictated what rehabilitation work had to be done at the operations sites; all soak pits (16 fixed and 2 mobile) were built prior to the launch of the spray campaign. The project also distributed to the sites all documents, data sheets, first aid guides, warning signs, and recommendations in case of spillage. In addition, before the campaign, all seasonal staff underwent medical check-ups (including pregnancy tests for women).

Approximately two weeks before spray activities began, the project performed a final PSECA to verify that all necessary work had been completed, and that the facilities were ready to receive insecticide shipments prior to spray operations.

Although the VectorLink Côte d'Ivoire Environmental Compliance Officer (ECO) has primary responsibility for the environmental compliance component of the project, the NMCP's representative for environmental compliance and the provincial environmental compliance officer who covered each IRS district participated in environmental inspections. By including them, the project continued to strengthen its IRS counterparts' capacity in environmental compliance for IRS activities, and ensure that they are cognizant of PMI's BMP guidelines. Finally, the team held a meeting to authorize delivery of insecticides to all sites.

ENVIRONMENTAL COMPLIANCE ACTIVITIES DURING THE CAMPAIGN

VectorLink Côte d'Ivoire's staff supervised spray operations and ensured that environmental compliance standards as specified in the PMI BMP Manual were met, including the proper use of PPE, progressive rinsing of spray pumps, condition of vehicles/tricycles used to transport spray teams and insecticides, and 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. The project monitored the condition of fixed and mobile soak pits on a regular basis to ensure proper flow and drainage. The ECO also trained district coordinators to inspect vehicles and tricycles to ensure they were fit to transport SOPs and materials to the field.

POST-SPRAY ENVIRONMENTAL COMPLIANCE ACTIVITIES

At the end of the 2020 spray campaign, VectorLink Côte d'Ivoire cleaned all IRS materials. The project then transported most materials from IRS sites to the two district warehouses. However, all remaining insecticide,

11,627 sachets of Fludora® Fusion and 12,823 sachets of SumiShield®, were transferred to the central warehouse in Bouake. The project team conducted post-spray site decontamination and decommissioning of operations sites. After the project restored the sites to a well-maintained state and made them safe for the surrounding communities, the team formally handed the sites back to the health centers and community representatives that provided the facilities, for safekeeping until the next IRS campaign.

On October 18-24 2020, VectorLink Côte d'Ivoire with representatives from the regional environment directorate performed a post-spray inspection of the central warehouse, district warehouses, and all operations sites in Nassian and Sakassou, and ensured that 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.

4.2 INCIDENT REPORTS

Two incidents (Table 7) took place during the 2020 IRS campaign and were reported within the 48-hour incident-reporting deadline. Of these two incidents, only that of Souaffoue Djahan recorded an injury.

TABLE 7: INCIDENTS RECORDED DURING THE 2020 IRS CAMPAIGN

Incident	Location	Date
Vehicle attack	Lambira-Nassian Way, Nassian district	July 12, 2020
Tricycle accident	Souaffoue Djahan, Sakassou district	September 5, 2020

4.3 DEMOBILIZATION AND WASTE MANAGEMENT

Under ECO supervision, all solid wastes generated from the 2020 spray campaign were collected and separated. The team collected all empty insecticide sachets, and reconciled the numbers in ledger books and stock cards.

VectorLink signed an agreement with RMG, a private incinerator, for the incineration of empty SumiShield® and Fludora® Fusion sachets and other contaminated items such as used masks, gloves, and mobile soak pits. All plastic wastes went to Conceptos Plasticos for recycling. Table 8 shows the solid wastes, and disposal methods and sites.

TABLE 8: WASTE GENERATED DURING THE 2020 SPRAY CAMPAIGN AND PLANNED MANAGEMENT METHODS

Type of Waste	Content	Quantity	Disposal Method	Estimated Date of Transfer to Disposal Site
Uncontaminated plastic	Polyethylene	-	Storage/donation	September 2020
Plastic materials	Plastic	-	Recycling/shredding and burial	TBD*
Contaminated plastic	Polyethylene	-	Incineration	December 2020
SumiShield® and Fludora® Fusion empty sachets	Aluminum sachet	21,815	Incineration	December 2020
Other waste (garbage bags, absorbent paper, empty boxes, etc.)	Paper, biodegradable materials, gloves latex	-	Incineration, repurposing	December 2020
Used masks	Synthetic polymer fibers	15,170	Incineration	December 2020
Flashlight batteries	Alkaline	-	Recycling	August 2021

* Originally scheduled in October 2020; postponed due to election period.

5. MONITORING AND EVALUATION

5.1 DATA COLLECTION/ENTRY/QUALITY ASSURANCE

For the first IRS campaign in Côte d'Ivoire, the project used standard data collection tools, including mobile devices, to record and monitor spray data within the DHIS 2 platform, VectorLink Collect. This system facilitated the access of near real-time spray coverage and progress results, which were used to assist monitoring and targeted planning of mop-up activities. The data collection tools used included IRS stickers, Daily Spray Operator forms, Team Leader Daily Summary forms, DOS forms, and the mHealth tools (Section 6.2).

The VectorLink Côte d'Ivoire team used the Open Data Kit (ODK) application on Android smartphones for mobile data collection based on the experience of the Burkina Faso pilot. Before the 2020 spray campaign began, the project trained M&E assistants, data cleaners, supervisors, team leaders, and SOPs on the data collection process and on completing all appropriate forms and applications using smartphones. As a precaution, the team had paper forms available, which were used only by one SOP on the first day of the campaign. The mobile data collection facilitated daily reporting and operational decision making throughout the spray campaign. Specifically, the ODK application automatically generated formatted IRS numbers to help SOPs to properly mark the structure and to reduce the possibility of duplicate IRS numbers. At the end of each day, the team leader verified the data collected by the SOPs and, with the help of M&E assistants, to ensure that the forms were properly filled out before they were synchronized to the VectorLink Collect server. The daily summary table generated by the ODK application was used by the team leader, as a quality assurance tool, to fill the Team Leader form. The site manager then referenced the Team Leader form to fill in the Performance Monitoring Tracker (PMT) form.

An M&E assistant was assigned to each operations site, to train SOPs, team leaders, and site managers on data collection. During the campaign, the M&E assistant was the first line of technical support in the field, and assisted the SOPs in data collection via smartphone, the marking of the structures, and the data synchronization every evening after the operations.

A WhatsApp group was created by PMI VectorLink's M&E team to facilitate exchanges by sharing experiences, challenges, and solutions. The VectorLink Collect Dashboard and data from the PMT were analyzed daily through logical controls to ensure data quality and to inform stakeholders of progress.

VECTORLINK COLLECT DATABASE

After household data collection was completed, the smartphones were synchronized every evening. The results were available the next day on the VectorLink Collect database. Before the campaign started, the M&E and Operations teams worked together to gather the necessary metadata that enable the deployment of the database. These data include geographical hierarchies of target areas, SOP code assignments, ODK application development, campaign spray targets, dashboard development, and user account creation.

Accounts to access the VectorLink Collect database were created for key stakeholders (like PMI, NMCP, district staff, and some VectorLink staff), and an orientation was provided on how to the use the database, and how to access the dashboard. This availability of real-time data for actors made it possible to monitor progress of each operations site, each health area, and each locality. When performance in an area was found to be weak, teams could discuss and find timely solutions.

Data Monitoring and Cleaning Process

The data-cleaning activities were carried out in two steps:

(1) *During the campaign* to ensure the quality of data, the monitoring was done with the mop-up tool, the duplicate finder, and some cross-referencing of logic variables (e.g., number of insecticide sachets used per room compared with stock inventory, the average of rooms per enumeration structure compared with the average of rooms per structure found during the IRS, the number of enumeration structures compared with the structures found during IRS in the same locality). When data were missing, it was immediately corrected in collaboration with the field teams.

(2) *At the end of the campaign,* the team held a workshop with the M&E assistants to ensure the synchronization of all the forms and to receive feedback from the field. There was also a database-cleaning workshop with the data cleaners using the different data cleaning tools (mop-up tool, duplicate finder).

5.2 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 with the support of Dimagi technical expertise. The complementary mHealth tools were designed in ODK. The mHealth reporting tools for data collection, which VectorLink Côte d'Ivoire used throughout the spray campaign, included the PMT, the job aids, and the mobile supervisory forms.

Performance Monitoring Tracker

On a daily basis, site managers summarized key operations data on a performance-tracking sheet. They 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 who worked that day, number of structures found, number of structures sprayed, and number of insecticide sachets used during the campaign.

Job Aid Messages

VectorLink Côte d'Ivoire sent out daily SMS messages as alerts to coordinators, supervisors, team leaders, and storekeepers to remind them about practices, such as compulsory breakfast, wearing PPE, gender awareness, the number of targeted structures that day, and any other instructions to promote good practices. SMS messages also were used to update spray teams based on the supervision observations. A total of 43,237 SMS messages (average: 4 per day) were sent to 323 seasonal staff during the IRS campaign.

Supervision Tools

A total of 2,939 supervision forms were successfully completed by national supervisors and site coordinators through the CommCare application. Table 9 provides a breakdown of the submitted forms.

TABLE 9: SUBMITTED SUPERVISORY FORMS DURING THE SPRAY CAMPAIGN

Supervisory Form	ODK	CommCare
	Submitted	Submitted
Morning Mobilization	59	374
Transportation Vehicle/Tricycle Inspection	34	289
Homeowner Preparation and Spray Operator Performance	369	1,040
End-of-Day Clean-up	86	352
Storekeeper Performance	17	146

5.3 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 of the delivery and storage of IRS and other vector control products, and innovation. The M&E plan indicator matrix (Annex A) shows how PMI VectorLink Côte d'Ivoire has performed against these indicators.

To monitor the performance of the spray campaign, key indicators are tracked throughout the campaign: structures targeted, structures found, and the proportion of structures sprayed out of those targeted (spray progress) and those found (spray coverage). Also during the campaign, the project collected household population details to report the number of people protected. This included the total population disaggregated by gender and special groups, such as pregnant women and children under 5 years.

During the 2020 IRS campaign, the project found a total of 58,695 structures (33,808 in Sakassou and 24,887 in Nassian). It sprayed 53,962 structures (30,467 in Sakassou and 23,495 in Nassian). The overall coverage rate achieved for both districts was 91.9% (90.1% in Sakassou and 94.4% in Nassian).

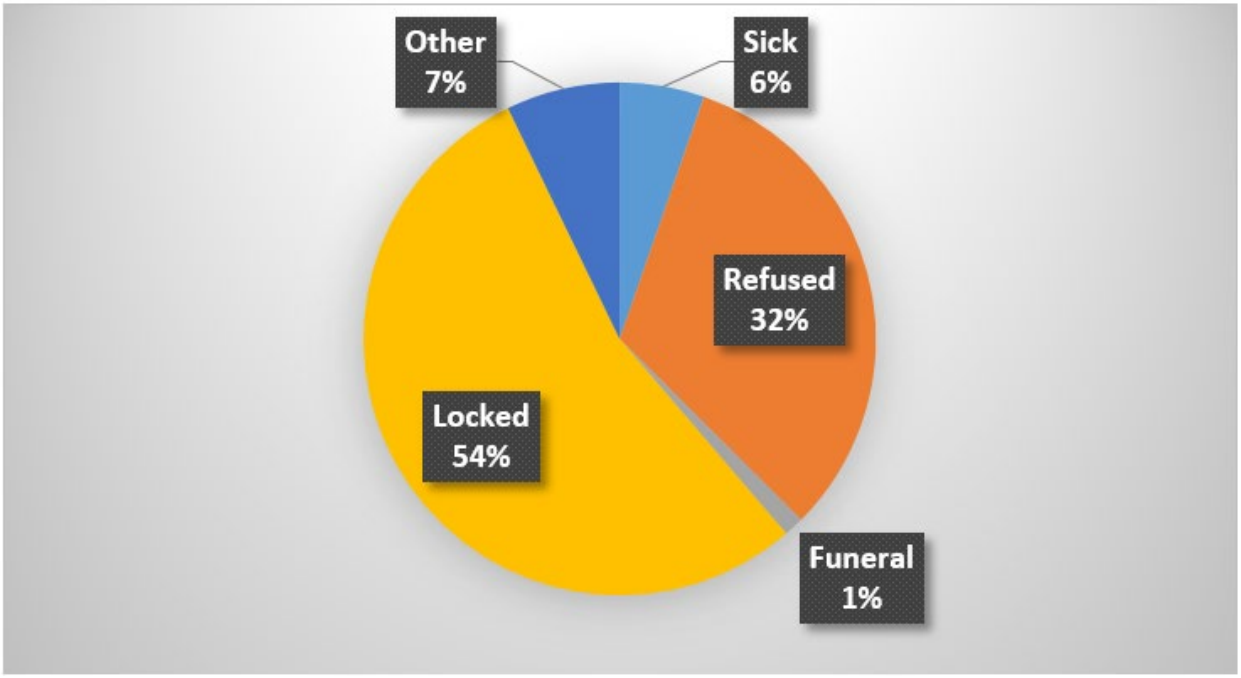
Table 10 provides a summary of key results.

TABLE 10: SUMMARY OF 2020 KEY IRS RESULTS

Districts	Structures Found by SOPs	Structures Sprayed	Spray Coverage	Population Protected	Pregnant Women Protected	Children <5 years Protected
Sakassou	33,808	30,467	90.1%	120,803	2,600	17,509
Nassian	24,887	23,495	94.4%	73,073	1,749	12,544
Total	58,695	53,962	91.9%	193,876	4,349	30,053

During the 2020 IRS campaign, 8.1% of eligible structures in the target districts (4,733) were not sprayed. Figure 10 breaks down the reasons for not spraying. The key reasons were locked structures (54%) and refusals (32%).

FIGURE 10: REASONS FOR NON-SPRAYED STRUCTURES



6. CHALLENGES, LESSONS LEARNED, AND KEY RECOMMENDATIONS

6.1 CHALLENGES AND RECOMMENDATIONS

PMI VectorLink Côte d'Ivoire's carrying out of this first large-scale IRS campaign was challenging, due in particular to COVID-19 restrictions and the country's current political situation. Despite these challenges, the project achieved more than 90% of its spray target. Based on the challenges encountered during spray operations, listed below, the project made recommendations for future campaigns:

COVID-19 Pandemic and delayed spray campaign:

- With the onset of the COVID-19 pandemic, the government suspended all gatherings of more than 50 people. The 2020 campaign was originally scheduled to take place in Sakassou in April and in Nassian in June. Based on guidelines from PMI and the WHO, the NMCP and VCSC recommended that the IRS campaigns be postponed and conducted simultaneously in both districts in August 2020. In some areas, occupants of eligible structures were students and teachers who left their structures locked during summer vacation, and these accounted for more than half (54%) of unsprayed structures.
- The pandemic also forced the cancellation of all planned short-term technical assistance to support the team in preparing for and implementing their first IRS campaign.
- The project will continue to engage communities and their leadership in all communication and mobilization activities to find sustainable solutions to the issue of locked structures; these include having students and teachers give the keys to these structures to household members before leaving for holidays. However, the project hopes to be able in future to spray earlier in the transmission season, driven primarily by the epidemiologic and entomological data, and thereby to reach communities before the academic vacation.
- The project will continue to work with the NMCP and stakeholders to accommodate COVID-19 transmission mitigation measures throughout future IRS planning and implementation, building on the experience of this year's IRS campaign.
- The project will continue using the project-wide knowledge base and will welcome virtual training from colleagues across Africa when in-person support is not a safe option.

Refusals in urban areas:

- Refusals were the second reason for non-sprayed structures (32%), and political tension around upcoming elections was behind much of this. In Assirikro, some beneficiaries felt the IRS program was a government initiative and because they opposed the government, they opposed the program. They were hostile to the IRS teams and refused to remove furnishings from their structures. Many called their sons in Abidjan town to verify that the IRS campaign was unrelated to the presidential elections before accepting IRS.
- The project will work with NMCP to include in all IRS workshops the leaders of the Development Mutual, most of whom live in Abidjan, and reinforce communication at different levels.

Variable structure size:

- Due to the different sizes of structures, progress was not uniform across operations sites. In areas where the structures are small (Sran Bondossou and Ayaou Sokpa in Sakassou district, and all

operations sites in Nassian), spraying went faster than expected. In some areas in town, where structures are bigger, progress was slower than expected.

- In future campaigns, the project will set daily output objectives at the site level based on the average number of structures sprayed in that site in the previous year. This should make progress easier to track during the campaign.

Leftover Insecticide:

- Insecticide quantification was done based on population data provided by NMCP and the results of the structure enumeration exercise conducted in September 2019. Given the large size of structures, variation in population data, and seasonal variation in structure eligibility (due to harvest season, academic calendar, etc.) the team estimated the quantities conservatively for the first IRS campaign in Côte d'Ivoire, resulting in a large leftover quantity. In future years, the team will project insecticide quantities based on actual insecticide utilization rates by operations site to minimize the amount of insecticide remaining at the end of a campaign.

Connectivity:

- Although mobile data collection was successful overall, the team encountered delays in synchronizing data from a few remote sites, particularly in Nassian, that lacked network coverage. Tablets from those sites had to be transported to another site for data synchronization twice per week.
- In future campaigns, the project will take into consideration the network in all operational selection

Women's participation:

- The project had relatively low women's participation in IRS in 2020. To increase female participation, the project will reinforce efforts to recruit more women, by involving women association and adopting a mentorship plan to retain them, and promoting high-performing women into supervisory positions.

6.2 LESSONS LEARNED

By the end of the campaign, the project team had learned several lessons, including the following:

- Conducting an IRS campaign during the COVID-19 pandemic is feasible through good planning and preparation, the establishment of alternative approaches, an interdisciplinary effort, and support from partners (communities, stakeholders, opinions leaders, etc.).
- Engaging high-level authorities such as the Ministry of Health and U.S. Ambassador was important to secure government and community support for IRS.
- Spraying both districts simultaneously was more manageable than expected; the team rose to the occasion with a robust training program. The team was able to coordinate and course-correct as needed; and the two districts faced very different challenges after all. As such, the project highly recommends to continue conducting a single-phase campaign in both IRS districts, maximizing the coverage of peak transmission periods while also accounting for competing malaria control activities and the NMCP's availability. For 2021 the two target districts will be sprayed simultaneously, from mid -May to June which covers the peak transmission periods in both districts.
- Engaging administrative and health authorities and community leaders (such as the local Assirikro administration) was a significant source of support in increasing acceptance of IRS in the country's first-ever campaign.
- Having a strong supervision plan that involves government counterparts and one project staff per operations site is necessary to closely monitor IRS.
- Paying seasonal staff via a mobile payment system eliminated risks associated with managing cash in the field and worked very smoothly. The project will continue use mobile money payment system to pay all seasonal workers in next year again.

- Training and empowering support staff such as drivers, finance and administrative staff, and office assistants to participate in IRS activities resulted in a strong internal capacity building program and a deep sense of collective accountability on the team.
- Engaging community members who live outside the village and play a key role in decision is an important part of the IEC initiatives to ensure support from household decision-makers to accept IRS.

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

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results					
					Year 1		Year 2		Year 3	
					Target	Result	Target	Result	Target	Result
Objective 1: Implementation of Malaria Vector Control (VC) Interventions										
1.1	**Successfully Execute IRS and Other Integrated Malaria VC Activities**									
1.1.1	Number and percentage of completed annual country work plans developed and submitted on-time	X	Project records	Country						
			Annually							
1.1.2	Number of eligible structures targeted for spraying		Project records	Country	NA	NA	NA	NA	56,601	58,695
			Annually							
1.1.3	Number of eligible structures sprayed with IRS[2]		Project records	Country	NA	NA	NA	NA	48,111	53,962
			Annually							
1.1.4	Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)		Project records	Country	NA	NA	NA	NA	85%	91,9%
			Annually							

[2] Target based on 85% of population within enumerated eligible structures in September 2019

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results					
					Year 1		Year 2		Year 3	
					Target	Result	Target	Result	Target	Result
1.1.5	Number of people protected by IRS[3]		Project records	Country	NA	NA	NA	NA	170,143[4]	193,935
				Sex Male					86,111	96,680
			Annually	Sex Female					84,032	97,255
				Pregnant women					2,714	4,349
				Children <5					24,245	30,053
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	Country						
			Annually							
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	Country						
			Annually							
1.1.8	Number of Insecticide Treated Nets (ITNs) distributed, by channel		Project Records	Country	NA	NA	NA	NA	NA	NA
			Annually	Channel						
1.1.9	Number and percentage of countries completing ITN durability monitoring data collection as planned in a given project year	X	Project Records	Country						
			Annually							
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	Country						
			Annually							

[3] Target based on 85% of estimated population

[4] The target is 85% of enumeration population (20,0168)

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results					
					Year 1		Year 2		Year 3	
					Target	Result	Target	Result	Target	Result
1.2	**Strengthen Capacity of NMCPs, VC Personnel, and Other Institutions to Implement and Manage IRS and Other VC Activities**									
1.2.1	Total number of people trained to support VC in target areas		Project Training Records	Country	NA	NA	NA	NA	1,229[5]	1129[6]
				VC Intervention:IRS						
			Annually	Sex Male					862	916
				sex Female					367	213
				Job Function						
1.2.2	Total number of people trained to support VC in target areas with USG funds		Project Training Records	Country	NA	NA	NA	NA	353[7]	353[8]
				VC Intervention						
			Annually	Sex Male					247	308
				Sex Female					106	45
				Job Function						

[5] Sprayers(278), Team Leaders(56), Site Managers(19), Substitutes(56), National Supervisors (30), District Supervisors(19), Washers(38), Pump Technicians(19), Ops Storekeepers(19), Districts Storekeepers(2), Central storekeeper(1), Ops Security guards(38), District Security guards(4), Ops Drivers(42), IEC Mobilizers(573), Logistic Assistant(2), Finance Assistants(2), Data Cleaners(4), M&E assistants(21)

[6] Sprayers(278), Team Leaders(56), Site Managers(19), Substitutes(26), National Supervisors (37), District Supervisors(55), Washers(39), Pump Technicians(19), Storekeepers(20), Districts Storekeepers(2), Central storekeeper(1), Ops Security guards(39), District Security guards(4), Ops Drivers(125), IEC Mobilizers(376), Logistic Assistant(2), Finance Assistants(2), Data Cleaners(4), M&E assistants(21)

[7] For IRS programs, this includes spray operators (278), team leaders (56), and site Managers (19).

[8] spray operators (278), team leaders (56), and site Managers (19)

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results					
					Year 1		Year 2		Year 3	
					Target	Result	Target	Result	Target	Result
1.2.3	Number of people trained during the Master (National) Training and/or IRS Training of Trainers[9]		Project Training Records	Country	NA	NA	NA	NA	85	85
				Sex Male					74	74
			Annually	sex Female					11	11
				Type of Training: TOT					55	55
				Master Training: Boot Camp					30	37
1.2.4	Total number of people hired to support VC in target areas.		Project Records	Country	NA	NA	NA	NA	1,076[10]	882[11]
				VC Intervention						
			Annually	Sex Male					753[12]	687
				sex Female					323	195
				Job Function						
1.2.5	Number of VC project training workshops targeting NMCP and other host country staff[13]		Project Training Records	Country	NA	NA	NA	NA	4[14]	4
			Annually							

[9] Does not include full-time VectorLink staff.

[10] Include all cadres of workers listed in 1.2.1 except drivers, government supervisors, and clinicians: Sprayers(278), Team Leaders(56),Site Managers(19), Washers(38), Pump Technicians(19), Storekeepers(19), Districts Storekeepers(2), Central storekeeper(1), Ops Security guards(38), District Security guards(2), IEC Mobilizers(573), Logistic Assistant(2), Finance Assistants(2), Data Cleaners(4), M&E assistants(21)

[11] Sprayers(278), Team Leaders(56),Site Managers(19), Washers(39), Pump Technicians(19), Storekeepers(20), Districts Storekeepers(2), Central storekeeper(1), Ops Security guards(39), District Security guards(2), IEC Mobilizers(376), Logistic Assistant(2), Finance Assistants(2), Data Cleaners(4), M&E assistants(21)

[12] Based on 70% for male and 30% for Female

[13] Training of Trainers (ToT) does not count, as they do not specifically target host country staff, even though host country staff are sometimes included.

[14] Trainings include: 1 Vectorlink Collect, 1 Entomology Training, 1 Environmental Compliance Training, 1 Intro to IRS

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results					
					Year 1		Year 2		Year 3	
					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	Country	NA	NA	NA	NA	12[15]	22[16]
			Annually	Job Function						
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	Country						
				Technical Area						
			Annually	Channel						
1.2.8	Number and percentage of technical assistance requests to support operational routine monitoring systems for continuous ITN distribution completed on time as planned in a given project year	X	Project Records	Country						
			Annually	Channel						
1.3	**Environmental Compliance and Safety**									
1.3.1	Number of seasonal vector control personnel trained in environmental compliance and personal safety standards in vector control implementation		Project Training Records	Country	NA	NA	NA	NA	1,121[17]	1,039[18]
				Sex Male					785(70%)	854
			Annually	sex Female					336(30%)	185
1.3.2	Number of health workers receiving insecticide poisoning case management training		Project Training Records	Country	NA	NA	NA	NA	74	55
				Sex Male					52	50
			Annually	sex Female					22	5

[15] District Data Managers/CSE (8), NMCP Data managers/M&E (1), NMCP Vector Control Specialist (1), DIIS data Managers/M&E(2)

[16] District Data Managers/CSE (2), NMCP Data managers/M&E (1), NMCP Vector Control Specialist (19)

[17] Spray operators (278), team leaders (56), site managers(19), Supervisors (19), washers(38), pump technicians(19), storekeepers(22), security guards(44), mobilizers (573), logistics assistants(2), drivers (51)

[18] Spray operators (278), team leaders (56), site managers(19), Supervisors (55), washers(39), pump technicians(19), storekeepers(23), security guards(45), mobilizers (376), logistics assistants(2), drivers (127)

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results					
					Year 1		Year 2		Year 3	
					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	Country	NA	NA	NA	NA	0	0
				Type of Exposure						
			Annually							
1.3.4	Number of SEAs and Letter Reports submitted at least 60 days prior to the commencement of VC campaigns	X	Project Records	Country						
			Annually							
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	Country	NA	NA	NA	NA	19[19];100%	18
			mobile soak							2(11%)
			Permanent soak							16(89%)
			Annually							
1.3.6	Number and percentage of storehouses inspected and approved prior to IRS campaigns		Project Records - PSECAs	Country	NA	NA	NA	NA	22[20],100%	22
				Storehouse Type						
			Annually							
1.4	**Promote Gender Equality in all Facets of Planning and Implementation**									
1.4.1	Number and percentage of women hired to support VC campaigns		Project Records	Country	NA	NA	NA	NA	339[21]	195[22]
				Sex: Female (%)					30%	22%
			Annually	Job Function						

[19] 1 per operational site

[20] Central(1), District(2), operational site(19)

[21] Sprayers(83),Team Leaders(17),Site Managers(6), Washers(11), Pump Technicians(6), Storekeepers(7), Security guards(13), Drivers (15), IEC Mobilizers(172), Logistic Assistant(1), Finance Assistants(1), M&E assistant(6), Data cleaners (1)

[22] Sprayers(38), Team Leaders(7), Site Managers(0), Washers(38), Pump Technicians(0), Storekeepers(9), Security guards(0), Drivers (10), IEC Mobilizers(87), Logistic Assistant(1), Finance Assistants(12, M&E assistant(12), Data cleaners (1)

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results					
					Year 1		Year 2		Year 3	
					Target	Result	Target	Result	Target	Result
1.4.2	Number and percentage of women hired in supervisory roles in target areas for VC activities		Project Records	Country	NA	NA	NA	NA	52[23]	34[24]
				Sex: Female (%)					30%	19.50%
			Annually	IRS Intervention:						
				Job Function						
1.4.3	Number and percentage of trainees (permanent and seasonal) who have completed gender awareness training		Project Records	Country	NA	NA	NA	NA	1212[25]	1111[26]
			Annually	Sex: Male (# and %)					848	931
				Sex: Female (# and %)					364	180
				Job Function						
1.4.4	Number and percentage of women in senior leadership roles in VectorLink country offices	X	Project Records	Country						
			Annually	Sex (# and %)						
1.5	**Implement and Support SBCC and Mobilization Activities**									
1.5.1	Number of radio spots and talk shows aired		Project Records	Country	NA	NA	NA	NA	392	430
				VC Intervention						
			Annually							
				Radio Spot					392	430

[23] Storekeepers(22), logistics assistants(1), supervisors(0), team leaders(17), site Managers(6), M&E assistant(6)

[24] Storekeepers(9), logistics assistants(1), supervisors(5), team leaders(7), site Managers(0), M&E assistant(12)

[25] Washers and cleaners will not receive gender awareness training. Sprayers(278), Team Leaders(56), Site Managers(19), National Supervisors (30), District Supervisors (19), Substitutes (56), Pump Technicians(19), Storekeepers(19), Districts Storekeepers(2), Central storekeeper(1), Security guards(38), District Security guards(4), Central security guard (2), Ops Drivers(42), District Drivers(4), IEC Mobilizers(573), Logistic Assistant(2), Finance Assistants(2), Data Cleaners(4), M&E assistants(21), Staff VC(21).

[26] Sprayers(278), Team Leaders(56), Site Managers(19), Substitutes(26), National Supervisors (37), District Supervisors(55), Pump Technicians(19), Storekeepers(20), Districts Storekeepers(2), Central storekeeper(1), Ops Security guards(39), District Security guards(4), Central Security Guard (2), Ops Drivers(125), District Drivers(2), IEC Mobilizers(289), Logistic Assistant(2), Finance Assistants(2), Data Cleaners(4), M&E assistants(21), Staff VC(21).

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results					
					Year 1		Year 2		Year 3	
					Target	Result	Target	Result	Target	Result
1.5.2	Number of print materials distributed to or targeted at beneficiaries		Project Records	Country	NA	NA	NA	NA	6486[27]	2371[28]
			Annually	VC Intervention						
1.5.3	Number of people reached with vector control and/or SBCC messages via door-to-door[29]		Project Records	Country	NA	NA	NA	NA	100,885	84434
				Sex Male					51,059	39262
			Annually	sex Female					49,826	45172
2. Entomological and Epidemiological Data to Drive Decision-Making										
2.1	**Vector Control Activities Monitored via Entomological and Epidemiological Data**									
2.1.1	Number of project-supported entomological sentinel sites established to monitor vector bionomics (vector species, distribution, seasonality, feeding time, and location)		Entomological Reports	Country	4	4	4	4	4	4
				VC Intervention						
			Annually		Ento Monitoring Only	Ento Monitoring Only	Ento Monitoring Only	Ento Monitoring Only	IRS Intervention	
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	Country	4	4100%	4	4, 100%	4, 100%	4
			Annually	VC Intervention	Ento Monitoring Only	Ento Monitoring Only	Ento Monitoring Only	Ento Monitoring Only	IRS Intervention	
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	Country	4	4100%	4	4, 100%	4, 100%	4
			Annually	IRS or Entomology Only Program	Ento Monitoring Only	Ento Monitoring Only	Ento Monitoring Only	Ento Monitoring Only	IRS Intervention	

[27] Caps (406), Picture Box (812), Flyers (4115), poster (708), banners (39), Tee-shirt (406). IRS Cards should not be counted as part of this indicator result.

[28] Caps (406), Picture Box (812), Flyers (0), poster (708), banners (39), Tee-shirt (406).

[29] 80% of total population expected to be visited by a spray operator.

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results					
					Year 1		Year 2		Year 3	
					Target	Result	Target	Result	Target	Result
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	Country	10	10100%	19; 100%	18; 100%[30]	18; 100%	18
			Annually	VC Intervention	Ento Monitoring Only	Ento Monitoring Only	Ento Monitoring Only	Ento Monitoring Only	IRS Intervention	
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	Country	N/A	N/A	N/A	N/A	18; (100%)[31]	18
			Annually	Insecticide Type						
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	Country	N/A	N/A	N/A	N/A	18; (100%)	18
				Insecticide Type						
			Annually	Insecticide Type						
2.1.7	Number of countries with an integrated vector control analytics dashboard created by PATH, available for decision-making	X	Project Reports	Country						
			Annually							
2.1.8	Number of people trained (VectorLink and non VectorLink staff) in entomological monitoring		Project Records	Country	17	17	19	19	20	35[32]
			Annually	Male:	13 (76%)	13 (76%)	15 (79%)	15 (79%)	75%	
				Female	4 (24%)	4 (24%)	4 (21%)	4 (21%)	25%	
2.1.9	Number and percentage of sites in which WHO cone bioassays were conducted to evaluate bio-efficacy of bed nets		Entomological Records	Country	NA	NA	NA	NA	NA	
			Annually							
2.1.10	Number of nets in which WHO cone bioassays were conducted		Entomological Records	Country	NA	NA	NA	NA	NA	

[30] While 19 sites were initially planned for, PMI/VectorLink jointly agreed to postpone 3 entomology sites to avoid overlap with Global Fund.

[31] Fludora Fusion for Sakassou, Sumishield for Nassian

[32] Swiss Center facilitated a two-day orientation.

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results					
					Year 1		Year 2		Year 3	
					Target	Result	Target	Result	Target	Result
	to evaluate bio-efficacy of bed nets		Annually							
2.2	**NMCPs Develop Country-Level IRS and Other Malaria VC Strategies**									
2.2.1	Number and percentage of countries with an integrated malaria vector control strategy, including a plan for monitoring and managing insecticide resistance supported by the project	X	Project Records	Country						
			Annually							
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	Country						
			Annually							
2.2.3	Number of countries that implement sub-national insecticide rotation	X	Project Records	Country						
			Annually							
2.3	**Build capacity of NMCPs and local institutions to collect, analyze, and use data for strategic malaria control decision-making**									
2.3.1	Number of individuals trained from NMCPs and national institutions to review and interpret data for integrated vector control decision making		Project Training Records	Country	NA	NA	NA	NA	12[33]	37[34]
			Annually	Organization						
				Job Function						
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	Country	NA	NA	NA	NA	12[35] (100%)	0
				Job Function						
			Thrice Over Project Life	Organization						

[33] Tableau software training with District(8), NMCP (2), DIIS(National information health system) (2)

[34] NMCP, DIIS, and district M&E (2 NMCP staff trained in ento and 35 trained in ento data collection)

[35] District Data Managers/CSE (8), NMCP Data managers/M&E (1), NMCP Vector Control Specialist (1), DIIS data Managers/M&E(2)

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results					
					Year 1		Year 2		Year 3	
					Target	Result	Target	Result	Target	Result
3. Procurement and Logistics										
3.1	**Cost-Effective Procurement Mechanism Established**									
3.1.1	Number and percentage of insecticide procurements that had a pre-shipment QA/QC test, done by a third party, at least 60 days prior to spray campaign	X	Procurement Records Annually	Country Insecticide Type						
3.1.2	Number and percentage of insecticide procurements received on-time to allow for the initiation of spray operations as scheduled		Procurement Records	Country	NA	NA	NA	NA	2 (100%)	2
			Annually	Insecticide Type					Insecticide Type:	
									Fludora fusion(1)	1
									Sumishield(1)	1
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	Country						
			Annually	VC Intervention						
3.1.4	Number of VectorLink staff trained on procurement	X	Project Records	Country						
			Annually							

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results					
					Year 1		Year 2		Year 3	
					Target	Result	Target	Result	Target	Result
3.2	**Robust Inventory Management and Logistics Systems Established**									
3.2.1	Number and percentage of logistics and warehouse personnel (seasonal and full-time) trained in VC supply chain management		Project Training Records	Country	NA	NA	NA	NA	24[36]	25
				VC Intervention						
			Annually	Sex Male					17	15
				Sex Female					7	10
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	NA	NA	NA	NA	19;100%	19
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						
4. Innovation										
4.1	**Conduct operational research or monitoring to scale up new tools, methods, and approaches**									
4.1.1	Number of operational research studies on promising new tools or new methods/approaches to existing tools that are implemented		Project Records Annually	Country Type of Innovation	NA	NA	NA	NA	0	0
4.2	**Create and share knowledge through dissemination of best practices and lessons learned**									
4.2.1	Number of innovations, best practices, and other data or lessons learned shared with other partners or international institutions for global reporting on the Vector Learning Exchange	X	Project Records	Country						
			Annually	Technical Area						
4.2.2	Number of individual members who use the Vector Learning Exchange	X	Project Records	N/A						
			Annually							

[36] Storekeepers(19), Districts Storekeepers(2), Central storekeeper(1), logistic assistants(1)

#	Performance Indicator	Global Project Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results					
					Year 1		Year 2		Year 3	
					Target	Result	Target	Result	Target	Result
4.2.3	Number of symposia and/or presentations submitted to and accepted at global conferences		Project Records	Country	0	0	0	0	2	1[37]
				Technical Area						
			Annually							
4.2.4	Number of success stories written or videos produced and shared on the VectorLink project website		Project Records	Country	0	0	0	0	1	3[38]
			Annually							
4.2.5	Number of peer-reviewed journal articles submitted and accepted	X	Project Records	Technical Area						
			Annually							
4.2.6	Number of contributions to vector control global or country policy and/or guidance documents		Project Records	Country	0	0	0	0	2	4[39]
4.3	**Develop and deploy cost-savings approaches**									
4.3.1	Number of innovative or novel approaches implemented to achieve cost savings in IRS and integrated malaria vector control programs		Project Records	Country	NA	NA	NA	NA	1	2
				Transportation						1
			Annually	local procurement						1
4.3.2	Number of cost effectiveness assessments of existing approaches in the implementation of IRS and integrated malaria vector control programs		Project Records	Country	NA	NA	NA	NA	NA	N/A
			Annually	VC Intervention						
4.4	**Cultivate public-private partnerships**									
4.4.	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	Country	NA	NA	NA	NA	0	2[40]
			Annually							

[37] ASTMH

[38] 3 videos shared on the website with NMCP IEC/BCC

[39] NMCP M&E plan (1); CNLAV (1), entomologic profile (1),; Strategic Plan (1)

[40] Memorandum of Understanding (2)

ANNEX B: ENVIRONMENTAL MITIGATION AND MONITORING REPORT

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 • 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. • 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, Food and Agriculture Organization (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.	Entomological activities are entrusted to the Swiss Center for Scientific Research in Abidjan (Center complies with international guidelines) as a subcontractor of PMI VectorLink.	N/A	N/A
3. Public Health Commodities	N/A	N/A	N/A
4. Small-Scale Construction	N/A	N/A	N/A
5. Small-Scale Water and Sanitation	N/A	N/A	N/A
6. Nutrition	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
7. Vector Control • 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. • Maintain procurement and inventory logs. • Ensure storage facility and PPE are appropriate for the active ingredient used and in accordance with approved SOPs. • Distribute insecticides to facilities that can manage such commodities safely in storage, use, and disposal (i.e., in a manner generally equivalent to Implementing Partner's own SOPs/WMP). • Inspect and certify vehicles used for insecticide or team transport prior to contract. • Train drivers. • Ensure availability of cell phone, PPE, and spill kits during insecticide transportation.	• Appropriate PPE has been provided to all personnel involved in IRS operations. • 22 sites were inspected to ensure proper management of insecticide storage, use, and disposal. • 76 tricycles and 28 Kia buses used for transport during the campaign were inspected and certified according to best practices. All vehicles were equipped with spill kits and first aid kits. • Driver training took place on August 8, 2020. A total of 125 drivers were trained for the 2020 spray campaign. • All drivers had cell phones as a prerequisite for hiring and were given PPE and spill kits after completing training on the inspection vehicle. • PMI VectorLink Cote d'Ivoire carried out supervision for the inspection of morning mobilization vehicles. • 557 medical examinations and 54 pregnancy tests were carried out on August 2-8, 2020, before hiring SOPs, team leaders, site managers, and washers. • International and local purchases were successfully carried out before all training sessions. • Instruction on the correct insecticide mixing procedure was included in all training. Pump technicians were trained in spray pump maintenance and progressive rinsing (August 3-4, 2020). • Adequate facilities and supplies have been procured for end-of-day clean-up. • Correct cleaning procedures were used.	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
• Do initial and 30-day pregnancy testing for female candidates for jobs with potential insecticide contact. • Health test all spray team members for duty fitness. • Procure, distribute, and train all workers with potential insecticide contact on the use of PPE. • Train SOPs on mixing insecticides and the proper use and maintenance of application equipment. • Provide adequate facilities and supplies for end-of-day clean-up. • Enforce application and clean-up procedures. • Implement 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. • Ensure health facility staff are aware of insecticide poisoning management. • Physically secure storage facilities and transportation vehicles to prevent theft. • Maintain records of all insecticide receipt, issuance, and return of empty containers. • Conduct analysis comparing number of houses treated with number of containers used.	• 376 mobilizers and town criers made the community aware of the behaviors to adopt before, during, and after the spraying of structures with the support of village chiefs, administrative authorities, and other leaders. Two community radios were also used for mobilization. • 55 health workers were trained on poisoning cases from July 13 to 25, 2020. • 22 stores had double locks as a way to reinforce security measures. • Storekeeper Performance forms were regularly completed to ensure the insecticide stock records were up to date and to assess the movement of insecticides. • A total of 53,949 houses were treated with 21,815 sachets of insecticide: one sachet of Fludora® Fusion treated on average 2.2 structures, and one of SumiShield® 50WG treated 2.9. • Supervisors conducted 1,409 DOS to assess the quality of spray techniques. • 163 Storekeeper Performance forms were submitted to report on physical inventories taken during the campaign. • PMI VectorLink Cote d'Ivoire did not transport insecticide over water during the campaign. • 1,121 actors including 379 SOP teams were trained on BMP guidelines and Cote d'Ivoire environmental compliance laws, which included SOPs and the WMP. • SOPs and other seasonal workers wore PPE that accorded with approved SOPs for use of	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
• Examine houses treated to confirm application. • Perform physical inventory counts during the application season. • For shipments of insecticide over water, sachets/ bottles will be packed in 220 liter open-top barrels with a water-tight top and a locking ring, or in a similar durable container. Waterproof labeling must be affixed to the barrel, with the identity of the pesticide, number of bottles inside, the weight, the type of hazard posed by the contents, and the PPE to be worn when handling the barrel. • 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. • Ensure application equipment and PPE are appropriate for the active ingredient used and in accordance with approved SOPs, and maintain equipment to avoid leaks. • Maintain application equipment. • Do not apply insecticides within 30 yards of beekeeping sites. • Handle, treat, and dispose of nonhazardous (general waste) and hazardous wastes in accordance with the approved WMP/SOPs and PMI BMP. • Ensure the WMP, which outlines SOPs for managing waste processes, is in accordance with PMI BMPs and host-country requirements.	clothianidin and deltamethrin during spraying and clean-up. • All pumps were packed and stored at the end of each spray day according to the SOPs for pump maintenance. • Beekeeping sites and other protected areas were not sprayed. • The project has a contract with non-governmental organizations specialized in the management of IRS-generated wastes (empty sachets of insecticides, used masks and gloves, etc.). • The Cote d'Ivoire WMP has met all country requirements and USAID 22 CFR regulations. • All soak pits were constructed in compliance with standards requirements for proper disposal of liquid waste during the campaign. • •All fixed and mobile soak pits contained charcoal according to BMP to absorb the insecticide from rinse water. A private incinerator (RMG) was found in country to support incineration of wastes.		

List Each Mitigation Measure from Column 3 in the EMMP	Status of Mitigation Measures	List Any Outstanding Issues Relating to Required Conditions	Remarks
• Choose sites for disposal of liquid wastes, including fixed and mobile soak pit sites according to PMI BMP. • Construct fixed and mobile soak pits with charcoal according to the BMP to adsorb insecticide from rinse water. • Maintain soak pits as necessary during season. • Monitor waste storage and management during campaign. • Monitor disposal procedures post campaign. • Dispose of wastes only in incinerators that comply with PMI BMP Collect and keep treatment and disposal documents and records on file. • Country-level USAID environmental compliance documentation must contain guidance on proper disposal of wastes.			
8. Emergency Response	An emergency plan was developed. First aid and spill management kits were distributed. Health workers were trained to manage cases of insecticide poisoning. All stakeholders were trained to administer first aid. Incident report forms were made available to all stakeholders. Stakeholders were trained on incident reporting procedures. Due to COVID-19, the project put in place a contingency plan, and spill and emergency response procedures guidelines.		