THE PMI VECTORLINK PROJECT ETHIOPIA 2018

END OF SPRAY REPORT

SPRAY CAMPAIGN:
MAY 21 – JULY 31, 2018

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ACRONYMS

AIRS	Africa Indoor Residual Spraying
BCC	Behavior Change Communication
BMP	Best Management Practices
CFV	Control Flow Valve
DCV	Data Collection Verification
DEC	Data Entry Clerk
DHO	District Health Office
DOS	Directly Observed Spraying
EC	Environmental Compliance
ECO	Environmental Compliance Officer
EE	Error Eliminator
EPHI	Ethiopian Public Health Institute
FEFO	First to Expire First Out
FMOH	Federal Ministry of Health
HEW	Health Extension Worker
IEC	Information, Education and Communication
IR	Insecticide Resistance
IRS	Indoor Residual Spraying
M&E	Monitoring and Evaluation
MEP	Monitoring and Evaluation Plan
MFP	Malaria Focal Person
MSP	Mobile Soak Pits
NMCP	National Malaria Control Program
PERSUAP	Pesticide Evaluation Report and Safer Use Action Plan
PMI	President's Malaria Initiative
PPE	Personal Protective Equipment
PSECA	Pre-Season Environmental Compliance Assessment
RHB	Regional Health Bureau
SEA	Supplementary Environmental Assessment
SNNPR	Southern Nations, Nationalities and Peoples' Region
SOP	Spray Operator

SQL	Squad Leader
SSA	Sprayable Surface Area
TL	Team Leader
TOT	Training of Trainers
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

The President's Malaria Initiative (PMI) has funded indoor residual spraying (IRS) in Ethiopia since 2008 with the aim of reducing the malaria burden, especially among children less than five years old and pregnant women. Under the PMI Africa Indoor Residual Spraying (AIRS) projects (2012-2017), Ethiopia successfully implemented six IRS campaigns. In each campaign, it sprayed 36 districts in Oromia Regional State. In 2017, the project conducted IRS in an additional eight districts in Benishangul-Gumuz region. In 2018, PMI VectorLink Ethiopia conducted IRS in 44 target districts in three regions: Benishangul-Gumuz (20), Gambela (14), and Oromia (10), initially targeting 595,618 structures using Actellic 300 CS (pirimiphos-methyl, an organophosphate) from May 21 to July 31, 2018 (60 days).

Implementation of Ethiopia's IRS program in 2018 was built upon lessons learned as the country entered its eleventh year of PMI support for IRS. The start dates for the IRS campaign were staggered mainly because the rains start earlier in Gambela region and certain target districts there become inaccessible due to flooding. Additionally, staggering the IRS campaign dates gave the PMI VectorLink leadership team the opportunity to maximize their time supervising logistics and spray quality in each region.

The spray campaign in Gambela region took place from May 21 to June 14, except in Gambela Town and Abobo district where spraying was extended for six days to allow the team to conduct a mop-up exercise between July 2 and 7. Spraying in Oromia and Benishangul-Gumuz started on June 11 and ended on July 31. The campaigns in these regions extended beyond the original end date, mainly because security concerns forced the interruption of spraying in some districts.

Spray operators (SOPs) sprayed 472,569 of the 485,358 structures they found in the 44 IRS target districts, accounting for a coverage rate of 97.4 percent. Relative to the adjusted target[1] of 574,042 structures, this represents 82.3 percent of the targeted structures having been sprayed. The lower than expected spray progress was mainly due to overestimation of the target structures by the regional health bureaus in the 12 new districts in Benishangul-Gumuz Region and in the 14 new districts in Gambela Region. In total, 1,264,189 residents were protected, including 213,459 children under five years old (16.8 percent of residents protected) and 28,944 pregnant women (2.3 percent). The results are summarized in Table ES-1.

VectorLink Ethiopia trained a total of 2,413 people to deliver IRS in 2018. These included 1,378 SOPs, 393 squad leaders, 276 supervisors, 324 porters, and 42 pump technicians. Overall, 9.4 percent (n=226) of all IRS personnel were female.

A total of 114,897 bottles of Actellic 300 CS were used to spray the 472,569 structures. This left 97,467 bottles unused at the end of the spray round. This balance was higher than expected because the number of structures had been overestimated and the structures found in Gambela and Benishangul-Gumuz regions had less sprayable surface area than estimated. The remaining bottles, which expire in March 2020, will be used in next year's campaign.

Wall bioassays conducted within one week of spraying to assess the quality of spraying in four selected districts recorded 100 percent mortality of wild *Anopheles arabiensis* except for one district (Bambasi) where the results showed 95.8 percent mortality. As a corrective measure, the affected house was re-sprayed and excluded from subsequent cone bioassay tests. At one month post-spray, all the sites showed good mortality on all surface types.

The 2018 IRS campaign faced numerous challenges, which included poor mobilization, inadquate training, and insufficient supervision. VectorLink Ethiopia will thoroughly review its strategy for mobilization,

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[1] Due to security concerns and district re-positioning, some structures were excluded from the target originally approved by PMI.

training, and supervision to ensure smooth implementation of future spray campaigns, including a robust focus on spray quality and data quality assurance.

TABLE ES-1: 2018 IRS CAMPAIGN SUMMARY RESULTS

Insecticide used	Organophosphates (Actellic 300 CS)
Number of regions covered by PMI-supported IRS	3 (Benishangul-Gumuz, Gambela, Oromia)
Number of districts covered by PMI-supported IRS	44
Number of structures found by SOPs	485,358
Number of structures sprayed by SOPs	472,569
2018 spray coverage	97.4%
Population protected by PMI-supported IRS	Total population: 1,264,189 Children under 5: 213,459 Pregnant women: 28,944
Dates of PMI-supported IRS campaign	May 21–July 31, 2018
Length of campaign (total days)	60 days
Number of people trained with U.S. Government funds to deliver IRS	2,413

I. BACKGROUND

The President's Malaria Initiative (PMI) has funded indoor residual spraying (IRS) in Ethiopia since 2008 with the aim of reducing the malaria burden, especially among children less than five years old and pregnant women. Under the PMI Africa Indoor Residual Spraying (AIRS) projects (2012-2017), Ethiopia successfully implemented six IRS campaigns. In each campaign, it sprayed 36 districts in Oromia Regional State. In 2017, the project conducted IRS in an additional eight districts in the Benishangul-Gumuz region. In 2018, PMI Ethiopia requested that VectorLink conduct IRS in 26 new districts and 18 old districts. These 44 target districts were spread across three regions shown in Figure 1: Benishangul-Gumuz (20), Gambela (14), and Oromia (10), initially targeting 595,618 structures using Actellic 300 CS (pirimiphos-methyl, an organophosphate) from May 21 to July 31, 2018 (60 days).

Malaria transmission in Ethiopia occurs up to 2,000 meters above sea level but has been reported to occur in areas up to 2,300 meters under abnormal weather conditions. The country's diverse ecology supports a wide range of transmission intensities. At least 75 percent of the country is malarious with about 60 percent (more than 50 million people) of the total population living in areas at risk of malaria. Annually, 4–5 million people are affected by malaria, which in Ethiopia is caused primarily by *Plasmodium falciparum* and *P. vivax* parasites. Malaria transmission peaks twice per year, from September to December after the long rainy season and from April to May, after a shorter rainy season. *Anopheles arabiensis* is the predominant malaria vector; *An. pharoensis*, *An. funestus,* and *An. nili* play a much lesser role in transmission. Indoor residual spraying (IRS) is one of the vector control interventions to combat malaria that are used in the country.

Under the National Malaria Strategic Plan 2017–2020, the Federal Ministry of Health (FMOH) targets areas where the malaria burden is high to received IRS, and highland fringe areas at risk of epidemics. In 2018, VectorLink Ethiopia originally planned to spray 595,618 structures in 44 districts (including 26 new districts) selected by the National Malaria Control Program (NMCP) and President's Malaria Initiative (PMI), and provide limited material support to 60 graduated districts (Figure 1). The number of targeted structures (Table 1) was determined in collaboration with government counterparts using population estimates.

FIGURE 1: PMI-SUPPORTED DISTRICTS IN 2018
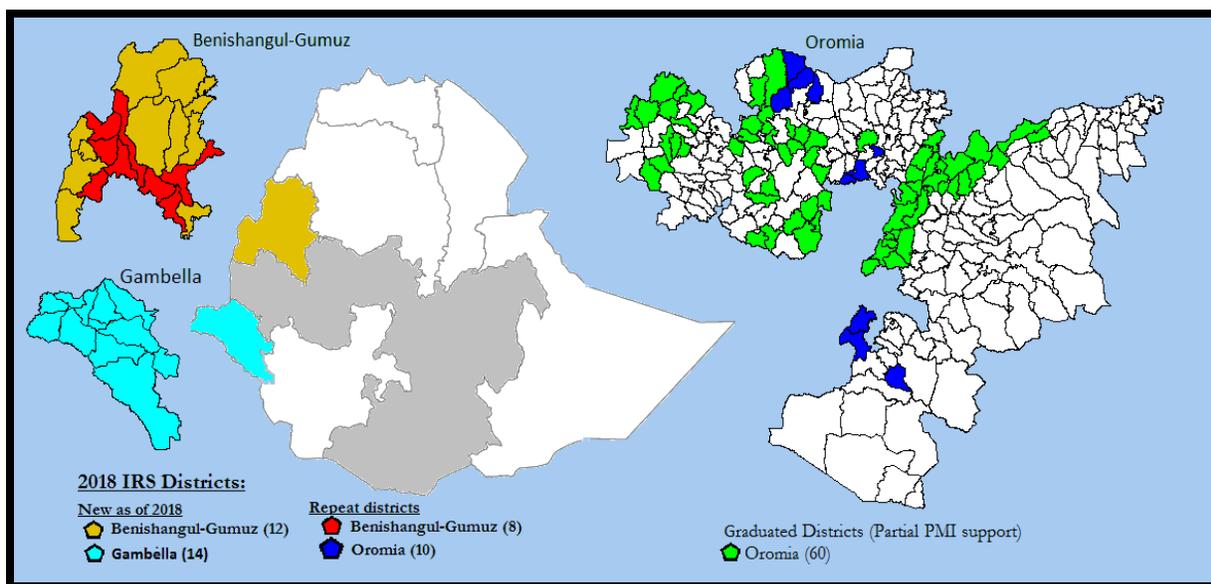
TABLE 1: IRS TARGET DISTRICTS 2018

Region	Zone	Number of Districts	Number of Targeted Structures*	Total Population Targeted
Benishangul-Gumuz	Metekel	7	108,774	285,805
	Kamashi	5	39,382	112,608
	Maokomo Special	1	28,869	64,803
	Assosa	7	153,951	322,791
Sub Total		*20*	*330,976*	*786,007*
Gambela	Nuer	5	54,577	166,444
	Majang	2	29,378	87,587
	Itang Special	1	17,026	52,213
	Gambela Town	1	14,954	57,665
	Agua	5	29,337	89,965
Sub Total		*14*	*145,272*	*453,874*
Oromia	West Guji	3	29,731	157,354
	Horo Guduru Wollega	4	44,765	113,471
	South West Shewa	3	44,874	143,056
Sub Total		*10*	*119,370*	*413,881*
	Grand Total	**44**	**595,618****	**1,653,762**

* These were the original targets based on government data but in some areas of Benishangul-Gumuz and Gambela, the VectorLink Ethiopia team found significantly fewer structures than expected. The project will re-evaluate the number of structures for next year.

** Due to security concerns and government district re-positioning, a total of 21,576 structures were later excluded from the target. Of the 21,576 structures excluded, 14,849 structures were excluded due to security concerns.

The main objective for the PMI VectorLink Ethiopia 2018 spray season was to work with the FMOH, the Benishangul-Gumuz, Gambela, and Oromia regional health bureaus (RHBs), and district health offices (DHOs) to spray approximately 595,618 targeted structures in 44 districts in the three regions: 20 in Benishangul-Gumuz, 14 in Gambela, and 10 in Oromia. In addition to spraying, the project aimed to carry out the following activities:

- Build capacity at the national, regional, district, and local levels to manage IRS operations, including planning, spraying, resource allocation, and monitoring and evaluation (M&E).
- Conduct training with a focus on IRS supervision and spray techniques to improve the overall quality of spraying.
- Provide regular M&E for VectorLink to ensure data quality.
- Mainstream gender equality and female empowerment into all project operations.
- Carry out a logistics assessment in all districts and arrange all procurement, shipping, delivery, and storage of IRS commodities.
- Strengthen the IRS logistics and warehousing system through enhanced training and supervision.
- Ensure safe and correct insecticide application to minimize human and environmental exposure to IRS insecticides, in compliance with the Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP) and Supplemental Environmental Assessment (SEA).
- Provide technical support to IRS operations in 60 graduated districts in Oromia.
- Coordinate advocacy and community mobilization activities in collaboration with stakeholders to raise awareness of IRS and to encourage beneficiary and stakeholder ownership.
- Conduct insecticide resistance (IR), wall bioassays, vector density monitoring, and behavioral studies.

2. Pre-IRS Activities

The VectorLink Ethiopia project and the Benishangul-Gumuz, Gambela, and Oromia regional states systematically worked together to ensure a smooth planning process. The team used the existing government structure and systems to implement IRS activities and promote sustainability of the program. DHO heads and districts malaria focal persons (MFPs) led IRS implementation and management in their districts with support and leadership from the regional experts (Regional MFP and Malaria Technical Advisor). During the micro-planning meeting, the stakeholders agreed to exclude kebeles with low risk of malaria and altitude above 2,000 meters from the target.

Health Extension Workers (HEWs) and local community leaders were assigned the community mobilization activities. Health professionals at various district health system levels served as squad leaders (SQLs) and team leaders (TLs), supervisors, and trainers of spray operators (SOPs). SOPs were recruited from within the target areas using IRS actor selection criteria and guidelines.

2.1 Structure Verification Assessment And Setting Targets

As noted above, VectorLink Ethiopia planned to target approximately 595,618 structures in 44 PMI districts, 26 of which were new districts. Due to security concerns and the government district re-positioning system, a total of 21,576 structures were excluded from the origianl target to give a total adjusted target of 574,042 strucutures. For details on the kebeles invloved, refer to table C8 in the Annex. VectorLink Ethiopia worked with the Gambela and Benishangul-Gumuz RHBs to estimate the number of eligible structures in these districts. Whenever possible, the team used spray data collected by the RHBs during the previous spray round. If the districts did not have IRS data, the project relied on recommendations from the RHBs. In the 18 districts previously sprayed by the PMI Africa Indoor Residual Spraying (AIRS) project, VectorLink used the number of found structures from the 2017 spray season as the target. There are approximately 400,000 refugees living in refugee camps in Gambela Region. This population is not covered by the PMI IRS program.

VectorLink Ethiopia also worked with the DHOs in the new districts to identify and select operations sites. The criteria for the selection of operations sites were based on proximity to the main health center in the district and ability to meet environmental compliance (EC) standards. The distance between kebeles (villages) determined how many operations sites were to be established; in districts with appreciable distance between kebeles, at least two sites were established.

The VectorLink team traveled to Gambela with members of the PMI Ethiopia team and the Gambela RHB in January 2018 to conduct a feasibility assessment in two districts of the region, Gog and Abobo. The group examined houses to assess their eligibility for spraying, and logistical factors that might impede the spray campaign. Generally, the housing structures found were sprayable, and therefore, the area was recommended for IRS in 2018. During the assessment, meetings with the RHB also revealed that 13 of the 14 district centers in Gambela have road access. It was noted, however, that roads in the region become inaccessible during the rainy season, and so it was recommended that Gambela begin IRS two weeks earlier than Benishangul-Gumuz and Oromia.

2.1.1 Benishangul-Gumuz Region

Benishangul-Gumuz Regional State is situated in northwestern Ethiopia. It borders Amhara region to the north, the Sudan Republic to the west, and Oromia to the east. The estimated population density is 15.9

people per square kilometer. The region has three zones (Assosa, Kamashi, and Metekel) and 20 districts (one special district and 19 districts). Elevation ranges from 580 to 2,731 meters above sea level and annual rainfall averages 800–2,000 mm. In 2017, eight districts were sprayed with PMI support and 12 districts were sprayed by the RHB. Therefore, the VectorLink team used the structures found by the PMI and RHB programs as the target for 2018. In total 311,912 structures received IRS in 2017. After adding an average of 6.1 percent on top of the structures estimated by the RHBs for the new PMI districts, the number of targeted structures was 330,976 (Table 2).

TABLE 2: TARGET SUMMARY IN BENISHANGUL-GUMUZ REGION

Woreda	Structures Sprayed 2017	Structures Targeted 2018	Remarks
Homosha	12,754	12,754	
Assosa	31,373	36,231	
Kumruk	9,266	9,266	
Belo Jegenfoy	10,816	11,364	
Mandura	12,466	16,021	The number of structures were established in consultation with the regional health bureau and respective district health offices
Bullen	14,908	16,068	
Wombera	10,811	13,725	
Dangur	12,370	15,015	
Dibate	18,833	22,217	
Guba	9,397	9,397	
Pawi Woreda	16,331	16,331	
Mao-Komo Special	28,869	28,869	
Menge	33,650	33,650	
Sherkole	18,434	18,434	
Bambasi	20,514	20,514	
Oda Buldigilu	23,102	23,102	Target set based on 2017 PMI AIRS spray campaign's found structures.
Sedal	6,953	6,953	
Agalo Mete	7,583	7,583	
Kamashi	5,734	5,734	
Yaso	7,748	7,748	
Total	**311,912**	**330,976**	

2.1.2 GAMBELA REGION

Gambela Regional State is situated in southwestern Ethiopia. The region borders Oromia region to the north, the Southern Nations, Nationalities and Peoples' Regional State (SNNPR) and the Republic of South Sudan to the south, Oromia and SNNPR to the east, and the Sudan Republic to the west.

Administratively, the region is subdivided into three zones, 13 districts, and one special district. Agnewak zone comprises five districts (Gambela Zuria, Gambela Town, Abobo, Jor, and Dima), Nuwar zone five districts (Lare, Jikawo, Wantawo, Akobo, and Makuey), and Mezhenger zone two districts and one special district (Godre, Mengesh, and Etang special district). Elevation ranges from 400 to 800 meters above sea level and annual rainfall averages 1,150 mm.

The region is sparsely populated with an estimated density of approximately 10 people per square kilometer. The average household size is 4.6 persons. The 2017 spray data showed that the RHB sprayed a total of 104,919 structures in the region, protecting 422,498 persons. Because three districts (Abobo, Godare, and Jor) did not conduct IRS in 2017, the number of targeted structures in these districts was based on recommendations from the DHO. Consequently, the final target was estimated to be 145,272 structures, based on the 2017 spray data and after adding an average 4.4 percent to account for structures that might have been left out in 2017 (Table 3).

TABLE 3: STRUCTURES TARGETED IN GAMBELA REGION

Woreda	Structures Sprayed 2017	Structures Targeted 2018	Remarks
Gambela Zuria	4,682	5,105	
Gog	2,965	8,112	
Abobo	6,544	7,990	
Dimma	12,526	3,856	Highland areas (above 2000m) excluded based on NMCP guidelines
Jor	n/a	4,274	Based on recommendation of regional experts
Akobo	n/a	11,394	
Jikow	8,619	9,998	
Lare	13,429	15,511	
Makuey	6,825	7,673	
Wanthoa	8,234	10,001	
Godare	n/a	18,693	Based on recommendation of regional experts
Mengeshi	12,740	10,685	Highland and hard-to-reach villages excluded
Itang Special	15,220	17,026	
Gambela Town	13,135	14,954	Town center excluded in 2017 and 2018
Total		**145,272**	

2.1.3 OROMIA REGION

Oromia Regional State is the largest and most populous regional state covering about 290,000 square kilometers, about one-third of the country's geographical expanse. Of the 333 districts in the region, 42 are urban and 291 are rural district administrations. The total population is estimated at about 37 million.

Of the 2.8 million structures targeted for IRS in 2017, 2.4 million were sprayed in 2017 by both PMI and the GoE combined. The PMI AIRS project sprayed 715,541 structures in 36 districts in 2016; in 2017, it sprayed 615,932 structures, again in 36 districts – though not all the same 36 as in 2016.

In 2018, the PMI team in collaboration with the ORHB recommended that only 10 Oromia districts be sprayed. Since all 10 had been sprayed by the PMI AIRS program, the team set the 2018 target using the number of structures found in 2017 (Table 4).

TABLE 4: TARGET SUMMARY IN OROMIA REGION

Woreda	Structures Sprayed 2017	Structures Targeted 2018	Remark
Abay Chomen	11,464	11,464	Target set based on structures found by SOPs in 2017
Abe Dengoro	19,768	19,768	
Amuru	8,526	8,526	
Jardega Jarte	5,007	5,007	
Goro	12,777	12,777	
Ilu	20,214	20,214	
Waliso	11,883	11,883	
Abaya	11,482	11,482	
Gelana	10,001	10,001	
Melka Soda	8,248	8,248	
Total	119,370	119,370	

2.1.4 STRUCTURE SIZES AND TYPE

During the structure verification assessment in November 2017, the team also took measurements in 20 randomly selected structures in each of two kebeles per district (total of 407 structures in Gambela and 475 structures in Benishangul, as shown in Tables 5 and 6). Information on the type and eligibility of each structure was taken. All structures assessed were found to be eligible for IRS. The sample, though not entirely representative of the district, provided a picture of what was expected to be found. The structures sampled were predominantly mud-plastered, and either rectangular or circular.

Structures in Gambela were generally small, with an average sprayable surface area (SSA) of 60.0 m² (range: 16–248 m²) though some heterogeneity of size was observed (Table 5). Onto this, the assessment team added 10 percent to the surface area estimation in consideration of the eaves and to accommodate any errors in the measurements. The calculated SSA included the ceilings of eligible structures, per the PMI Best Management Practices (BMP) manual, which in the end were not consistently sprayed by SOPs.

TABLE 5: STRUCTURE SIZE AND TYPE IN GAMBELA REGION

District	SSA in m2			SSA m2 + 10%	# of Structures Measured	Structure Type*
	Avg	Min	Max			
Gambela Zuria	34.1	22	54	37.5	32	1
Gog	30.2	18	36	33.2	26	2
Abobo	59.3	23	118	65.2	30	2
Dima	38.2	19	176	42.0	27	1
Jor	29.6	16	105	32.6	26	2
Akobo	ND	ND	ND	ND	ND	ND
Jikawo	38.6	27	154	42.5	26	2
Lare	36.8	25	70	40.5	32	2
Makoy	39.8	22	152	43.8	30	2
Wonthawo	37.5	22	104	41.3	38	2
Godere	91.05	36	248	100.2	38	1
Mengeshi	110.5	31	205	121.6	24	1
Itang	36.9	23	87	40.6	38	2
Gambela Town	126.0	66	151	138.6	40	1
Average/ Sum	54.5			60.0	407	

*1: Rectangular – Mud plastered; 2: Circular – Mud plastered; ND= Not Done due to inaccessibility

Structures in the new districts of Benishangul-Gumuz were observed to be larger than those in Gambela. The average sprayable surface area of structures measured in Benishangul-Gumuz region was 103.4 m² (range: 26–280 m²). The structures were predominantly mud plastered, with roofs of either corrugated iron sheeting or grass thatch (Table 6). In Oromia region, the project used the information from the previous PMI-supported IRS campaign to quantify the insecticide need for 2018.

TABLE 6: STRUCTURE SIZE AND TYPE IN BENISHANGUL-GUMUZ REGION

District	SSA in m2			SSA m2 + 10 %	# of Measured Structures	Structure Type*
	Avg	Min	Max			
Homosha	77.0	26	157	84.7	42	2
Assosa Zuria	95.0	35	123	104.5	40	2
Kurmuk	77.0	27	151	84.7	40	1
Belo Jigenfoy	87.0	25	162	95.7	42	1
Mandura	103.0	36	180	113.3	40	2
Bulen	90.0	30	280	99	40	1
Wenbera	77.0	38	228	84.7	40	2
Dangur	103.0	32	234	113.3	40	2
Dibate	109.0	53	256	119.9	40	1
Guba	70.0	34	209	77.0	40	2
Pawi	122.0	64	237	134.2	40	1
Mao Komo	118.0	30	270	129.8	31	1
Average/ Sum	94.0			103.4	475	

*1: Rectangular – Mud plastered; 2: Circular – Mud plastered

2.2 MICRO-PLANNING MEETINGS

Two two-day micro-planning meetings were conducted. One was for the 26 new districts and the other was for the 18 "old" PMI districts. In both sessions, the VectorLink team used a pre-formatted data collection tool with comprehensive variables to get all information (i.e., sprayed kebeles, targeted structures, sprayed structures, total population protected, children under five protected, pregnant women protected, insecticides used and number, daily output, average structure per sachet/bottle, and average SSA in square meters) from the districts. The meetings also discussed and developed IRS operational plans with district teams. Issues discussed during the micro-planning meetings include:

- Timing of spray operations
- Spray campaign duration (# of days)
- Spray performance targets
- Monitoring and supervision plan
- Recruitment of spray operators
- Commencement date for spray operations
- Role and responsibilities of stakeholders before, during, and after spray operations.
- Importance of including more women in IRS

The meeting resulted in the VectorLink team having comprehensive information on spray timing based on the rainy season and the peak of the malaria cases. The meeting also provided information on structure targets per kebele, supervision plan, recruitment process, roles of each actor, and women's participation. Based on this information, the VectorLink team in collaboration with regional, zonal, and DHOs prepared an implementation plan for the 2018 IRS campaign.

2.3 INSECTICIDE SELECTION

Ethiopia has an insecticide resistance management structure that uses entomological studies to select insecticides to be used in the country. The Technical Advisory Committee, which meets twice per year, recommended the use of Actellic 300 CS, an organophosphate, for the 2018 spray campaign in all 44 districts. The selection was based on data obtained from insecticide susceptibility tests conducted from 2014 to 2017,

which showed that the main malaria vector, *An. gambiae* s.l., was susceptible to pirimiphos-methyl in all sites where the testing was done.

2.4 QUANTIFICATION AND PROCUREMENT

The VectorLink Ethiopia program quantified and procured personal protective equipment (PPE), insecticide, and spray equipment for the 2018 spray round based on the number of structures targeted in the districts and on the results of the inventory remaining after the 2017 campaign. The tenders were evaluated for technical soundness and overall value. Other IRS commodities were quantified based on the number of IRS actors and also sometimes based on the number of days that the district was planning to spray.

The insecticide need for new districts was quantified based on the target number of structures per district and the average SSA per structure (see Section 3.1.4). The SSA was calculated per district and multiplied by the number of planned structures in the districts. The product was then divided by 250, corresponding to the average surface area that one bottle of Actellic 300 CS can cover if applied per the PMI BMP. This was the basis for estimating the amount of insecticide for the new PMI-supported districts. The old PMI-supported districts in Benishangul-Gumuz and Oromia assumed consumption rates of 4.0 and 2.5 structures per bottle, respectively, based on the consumption rates observed in 2017. A 5 percent buffer was added only for the 26 new PMI districts. Based on this, VectorLink Ethiopia estimated that the total amount of Actellic 300 CS needed for the 2018 IRS campaign was 212,396 bottles. Table 7 shows the estimated quantities of insecticide needed per region. With 70,984 bottles of Actellic 300 CS leftover from 2017, the program needed to procure 141,412 additional bottles for 2018 IRS.

TABLE 7: SUMMARY OF INSECTICIDE

Region	# Structures	Insecticide Needed (bottles)	5% Buffer for New Districts Only	Total Estimated Insecticide Need
Gambela @ 60 m2 SSA	145,272	38,012	1901	39,913
Benishangul-Gumuz New @ 103 m2 SSA	207,258	89,338	4467	93,805
Benishangul-Gumuz old @ 4.0 structures/bottle	123,718	30,930	n/a	30,930
Oromia @ 2.5 structures/ bottle	119,370	47,748	n/a	47,748
Total	595,618	206,028	6368	212,396
Stock balance (at hand from 2017)				70,984
2018 Actellic Procurement				141,412

All 141,412 bottles were received on June 9, 2018 – several days after the planned start of the spray campaign in Benishangul-Gumuz and Oromia (originally scheduled to begin on June 4). As a result, VectorLink Ethiopia postponed the start to June 11. Although the project could have started the campaign with the stock already on hand, it postponed to ensure that all insecticide was in country to avoid any interruptions due to stock-outs.

A consignment of PPE, including 4,784 pairs of gloves, 225 helmets, and 61,690 nose masks, was received at the end of May 2018. A total of 850 Hudson pumps were received on May 8, before the start of spraying in Gambela. VectorLink Ethiopia also procured 3,031 constant flow valves (CFVs) and 1,542 ceramic yellow nozzle tips, which were received in June 2018 in time for the Benishangul-Gumuz and Oromia start dates. Various entomology materials were also procured through the home office.

Coveralls, neck protectors, printing of M&E data entry forms, and transport services were procured locally through an open national competitive bidding process. All the tenders were evaluated by the VectorLink procurement committee.

Table A-1 in Annex A lists the commodities that were procured internationally and locally. International procurements were based on the number of SOPs for 2018 campaign and the balance brought forward from the 2017 spray campaign. All insecticides and all IRS commodities for the 2018 spray campaign were received and stored at a central warehouse in Addis Ababa.

2.5   SITE PREPARATION AND LOGISTICS

In 2018, the VectorLink project implemented IRS in 26 new districts (14 in Gambela and 12 in Benishangul-Gumuz) and in 18 old districts (10 in Oromia and 8 in Benishangul-Gumuz). To improve spray site compliance with environmental standards, the VectorLink Ethiopia team conducted the pre-spray environmental compliance assessments (PSECAs) in all 44 districts. The PSECAs found that the program needed to rehabilitate all 26 storerooms in the new districts and construct 56 new soak pits in those districts for the program to be ready for the 2018 spraying season. PSECA results in the 18 old districts showed that most storerooms needed minor renovations, 17 soak pits needed minor renovations, and one soak pit needed major renovation. The PSECA also recommended that all the sites (in new and old districts) needed dedicated showers and toilets (male and female)for IRS personnel. The VectorLink Ethiopia team worked with the DHOs to renovate storerooms and construct soak pits to ensure compliance with environmental standards before spraying began. In most districts, DHO staff were not fully engaged and therefore the VectorLink team spent more time renovating the soak pits than expected, which detracted from other responsibilities such as supervising cascade trainings.

All IRS commodities were transported to the IRS sites on time in Gambela region but spraying in Benishangul-Gumuz and Oromia was delayed by one week because of the delayed arrival, clearing, and subsequent dispatch of the insecticide. The shipment of the Actellic 300 CS to Ethiopia was delayed twice by Arysta/Syngenta, which resulted in the shipment arriving two weeks late. The delay was due in part to the VectorLink team requesting an additional 31,412 bottles of insecticide in January, 2018, based on the structure verification assessment done in November, 2017 and particularly due to the Ethiopian requirement for special Amharic labels. For its part, Arysta/Syngenta decided to split the insecticide shipment into two lots (85 percent and 15 percent). The first (85 percent) consignment arrived in Djibouti Port on April 18, 2018, but the clearing process was complicated because Actellic 300 CS is not registered in Ethiopia. While it had previously been cleared quickly from years of collaboration with the government, there were unanticipated delays due to the new administration being unfamiliar with IRS. For this reason, the insecticide only arrived in Addis Ababa in the first week of June, forcing a delay in the start of spraying in Benishangul-Gumuz and Oromia. The VectorLink team met with Arysta/Syngenta in early August 2018 to insist on having Actellic 300 CS registered in Ethiopia. The team was informed that Arysta/Syngenta submitted the documentation for registration in late July; the VectorLink Ethiopia team and the local PMI office will follow up on the registration process to ensure the registration is complete in time for next year's shipment.

To ensure better management of IRS commodities at the district stores, the project trained storekeepers and storekeeper assistants. It also recruited a full-time Warehouse Coordinator to manage both the central and district warehouses. More information on management of insecticide logistics is discussed in Section 4.3.

2.6   IEC AND COMMUNITY MOBILIZATION

Information, Education and Communication (IEC) and Behavior Change Communication (BCC) activities are vital for IRS implementation to ensure successful spray campaigns by promoting community acceptance of the intervention. In 2018, the district MFPs and IEC/BCC experts were responsible for organizing and leading one-day orientation sessions in all 44 target districts for community mobilizers. IRS key messages for pre-, during, and post-spray, including information on household preparation for IRS, avoidance of re-plastering of sprayed walls, and adherence to personal and environmental safety precautions, were discussed.

Despite the generally high IRS acceptance levels during the last several spray rounds, partly as a result of the long history of IRS in Ethiopia, it was still important to familiarize the communities with safety requirements and procedures before and after IRS. Based on gaps in mobilization identified in 2017, the project engaged mobilizers to ensure that households were adequately informed of actual spray dates, and that eligible structures were adequately prepared in advance of the arrival of SOPs. The use of Actellic 300 CS for the first time in 26 of the 44 districts presented the need to engage mobilizers to provide specific messages to households on safety precautions to ensure acceptance and a successful spray round.

The district IEC focal persons coordinated all mobilization activities through the kebele administration, HEWs, and other channels, including kebele meetings and in churches and mosques. HEWs received orientations on how to conduct community outreach and on specific key IRS messages to be delivered to beneficiaries in their respective kebeles. Table F-1 in Annex F shows the number of mobilizers per district.

Mobilization for the 2018 IRS campaign was under the purview of the Government of Ethiopia), as was the case for many years in Oromia and Benishangul-Gumuz under AIRS. However, it was evident that the mobilization conducted by the RHBs were insufficient for the Gambela and Benishangul-Gumuz regions as most urban areas recorded low acceptability, especially in Gambela, and homeowner preparation was poor in some Gambela districts.

2.6.1 TRAINING

IRS is a highly technical process and demands vigorous and thorough training of all personnel involved in order to achieve the intended impact. VectorLink Ethiopia, in collaboration with the local DHO, trains its seasonal IRS personnel each year before spray operations begin so that they are able to spray structures correctly.

The cascade training were not well supervised because the VectorLink Zonal Coordinators were unexpectedly preoccupied with the renovation of the storerooms, soak pits, and bathrooms. This led to inadequately trained SOPs and SLs in most districts in Gambela region.

Table 8 lists each type of IRS training conducted, and gives a description of the hiring process, its contents and its duration. Table 9 lists the number of people trained, and Table 10 disaggregates trainees by gender.

TABLE 8: TYPE, DESCRIPTION, AND DURATION OF TRAININGS

Type of Training	Description of Training	Duration of Training
Training of Trainers (TOT) and Supervisors	Participants included district MFPs and supervisors at regional, zonal, and district level. The training trained people who will train seasonal workers (SOPs, SLs, porters, and community mobilizers). The emphasis was to ensure that trainers are able to effectively explain and demonstrate current IRS best practices. The supervision component was to improve supervision.	5 days
Spray Operators	VectorLink Ethiopia worked with the DHO to recruit and train SOPs in all 44 target districts. The training built SOPs' capacity to conduct IRS and communicate with households effectively. The emphasis was to ensure that SOPs find all structures and conduct quality spraying. Other topics covered: introduction to malaria control, spray techniques, handling and managing insecticides and spray pumps, personal and environmental safety, leading a spraying team, data collection and filling out data collection forms, and basics of IEC for IRS.	6 days

Type of Training	Description of Training	Duration of Training
Squad Leaders	SQLs were recruited by DHOs in collaboration with VectorLink Ethiopia. The training built the capacity and skills of SQLs to lead a team of at least 4 SOPs ensuring that spraying is completed on schedule and delivered with a high degree of quality. SLs were also trained in recording and reporting spray data.	6 days
Data Entry Clerks (DECs)	DECs were trained on the following topics: familiarity with data collection forms (SOP and TL forms, and the Spray Quality Checklist), understanding key IRS definitions (e.g., eligible structure) and indicators and responsibilities, reviewing collected data and spotting irregularities, timely, consistent, and accurate reporting, setting appropriate and realistic reporting timelines, establishing back-up reporting/ communication protocols, VectorLink database and security protocols.	3 days
Logistics	At least two storekeepers from each target district (one a government employee and the other one a VectorLink seasonal storekeeper) were trained on store and inventory management.	3 days
Clinicians	Clinicians were recruited from at least one key health facility from each target district. The training focused on insecticide poisoning management, poisoning prevention and mitigation practices, and health hazards and their management.	1 day
Community Mobilizers	CHWs were trained to increase the community's understanding of malaria, acceptance of IRS, and awareness of the IRS spray schedule.	1 day
Drivers	Newly hired drivers certified to drive for the 2018 IRS spray season were provided an overview of the importance of safely transporting IRS materials and workers.	1 day

TABLE 9: NUMBER OF PEOPLE TRAINED WITH U.S. GOVERNMENT FUNDS TO DELIVER IRS*

Type of Training	Squad Leaders	Spray Operators	Porters	Team Leaders	Pump Technicians	District Malaria Focal persons	District Supervisors	Zonal Supervisors	Regional Supervisors	Males	Females	Total
Training of Trainers				81		44	129	17	5	268	8	276
Spray operations	393	1378	324		42					1,919	218	2,137
Total	393	1378	324	0	42	0	0	0	0	2,187	226	2,413

* The number of people trained using USG funds is a subset of total trained personnel; the attendees for each training are detailed in Table 10

TABLE 10: NUMBER AND TYPE OF SEASONAL TRAININGS, BY GENDER

	Training on IRS Delivery								Other Trainings														
	Training of Trainers(Supervisors)		Spray Operations		Pump Technician Training		Poison Management		National Capacity Building on IRS Implementation		Data Capture and Reporting		EC, Washing, Fire Safety and Operation Site Security		Store Management and Safety		SBCC, Mobilization and Enumeration		Transport Safety and Security		Total		Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
Regional Supervisors	4	1																			4	1	5
Zonal Supervisors	17	0																			17	0	17
District Supervisors	123	6																			123	6	129
District MFPs	42	2																			42	2	44
Team Leaders	78	3																			78	3	81
VectorLink Technical Staff																					0	0	0
Data Entry Clerks											45	4									45	4	49
Clinicians							90	13													90	13	103
IEC Mobilizers																	373	1,095			373	1,095	1,468
Squad Leaders			369	24																	369	24	393
Spray Operators			1296	82																	1,296	82	1,378
Porters*			212	112																	212	112	324
Washers													4	78							4	78	82
Drivers																			129	0	129	0	129
Security Guards													81	0							81	0	81
Pump technicians					42	0															42	0	42
District Storekeepers															43	1					43	1	44
District Store Supervisors															43	1					43	1	44
TOTAL M/F	264	12	1,877	218	42	0	90	13	0	0	45	4	85	78	86	2	373	1095	129	-	2,991	1422	4413
TOTAL	276		2095		42		103		0		49		163		88		1468		129		4413		

*Porters serve as back-up spray operators

3. IMPLEMENTATION OF IRS

3.1 APPROACH

The implementation of IRS was carried out in close collaboration with the FMOH, the three RHBs, and zonal and district health offices. In this district-based IRS model, the VectorLink project provided the technical oversight, which including training, logistics, supervision, and M&E in all 44 PMI-supported districts, but the DHOs assigned their staff to serve as supervisors, district IRS MFPs, TLs, and some SQLs. DHOs also recruited the seasonal spray personnel (SOPs, porters, DECs, washers, water fetchers, security guards) based on recruitment criteria developed by the VectorLink project in partnership with the three RHBs. The number of spray operation teams was determined based on the number of targeted structures per district.

In the district-based model, spray teams comprised one TL, who was in charge of 4–5 squads, each of which had one SQL, four SOPs, and one porter. The site leadership teams comprised one MFP, one Environmental Compliance Officer (ECO), and one IEC Officer, all of whom were full-time DHO employees. The nine VectorLink Zonal Coordinators (full-time Abt staff) each oversaw 3-5 districts and were the liaison to the VectorLink project senior management team.

The TLs were responsible for compiling spray data from their 4–5 squads at the end of each day and sending the SMS report as well as individual supervision and quality control reports. The SLs were responsible for collecting and reporting structure-level spray data for each SOP on their squad and ensuring the spray quality of each SOP through Directly Observed Spraying (DOS). In many districts of Gambela, it became clear that the SLs had too much to manage and were not adequately supported by site leadership, and this created signigifant quality issues. As a result, the VectorLink Ethiopia team added one SQL assistant for every two squads in the new districts in Benishangul-Gumuz, which started spraying a couple weeks after Gambela, to reinforce spray quality and on-the-spot training.

The majority of the district-based spray teams camped and operated from a designated spray operations site. Based on the dispersion of the targeted kebeles, all districts had at least one operations site: 14 districts had one operations site, 25 districts had two operations sites, and the rest had more than two operations sites. Each operation sites had a permanent storeroom, wash area, and fixed soak pit, except for seven operations sites which had a temporary warehouse at a local health post or health center. Whenever possible, districts started spraying from the most remote kebeles and worked their way toward the district center to ensure the coverage of the hardest-to-reach areas, many of which become inaccessible when the rains begin due to flooding. In a few cases, rental vehicles were not delivered on time so the teams adapted their plans to spray more accessible kebeles first.

3.2 SUPERVISION

The VectorLink Ethiopia team developed and used a monitoring and supervision schedule during the 2018 spray campaign. The schedule showed the role of specific individuals, which site they were working from, the type of supervisory tools to be used, and the targeted frequency of usage of each supervisory tool. The VectorLink Ethiopia project deployed 14 staff (nine Zonal IRS Coordinators and five senior staff) to the zones during IRS implementation to provide supportive supervision. Each VectorLink Zonal Coordinator was in charge of 3–5 districts and worked closely with regional, zonal, and district MFPs. The project also recruited 14 seasonal District IRS Coordinators for 14 districts in Gambela region. The District Coordinators provided support in districts during the IRS cascade training and IRS implementation. They also ensured that there was capacity building of the district staff and spray quality in the districts. IRS supervision was conducted in collaboration with the RHBs based on the supervision plan. At the national level, the Chief of

Party, the two Operations Managers and the ECO provided continuous oversight in the three regions. Each region had a designated responsible member of the senior management team who had the authority to make immediate decisions in the field. The Chief of Party and the Operations Manager for IRS Planning and Supervision together had this authority for Gambela because of the complexity of the region. The Operations Manager for IRS Training and Implementation was in charge of Benishangul-Gumuz, and the ECO was in charge of Oromia.

Two members of the home office team, Cecilia Flatley and Tiffany Clark, traveled to Ethiopia to provide Short-Term Technical Assistance (STTA) during the campaign.

Apart from the senior management supervisors, the M&E Manager and the Database Manager from the VectorLink team also joined the district teams for supervision. All teams used standardized VectorLink supervision and monitoring tools, which were loaded on mobile phones, to assess the spray quality, EC activities, and spray data collection. The project provided one mobile phone per district for supervision purposes. The supervisors with no access to mobile phones used paper-based tools.

During supervision, the SLs and other supervisors were tasked with using the DOS forms to monitor quality of spraying and provide on-the-spot feedback to improve SOP performance. During the spray season, SQLs and TLs used the DOS checklist a total of 24,266 times rather than the expected minimum of 30,316. In Oromia region, where IRS has been supported by PMI for several years, the supervision was conducted to the expected VectorLink standard. In the other regions, however, it was noted that the spray personnel assigned to IRS from the DHO (including TLs, the MFPs, and IEC and the EC officers) rarely conducted field visits, which jeopardized the quality of IRS. Table C-7 in Annex C shows how many times each checklist was used in the campaign. TLs used the performance tracker to monitor SOP performance and submitted results to Zonal Coordinators on a weekly basis. Even though it was planned that the Zonal Coordinators, Supervisors, and MFPs were supposed to meet on a daily basis to review the daily progress and plan for the following day, this rarely happened in most districts.

During supervision, the VectorLink project team observed that some districts regularly conducted the required daily morning mobilization. They used the related checklist to verify that spray teams left the operations site for the day with correctly accounted for PPE, equipment, insecticide, and supplies, and were safely transported to the spray site. Unfortunately, some districts did not conduct morning mobilization regularly or hardly ever, especially in Gambela, despite repeated reminders from VectorLink project management. To ensure that teams were mobilizing daily and leaving for the field prepared, in the third week of spraying, the VectorLink team mandated Gambela supervisors to send to the ECO daily photos of morning mobilization with all team members in full PPE.

To ensure that SOPs were only spraying structures that were correctly prepared for spraying and were using correct spray and insecticide handling techniques, the VectorLink team required field supervisors to directly observe SOPs throughout the day and submit homeowner and SOP performance supervision forms through smartphones to document their inspections. In Benishangul-Gumuz and Oromia, household preparation was observed to be good and spray quality generally high. SOPs largely respected the guidelines of 45cm distance, 75cm swath, and 5cm overlap. Again, however, the team observed that in most districts in Gambela, homes were found to be inadequately prepared, especially in districts that were poorly supervised. In addition, during supervsion, it was also observed that SOPs did not consistently spray according to the IRS guidelines (e.g. leaving the ceiling unsprayed). When this was observed, VectorLink project management responded by immediately requiring all districts to re-train the SOPs and asked the Gambela RHB to ensure that supervision was improved in all districts.

The other challenge observed in Gambela was that structures were very small and most of them were round, as opposed to the tall, flat walls used during the training, so the SOPs had difficulty spraying a perfectly vertical swath. Adapting to the round nature of structures will be incorporated into the training curriculum for next season.

Other than in a few districts in Gambela, SOPs were always in full PPE, and they conducted end-of-day clean-up following the correct EC procedures for cleaning equipment, accounting for insecticide stock, and

storing equipment for the next day. The failures of SOPs to be in full PPE in some districts of Gambela were mainly attributed to lack of proper boot sizes (due to completely different demographics, poor supervision, and lack of adherence to EC guidelines probably resulting from poor training that did not emphasize the danger of insecticide exposure). These lapses were corrected by procuring boots of the correct size from local markets and providing regular on-site trainings.

3.3   LOGISTICS AND INVENTORY CONTROL

The Logistics Coordinator was in charge of managing stock at the central level and supervising the 88 storekeepers. Each district store was managed by two storekeepers, one government employee and one assistant storekeeper whom the VectorLink project hired as a seasonal worker. All of the districts had storerooms where all of the commodities were stored according to the standard PMI BMPs, meaning the insecticide and insecticide-contaminated items were stored separately from the clean commodities. To enhance tracking of insecticide use, the project provided IRS stock cards, bin cards, incoming and outgoing registration books, and insecticide tracking forms to account for the quantity issued, quantity used, and quantity returned on a daily basis.

During supervision, the VectorLink project team observed in all the three regions that most storerooms were in good condition with most items unpacked, stacked on shelves, and clearly labeled. However, some procedural issues were consistent across stores, suggesting that a weak trainer had provided incomplete or improper guidance on best practices in inventory management and chain of custody, particularly for insecticides. During supervsion, 18 stores in Gambela and Benishangul-Gumuz regions were vsisted by senior VectorLink project supervsiors. It was observed that in 62% of stores visited the stock cards were either out of date or did not have a record of all incoming and outgoing bottles on a daily basis. The team discovered that the storekeepers were not appropriately recording the full bottles of insecticides that SOPs returned at the end of the day on the formal stock cards; instead, they recorded this on a separate unofficial register. In other words, they were keeping track of the insecticide, but not in accordance with insecticide management and chain of command best practices. As soon as this was noted, the VectorLink project management sent the project Logistics Officer to provide on-site mentorship to all storekeepers on the best practices for insecticide storage and reminded them of the proper inventory control protocols. He reinforced proper inventory control measures by requiring at least two members of each site management team to send him the balance of full and empty bottles at the end of each day. If the balances reported did not agree, he would ask them to recount and document.

With the old stock of 70,984 bottles of Actellic 300 CS insecticide which was expiring before the next IRS campaign, it was important for all the storekeepers to adhere to the 'first to expire first out' (FEFO) principle to use up as much of the old Actellic stock as possible. The VectorLink supervisory team prioritized the FEFO approach. To do this, the VectorLink Ethiopia senior management mandated that all boxes of old insecticide be clearly marked (using bold-colored paint) to avoid confusing them with the new supply. All VectorLink project supervisors were instructed to counter-check the numbers and report them to the Chief of Party on a weekly basis until completely exhausted. At the end of the 2018 campaign, the Logistics Manager was tasked with ensuring the leftover stock of Actellic was marked with highly visible paint so that it would be visually distinct from any new supply that is procured in 2019.

Details on insecticide consumption are presented in Section 5.2 of this report.

A total of 129 vehicles were contracted to support IRS operations in the 44 PMI-supported districts. Forty-seven of them were mini-trucks and 82 were long-based 4X4 type of vehicles. During IRS implementation, the majority of the vehicles were dispatched on time, immediately after being inspected by the VectorLink team. However, the vehicle vendors delayed the dispatch of 24 vehicles by at least two days, which prevented full start-up of IRS in 17 districts. Additionally, when six vehicles needed replacement (one due to an accident and five due to mechanical problems) at various points during the campaign, the vehicle vendor was not able to substitute the IRS vehicles in a timely manner, so the VectorLink project management substituted the vendor with another vendor who was already contracted and proving to be more reliable.

3.4   STAKEHOLDER ENGAGEMENT

VectorLink's integrated approach for IRS implementation requires full collaboration among implementing partners, stakeholders, and beneficiary communities. During implementation, all stakeholders, including the FMOH, NMCP, and RHBs collaborated closely with the project. They supported the project during micro-planning, cascade training, and, as supervisors of DHOs, supervision, trying to ensure quality IRS implementation (though as seen above, some areas needed to be strengthened). They also supported project communication with the districts. VectorLink also closely worked with the local PMI team for guidance on IRS implementation, especially when its team faced challenges and needed such guidance.

3.5   MOP–UP

Spray operations began in Gambela region on May 21 and the majority of districts finished on June 14. However, there were many refusals in Abobo and Gambela Town districts. After completing data collection verification exercises indicating that non-sprayed structures had not been properly recorded in those areas, the VectorLink team determined that mop-up spraying was needed. The mop-up exercise was conducted on July 2–7. The mop-up sprayed 2,798 structures, 540 in Abobo and 2,258 in Gambela Town.

3.6   SECURITY

There were security concerns in parts of the PMI-supported districts before and during IRS implementation. Two weeks before spraying started in Oromia, there was a resurgence of disputes between members of the ethnic groups from the Gedo and West Guji communities over farming land. This affected three districts from West Guji zone: Abaya, Gelana, and Melka Soda. The violence killed at least 20 people and destroyed about 50 homes. It was also reported that over 1,000 people were temporarily displaced from these communities. The conflict lasted for more than a month. Similarly, during a June 24 public demonstration in Mao Komo and the surrounding districts to support the new Prime Minister, violence erupted between members of the Mao Komo and Oromo ethnic groups. Again, people were killed, homes were destroyed, and thousands were displaced. During both conflicts, roads were blocked – the road to Mao Komo was closed for at least a month – a curfew was placed on the districts, and movements were restricted. This led to interruptions and postponements of the IRS campaign, leading to more operational days than expected and increased costs. It also forced spray dates to be changed, which led to some refusals of IRS among families who had previously prepared their homes and not been visited by an SOP.

During the conflict, the VectorLink team developed a good relationship with local authorities who included the local political leadership and security authorities. This made it possible for the project to get information on a daily basis regarding the conflicts, which enabled the team to make informed security decisions, in particular on where spray teams could and could not go. Table 11 details which districts were affected by the conflicts and for how long.

TABLE 11: IRS INTERRUPTIONS FOR SECURITY ISSUES

Region	Zone	District	Dates of Interruption
Oromia	West Guji	Abaya	June 9–July 11
	West Guji	Gelana	June 9–July 12
	West Guji	Melka Soda	June 9–July 11
Benishangul-Gumuz	Special district	Mao Komo	June 24–July 17
	Assosa	Bambasi	June 26–June 30
	Assosa	Assosa	June 26–July 8 8
	Assosa	Kurmuk	June 26–July 3
	Assosa	Menge	June 26–July 3
	Assosa	Sherkole	June 26–July 6
	Assosa	Oda bildigildu	July 9–11
	Kamashi	Tsedal	July 11–13
	Kamashi	Agalo Meti	July 12–14

4. IRS CAMPAIGN RESULTS

4.1 PROGRESS AND COVERAGE

The 2018 IRS campaign took place over a 60-day period, May 21 to July 31, 2018. In Gambela region, IRS began on May 21 and ended on June 13. In Benishangul-Gumuz and Oromia regions, it began on June 11 and ended on July 31. The average number of operational days per district in Gambela was 20 days, while the average for Benishangul-Gumuz and Oromia was 30 days. The start dates for the IRS campaign were staggered mainly because the rains usually start earlier in Gambela, and flooding makes some of the districts inaccessible. Staggering the start dates also allowed the PMI VectorLink leadership team to conduct supervision in the field and oversee the logistics and quality of spraying during the campaign in a more effective manner. Table C-5 in Annex C outlines the start and end dates of the spray campaign for each district.

While VectorLink Ethiopia originally planned to target 595,618 structures, it only found 485,358, and sprayed 472,569 for a spray coverage of 97.4 percent. Of the total structures sprayed, living/sleeping and kitchen structures represented 79.1 percent (n=373,571); the other 20.9 percent of structures (n=98,998) were cowsheds, toilets, and others. A total of 1,264,189 people were protected, including 213,459 (16.9 percent) children under five years and 28,944 (2.3 percent) pregnant women. Regional-level coverage and progress rates are shown in Table 12; tables C-6 and C-8 in Annex C give district-level details on types of structures sprayed and spray results.

TABLE 12: SUMMARY OF 2018 SPRAY RESULTS

| Region | Target | Progress (%) | Sprayed | | | Population Protected | | | Total Pop Found | % Pop Protected |
			Structures Found	Structures Sprayed	Spray Coverage (%)	Population Protected	Pregnant Women	Children <5		
Gambela	145,272	65.78%	98,967	95,564	96.56%	301,382	13,051	62,792	315,577	95.50%
Benishangul-Gumuz	315,532	83.00%	266,207	261,904	98.38%	610,356	9,775	99,250	620,992	98.29%
Oromia	113,238	101.65%	120,184	115,101	95.77%	352,451	6,118	51,417	365,446	94.44%
TOTALS	574,042	82.32%	485,358	472,569	97.37%	1,264,189	28,944	213,459	1,302,015	97.09%

4.2 INSECTICIDE CONSUMPTION

During the 2018 spray campaign, VectorLink Ethiopia sprayed the insecticide Actellic 300 CS (pirimiphos-methyl, an organophosphate) in all 44 districts. The new 26 districts were using this insecticide for the first time.

VectorLink started the 2018 spray season with 212,396 bottles of Actellic and consumed 114,897 bottles. Table 13 shows the consumption rate by region. Table E-1 in Annex E shows the consumption rate by district. An additional 32 bottles were lost during the campaign, leaving a balance of 97,467 bottles. (The individual cases are described in further detail in section 8.3.3. of this report.) This remaining insecticide stock expires in February 2020. The VectorLink Ethiopia team will ensure that the bottles are safely stored and used during the 2019 spray round.

TABLE 13: INSECTICIDE CONSUMPTION RATE BY REGION

Bottles of Insecticide used for the 2018 IRS			
Region	Old Insecticide	New Insecticide	Total
Gambela	17,126	613	17,739
Benishangul-Gumuz	29,134	26,691	55,825
Oromia	24,692	16,641	41,333
TOTALS	**70,952**	**43,945**	**114,897**

On average, SOPs sprayed 16.9 structures per day and 4.1 unit structures per bottle of insecticide. At the regional level, the consumption rate varied. In Oromia the average observed consumption rate was 2.7 structures per bottle, compared with the estimate of 2.5 used to quantify insecticide for the campaign. In Benishangul-Gumuz, the average observed rate was 4.8 structures per bottle, compared with the estimate of 4.5. In Gambela, the average observed rate was 5.4 structures per bottle, compared with the estimate of 4.5. The two main reasons for the large difference in actual versus estimated consumption in Gambela were that 1) most structures were much smaller than the structures and surface area sampled in the structure verification assessment and 2) the assessment included ceilings in the measurement of SSA, but supervisors noted that most SOPs did not spray ceilings despite repeated reminders and re-training.

If the consumption rate had been correctly estimated for each region (Gambela at 5.4 structures per bottle, Benishangul-Gumuz at 4.8, and Oromia at 2.7), the project would have estimated that only 140,067 bottles of Actellic in total were needed to cover the original 2018 target of 595,618 structures, not the 212,396 bottles which led to an overestimation of 72,329 bottles. The additional balance of leftover bottles is suspected to be due to two reasons: 1) some targeted communities were ultimately excluded because of security concerns and 2) it is suspected that some targeted communities in the new districts were not reached by the spray teams. In order to address this in future spray campaigns, the VectorLink Ethiopia project will consider conducting an enumeration exercise in late 2018 to better characterize the target and measure coverage of the campaign.

4.3 AVAILABILITY AND USE OF MOSQUITO NETS

Per requests by PMI and the FMOH, the VectorLink Ethiopia project collects information on mosquito nets in beneficiaries' homes. The use of insecticide-treated nets is a second method, along with IRS, that countries use to control mosquito vectors. Across the 44 districts, households reported having a total of 395,547 mosquito nets at the time the SOP visited during the 2018 spray campaign. Some 20,092 pregnant women and 151,907 children under five years of age were reported as having slept under a mosquito net the night prior to the SOP's visit. See also Table C-9 in Annex C.

5. POST-SPRAY ACTIVITIES

5.1 POST-SPRAY MEETINGS

After the IRS campaign, three post-spray review meetings – one per region – were organized and attended by PMI, VectorLink, NMCP, the RHBs, and all key members from all the districts in the region and other stakeholders. The post-spray review meeting for Gambela region took place on August 2-3 and the post-spray review meeting for Oromia region was held from September 7-8, 2018. The meeting for Benishangul-Gumuz regions was scheduled to take place in the first week of September but was postponed to the first week of October, 2018 due to a prior commitment of the Benishangul-Gumuz RHB. During these meetings, attendees discussed the operations, successes, challenges, lessons learned, and recommendations from the 2018 spray campaign and the way forward for the 2019 campaign. The Oromia meetings revealed that not all eligible structures have been targeted and this may contribute to the questionable impact of IRS that was observed in some districts in the region using HMIS data. Some kebeles were excluded due to low malaria transmission and historically, some kebeles have not been sprayed in the past. In the 2019 IRS season, the VectorLink Ethiopia team, in collaboration with the Oromia RHB and the local PMI team, will ensure that all eligble kebeles (under 2000m in elevation) are included in the 2019 spray season.

5.2 DECOMMISSIONING SITES AND CONSOLIDATION OF IRS INVENTORY

To ensure safe and effective completion of the spray season, the VectorLink Ethiopia team decommissioned the sites and conducted post-spray inventory activities. All IRS materials and equipment were returned to the district warehouses. All equipment was checked to ensure it was fully functional. Broken equipment was identified and will either be repaired before the start of the 2019 IRS campaign or, if unsalvageable, like plastic sheets, will be disposed of according to EC protocols by November 30, 2018.

The quantity and functionality of all other IRS materials and equipment in all districts was checked and documented to help plan for the next spray season. All insecticide-contaminated waste generated from operations will be disposed of in compliance with environmental regulations using disposal facilities available in Ethiopia by November 30, 2018. For further details on decommissioning, see Section 9.3.1.

Of the remaining 97,467 unopened (full) bottles of Actellic 300 CS, only 30,002 are in the districts. They will be transported to the central warehouse in Addis Abba for safe and secure keeping until the 2019 spray season. The VectorLink team will follow PMI BMP in transporting and storing these insecticides.

6. ENTOMOLOGICAL MONITORING

Entomological investigations are being conducted to obtain information on the density, resting and feeding habits and habitats of vectors, infection rates, blood meal sources, change in the level of insecticide susceptibility/resistance, mechanisms of resistance, quality of IRS, and decay rate of Actellic 300 CS. One entomological monitoring sentinel site has been selected from each region: Bambasi (Benishangul Gumuz), Lare (Gambela), and Abaya (Oromia). Mosquitoes are being sampled monthly for one year, from May 2018 to April 2019, using Centers for Disease Control and Prevention light traps, human landing catch, and pyrethrum spray sheet catch methods. The pre-spraying entomological assessment was carried out in May 2018. The impact of IRS will be known from mosquito sampling in the remaining months. Insecticide susceptibility tests in 13 districts are being carried out by the VectorLink team and collaborating consultants from five universities. The findings from entomological monitoring and insecticide susceptibility tests will be presented in progress and final reports.

The spray quality and monthly decay rate evaluations are being conducted in all the three sentinel sites and in Goro (an IRS district in Oromia Region). The evaluations use the World Health Organization (WHO) cone and fumigation bioassays in 48 randomly selected residential houses with mud (28 houses), dung (4 houses), and painted walls (16 houses). The fumigation bioassays method is new to the VectorLink Ethiopia sites this year; it is used to examine the airborne effect of the sprayed insecticide product on the knockdown and mortality of *An. arabiensis*. Quality assurance data at time zero (T0) and decay rate at time one (T1) (after a month of spraying) are shown in Table 14 for *An. arabiensis*.

Because of the different IRS start dates, cone bioassay tests at T0 were conducted in May in Lare, in June in Goro and Bambasi, and in July in Abaya. The first cone bioasays were conducted from 1–4 days post spraying. At T0, *An. arabiensis* mortality on mud, dung, and painted surfaces was 100 percent for Lare, Goro, and Abaya but not for mud surfaces in Bambasi, where mosquito mortality was 95.8 percent. At one month post-spraying (T1), mortality on mud surfaces dropped to 98.3 percent in Goro and 97.5 percent in Bamabsi, but remained at 100 percent on the rest of the surfaces in these districts and in Abaya. In Lare, in the second month, mortality declined to 72.7 percent. The cone wall bioassay test was repeated in August to further verify the persistence of the lower mortality and to confirm a speedy decay rate. Death of mosquitoes tested in Goro in the second month post-spraying (T2) on all surfaces was 100 percent; it also was 100 percent on painted surfaces in Bambasi.

TABLE 14: MORTALITY RESULTS OF WHO CONE BIOASSAY TESTS ON *AN. ARABIENSIS* IN FOUR DISTRICTS, MAY–JULY 2018

Time	% mortality of An. arabiensis							
	Lare (Gambela)	Goro (Oromia)			Bambasi (Benishangul Gumuz)		Abaya (Oromia)	
	Mud	Dung	Mud	Painted	Mud	Painted	Mud	Painted
T0	100 (May)	100 (June)	100 (June)	100 (June)	95.8 (June)	100 (June)	100 (July)	100 (July)
T1	99.4 (June)	100 (July)	98.3 (July)	100 (July)	97.5 (July)	100 (July)	100 (August)	100 (August)
T2	72.7 (July)	100 (August)	100 (August)	100 (August)	97.5 (August)	100 (August)		

The fumigation bioassay tests resulted in 91.7 percent, 90 percent, 63.3 percent, and 50 percent *An. arabiensis* mortality at T0 from Abaya Lare, Bamabsi, and Goro, respectively (Figure 2). In the first post-spraying tests (T1), the airborne effect declined to 71.7 percent, 86.7 percent, 45.7 percent, and 43.3 percent. In the second month (T2), more than 50 percent of mosquitoes were killed in Lare and Bamabsi. Lower mortality (30 percent) was observed in Goro.

FIGURE 2: MORTALITY OF *AN. ARABIENSIS* FROM AIRBORNE BIOAVAILABILITY OF ACTELLIC 300 CS
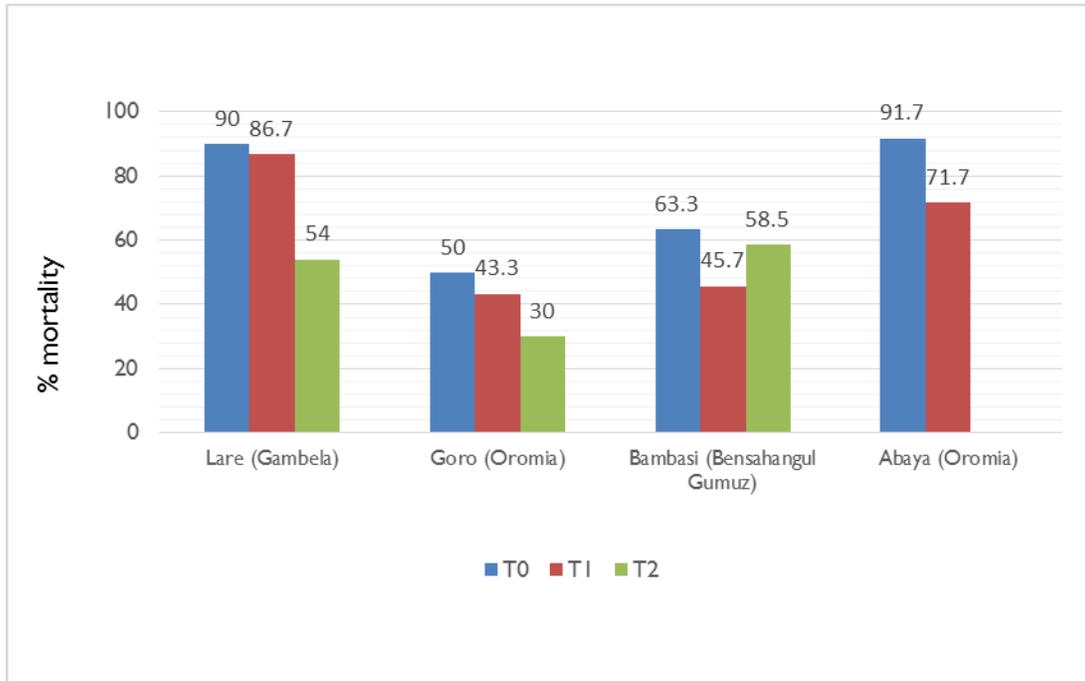
7. MONITORING AND EVALUATION

7.1   APPROACH AND KEY OBJECTIVES

The key objectives of VectorLink Ethiopia M&E activities were:

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

7.2   DATA COLLECTION

Data were collected using standardized data collections forms designed to capture all core PMI indicators. VectorLink Ethiopia has six forms for capturing the project's process indicators at different levels:

- Training Participant Registration Form
- Daily Spray Operator Form
- Squad Leader Daily Summary Form
- Directly Observed Spraying (DOS) Form
- Team Leader Daily Summary Form
- District MFP Daily Summary Form

Trainers use the Training Participant Registration Form at training workshops to capture information about the trainees. The Daily SOP Form is the sole primary data source for data entry, analysis, and reporting. Squad leaders (SQLs) use the Daily SOP form to collect the daily spray data from households and summarize the data using the SQL Daily Summary Form. District supervisors use the DOS and TL Summary forms to ensure data quality and to manage team and squad performance on a daily basis. The District MFP Daily Summary Form is used to summarize the overall spray data on a daily basis. The DOS Form focuses on spray quality and is used to provide continuous feedback and corrections. Table C-1 in Annex C gives more detail about each form.

In addition, VectorLink Ethiopia uses numbered IRS cards; these are distributed to households after spraying and they give each household a unique identification number to use as a spray record.

The PMI VectorLink Project used five paper-based data quality assurance tools – SQL Form, TL Form, Error Eliminator (EE) Form, Data Collection Verification (DCV) Form, and Data Entry Center Supervision Checklist – to ensure proper supervision of data collection and data entry. To improve data quality, in 2018 the M&E team revised the contents of SQL and TL forms and added variables that help check the quality of IRS data. In 2016, the PMI AIRS Project digitized the DCV form and integrated it with the mHealth system to enhance data collection accuracy for supervision, and that is still in use under VectorLink. These tools are fully described in Table C-2 in Annex C.

Additionally, VectorLink Ethiopia used the VectorLink Microsoft Access Database Cleaning/Reporting Tool to ensure high-quality data. The tool is a database that links to the VectorLink database at the backend (i.e., the spray data) and has two functions: generating district-level reports and data cleaning. The district-level reports provide spray progress to date, per day, per week, per squad, per administrative level (district and/or kebele), per SOP, etc. These various reports are used by VectorLink team members and/or RHB supervisors to get updates and respond to spray coverage issues in real time. During the 2018 campaign, security issues in several districts of Oromia and Benishangul-Gumuz regions delayed data entry, which made real-time decision making difficult. The data cleaning function was used by DECs for data verification and daily data reconciliation and cleaning. The M&E team and spray supervisors also used the cleaning function to perform data verification (e.g., looking up the spray data for a specific day, SOP, or household).

During regional and zonal TOTs, the M&E team emphasized definitions of key IRS terms and reporting indicators, compliance with M&E protocols, and proper data collection. They also trained field staff and supervisors on the database system, supervisory roles and responsibilities, and data security. The M&E team was fully engaged in supervising fieldwork during spray operations. While observing data collection and entry in the field, the team identified issues and was able to correct errors on the spot. Most of the data recording and entry problems during the first week of the spray, especially in the new PMI-supported districts, were alleviated through on-site refresher training, which resulted in improvements in the observed gaps over the course of the campaign. However, there were persistent problems in identifying and capturing eligible structures, which the M&E team is working to minimize in the coming campaign.

7.3 DATA QUALITY ASSURANCE PROTOCOLS

One of the key tools for providing corrections in the field was the DCV form. The electronic version of the tool was integrated with the existing mHealth supervisory application on smartphones and used by supervisors to share real-time information. VectorLink staff and FMOH supervisors captured issues and provided feedback during spray operations. In 2018, using findings from the DCV form, the VectorLink team carried out mop-ups in two districts of Gambela region. The most common issues found through the use of the DCV form are summarized in Table 15.

TABLE 15: USE OF DCV FORM: COMMON ISSUES AND CORRECTIVE ACTIONS

Errors/Issues Observed	Corrective Actions Taken
VectorLink supervisors found it was very difficult for a single SQL to both ensure spray quality and to collect accurate spray data for all four SOPs under his/her supervision.	The VectorLink management deployed additional SQLs in Benishangul-Gumuz region to improve recording of data.
DCV assessments by VectorLink and DHO supervisors in Gambela Town and Abobo districts of Gambela region found structures that were not captured in the SOP forms and also not sprayed.	During a mop-up campaign, the team identified, recorded, and sprayed the structures that SOPs had missed during first round visit by the spray team.
Supervisors found incomplete information on IRS cards and SOP forms (i.e., structure number, population size, stuctures types, etc.). SQLs did not record all the relevant information in the IRS card, especially in new districts.	Supervisors carried out intensive onsite support and training for SQLs, particularly to those who frequently filled out cards incorrectly.
Households failed to keep earlier IRS cards.	The supervisory team facilitated the provision of replacement IRS cards. The team also discussed with SOPs the importance of retaining IRS cards, so that they can pass the information to households.

See Table C-3 in Annex C for a summary of VectorLink Ethiopia's tools for addressing core areas of data quality.

7.4 DATA ENTRY

VectorLink Ethiopia employed 49 DECs, one per district in 39 districts and two per district in five large districts. The 2018 database, along with the reporting/cleaning tool, was installed on every DEC laptop together with a separate program to synchronize the data and use cloud technology for storage.

VectorLink has retained the shared back-end data entry system in the five large districts, which allowed two DEC computers to connect and enter data in a single back-end database. One DEC computer functioned as a server for the other client machine connected to it. In this way, the two DECs entered data on the shared backend and then stored it in a single backend. This system facilitated the data entry and cleaning process in districts that have a high number of structures.

Data entry was carried out at two levels, first by entering "totals" (for quick reporting and feedback) then by "details," i.e., by each structure captured on the Daily Spray Operator form, for more accurate data entry and verification.

7.5 DATA STORAGE

Hard copies of the Daily Spray Operator forms are stored in binders at the district level. The forms were filed by date and team to provide a uniform organizational system and facilitate easy reference.

At the end of every day, all data were backed up electronically in three stages, first in a back-up folder on the data entry laptop, then to a cloud back-up system (Dropbox), and then on an external memory drive that was provided to each DEC.

7.6 DATA CLEANING

The M&E Manager and Database Manager facilitated data cleaning at the district level, which involved the following major activities:

- Ensuring that all Daily Spray Operator forms were entered correctly by the double entry method (by totals and then by details);
- Ensuring that all necessary corrections were made so that the totals and details are in agreement;
- Checking and, where necessary, removing duplicate records;
- Ensuring proper documentation of Daily Spray Operator forms for easy retrieval and use;
- Checking that all backups are made on the secondary media and hard copy as per the protocol; and
- Identifying and entering missing records.

Data cleaning was done using the Access-based Cleaning/Reporting tool mentioned above. The DECs cleaned spray data daily throughout the spray campaign, with final data cleaning completed seven days after the end of the spray campaign. SQLs collected the data and verified the SOP forms while TLs checked and verified data. Further checks were completed by MFPs and district IEC Officers. District DECs checked the completeness and accuracy of daily spray data variables before entering the data into the database.

7.7 REPORTING OF SPRAY DATA

Spray data were collected and entered into the database on a daily basis, although there were delays in some districts. The main reasons for the delays were roads blockages because of security problems, the distance between operation sites and data entry centers, and the new DECs' lack of experience. Network connectivity problems also hindered the flow of reports from the DEC database to the central system. Weekly IRS progress reports were shared with the VectorLink home office and PMI. At the end of each spray day, MFPs used the mobile system to submit daily performance reports to a central server managed by Dimagi, LLC. The server subsequently submitted these reports to all VectorLink Ethiopia supervisors, the VectorLink Operations Managers, and the Chief of Party. A few mobile devices malfunctioned in the field, which caused minor issues in timely data collection and reporting. Additionally, the persistent connectivity problem also impacted the flow of reports, which decreased the ability to monitor campaign progress and coverage in real-time.

8. ENVIRONMENTAL COMPLIANCE

This section focuses on the activities that were undertaken in overseeing the 2018 IRS program compliance with:

- The United States Government: USAID Regulation 216
- The 2015 SEA and the 2018 Letter Report
- This section also presents operational issues that arose during IRS implementation and how the team responded. More details can be found in Table D-1 in Annex D, the Environmental Mitigation and Monitoring Report (EMMR).

Under the umbrella of the 2015-2020 SEA, a letter report was prepared for the 2018 spraying operation and approved before spraying commenced. Similar to 2017, the VectorLink Ethiopia project used the brand-name organophosphate Actellic 300 CS (pirimiphos-methyl) in all 44 PMI-supported districts. In 2018, the project implemented IRS in 26 new districts and therefore there was need to pay great attention to first-time EC activities there. The other unique problem faced by the 2018 IRS campaign was civil unrest, which presented a security concern and forced interruption in the spray calendar. As per the guidance of the PMI BMP, VectorLink Ethiopia's strong monitoring system ensured that despite the interruptions and slowed progress, IRS operations adhered to EC requirements so as to protect spray actors, beneficiaries, and the environment. Activities performed to protect these components are discussed below.

8.1 PRE-SEASON ENVIRONMENTAL COMPLIANCE ASSESSMENTS

Out of the 44 PMI-supported districts targeted for the 2018 spray campaign, 26 were new district that were being sprayed with PMI support for the first time. The first round of PSECAs in the new districts, done about 10 weeks before spraying was to commence, focused on assessing whether the operations sites met the standards for the storerooms and soak pits. It also assessed the status of operations sites in the other 18 districts. All identified gaps were immediately shared with stakeholders during the TOT session, which gathered together all stakeholders. It was determined that all the gaps that had been identified were to be fixed by three weeks before the start of the spray campaign. The VectorLink Ethiopia team conducted the second round of PSECAs about a week before the start of the campaign. The majority of the IRS sites met the standards. For those that did not, additional, successful, effort was made to get them ready. One of the challenges faced in Gambela region was late submission of the final PSECAs, because of the remoteness of the region and lack of internet. It was also due to a miscommunication about the time for the PSECA submission. For more details, tables D-2 and D-3 in Annex D summarize the requirements and key gaps that were identified during the first-round PSECA and corrected on the second round.

PSECA findings noted that the 2018 IRS program needed 80 fixed soak pits. Out of the 80, 56 were newly built in the new 26 districts and 24 were built in the old districts. In addition to the 80 fixed soak pits, the VectorLink project needed 15 mobile soak pits for use in different districts.

Apart from constructing soak pits, the VectorLink project conducted major renovations of the storerooms in 26 new districts. The project also made minor renovations to the storerooms in the 18 old sites. The project also equipped the storerooms with fire extinguishers, shelves, pallets, first aid kits, dust bins, emergency spill kits, and thermometers to ensure health and environmental safety during the spray campaign.

Following this construction and renovation, VectorLink project staff in collaboration with the DHO teams inspected the soak pits and storerooms to ensure that the infrastructure met EC standards.

8.1.1 MEDICAL CLEARANCE

As part of protecting the spray actors from any incident related to the spraying operations, all spray actors hired for the 2018 spray season underwent medical examinations to determine their physical fitness for the program's demands. All female spray actors were given pregnancy tests to ensure no expectant mothers were at risk of exposure to insecticide. The test was repeated 30 days later for all districts that sprayed for more than 30 days. No positive pregnancy test was recorded during the campaign.

8.1.2 TRAINING OF CLINICIANS IN MANAGEMENT OF INSECTICIDE POISONING

VectorLink Ethiopia did a one-day training on insecticide exposure management for 103 clinical practitioners. These clinicians were made responsible for orienting other clinicians in their health facility on the management of insecticide exposure cases. The project also ensured that the antidote for organophosphate poisoning was available at all health facilities closest to the IRS sites in districts that would be sprayed in 2018. No project funds were used to procure the antidotes.

8.2 MID- AND POST-SEASON ENVIRONMENTAL INSPECTIONS

VectorLink Ethiopia used both smartphone-installed and paper-based supervision tools to conduct the mid- and post-spray environmental inspections. Although project supervisors and the district MFPs were provided with smartphones to conduct the inspections, it was not always possible to have real-time feedback because of poor internet connectivity throughout the country.

The Ethiopia project conducted EC assessments and supervision based on standard VectorLink checklists. This was done in collaboration with the district and zonal MFPs. Four major checklists (Morning Mobilization and Transport Vehicle Inspection; Home Owner Preparation and Spray Operator Performance; Storekeeper Performance; and End-of-Day Clean-up) were used for the mid-spray supervision. Supervisors were responsible for providing on-the-spot guidance and corrections to the spray teams when needed. In general, the DHO supervisors were visited the field for supervision and this jeopardized the quality of IRS. At the end of each inspection, DHO teams discussed the status, achievements, shortcomings, and constraints found during the spraying period. The teams also made recommendations based on their findings. A summary of inspections and mitigation measures taken is in Table D-1 in Annex D.

8.3 POST-SEASON DEMOBILIZATION AND WASTE DISPOSAL

8.3.1 CLOSURE OF STOREROOMS AND SOAK PITS

Decommissioning of all IRS facilities, specifically storerooms and soak pits, was principally the role of the ECO supported by the VectorLink Zonal Coordinators and personnel from the respective districts health teams. During the inspections, the ECO made sure that the following had been undertaken:

IRS Documentation:
- All the records for all IRS commodities were updated and balanced.
- The amount of chemical used tallied with the empty bottles available.

Pesticide Storage Facility: The storage facilities were thoroughly washed with soap and water. The leftover chemical with other IRS commodities as well as IRS waste were clearly quantified, labeled, and neatly packed for transport to the central warehouse in Addis Abba. EC items such as pallets, hand washing bucket, fire extinguishers, thermometers, first-aid kits, spill management kits, emergency and spill response manuals, and waste storage bins were preserved for use in the 2019 IRS campaign. All IRS waste will be collected from the districts for safe and environmentally sound disposal in the presence of representatives from the Ethiopia Environmental Protection Agency.

Soak Pit and Wash Bay: The wash bays were washed with adequate water to remove all traces of pesticides, and the wastewater was drained into the soak pits. The soak pits have been covered to prevent debris from

falling into them during the off season. The soak pit areas have been locked with danger signs displayed in order to avoid unauthorized access.

PPE: Overalls, helmets, face shields, and gum boots were thoroughly washed with soap and water and are being kept safely in the district storage facility for use in 2019.

Defective Pumps: Defective spray pumps and other IRS equipment that were damaged during the campaign have safely been stored in the district storerooms and will be repaired before the 2019 spray campaign begins.

IRS Waste: Used nose masks, used polythene sheets, and worn-out coveralls, face shield, helmets, gloves, boots, and backpacks (bags) were quantified, weighed, and kept in their respective waste bins awaiting environmentally sound disposal.

8.3.2   SOLID WASTE DISPOSAL

The project is in the process of collecting contaminated waste from district stores for transport to the central warehouse in Addis Ababa and eventual disposition of all items (Table 16). VectorLink Ethiopia project signed a MoU with Tewodros Fikru rubber and plastic production factory to recycle empty bottles into electrical conduit cables. Preparations for the incineration of used masks and other contaminated waste were completed and the process only awaits transport of the waste from the districts. The process of incineration will consider last year's recommendation from the Addis Ababa University on how to minimize emissions from the incinerator smokestack.

TABLE 16: SUMMARY OF TYPE, QUANTITY, AND DISPOSAL STREAM OF 2018 IRS SOLID WASTE

Waste Category	Quantity	Disposal Method
Empty bottles	114,897 bottles	Will be recycled into electric cable transferring conduits.
Plastic sheeting	83 Kg	Will be re-used to cover the soak pits during the off-season and then disposed of together with the used bottles for conduit production.
Boots	94 Kg	After decontamination, will be given to the SOPs in need.
PVC gloves	131 Kg	As recyclers have not been successful in using them, minimizing this waste was recommended. Once collected in the central warehouse, they will be cleaned with soap and water, shredded, and placed in a landfill.
Used nose masks	2,850 Kg	Will be incinerated at the central warehouse in Addis Ababa-Burayu.
Worn-out overalls and insecticide bags	410 Kg	Will be given to deserving SOPs after being thoroughly cleaned with soap and water.
Cardboard boxes	4,791 Kg	Will be recycled into insecticide packaging material in a government-owned pulp and paper production factory.

8.3.3   INCIDENTS ENCOUNTERED DURING THE IRS OPERATION

Eight incidents were reported during the 2018 IRS season. One occurred in Addis Ababa during campaign preparation, five occurred in Gambela region, and one incident each occurred in Benishangul-Gumuz and Oromia regions. All incidents were recorded and reported to PMI within 48 hours, as per the PMI incident reporting requirement. The incidents reported are described below, by type:

Injuries

1. The first IRS incident in the 2018 season occurred on May 4. The VectorLink Ethiopia ECO sustained injuries to his left shoulder while conducting the first round of PSECA in Gambela Town. He was hospitalized for nine days. In his absence, the project technical staff effectively covered EC-related issues with minimal supervision. The ECO recovered after about a month of sick leave and re-joined the spray campaign.

2. On June 2, a seasonal supervisor in Gambela Zuria district was injured by loose glass in a window at the district store. He was taken to the nearest district health center and fully recovered after a few days.

3. At around 3:30 p.m. (local time) on June 17 in Guba district of Benishangul-Gumuz region, a road accident occurred as the spray team was leaving a community where spraying had been completed. The accident involved eight spray team members, including the driver, who lost control of the vehicle. The vehicle rolled over causing injuries to the people on board and damage to the vehicle. All the injured personnel were taken to the hospital and all recovered.

Missing insecticide

1. The first incident of missing Actellic occurred on May 22 in Mengeshi, a district in Gambela region. A porter put his bag outside a house while he helped the resident move out furniture. When the porter returned to his bag, he discovered a full bottle of insecticide was missing. The porter was taken into police custody. The police conducted a thorough investigation but could not find the bottle. Information about the serious risk of insecticide exposure was disseminated to the community.

2. The second case of missing bottle occurred in Gambela Town between May 23 and 27, 2018. Three bottles of Actellic 300 CS were lost in the field and documented in the storekeeper's register but not communicated to senior staff according to VectorLink protocol. The spray team recovered one empty bottle in a house that had been sprayed. The supervisor, who is also health worker, made sure that children in the house were kept away from the empty bottle, which was returned to the store. The disappearance of the remaining two bottles was thoroughly investigated by the police but the bottles were not recovered. The police report is available upon request.

3. The third case of missing Actellic 300 CS involved the loss of 26 bottles of Actellic 300 CS in Lare district of Gambela region. The incident report indicated that 32 bottles were missing but a thorough inspection revealed that only 26 bottles were missing. This was discovered by the VectorLink staff when he was performing a storekeeper performance inspection. Investigations have not yielded any positive results and the case is still active.

4. The final incident of missing insecticide occurred in Ilu district of Oromia region. One bottle of Actellic was discovered missing after 1,200 bottles were delivered from the district store in Mengeshi (Majang zone, Gambela region) to the Ilu district store (South West Shoa zone, Oromia region). After the delivery, the team decided to verify the quantities and discovered that one case of Actellic, which was presumed to be full, contained only 11 bottles instead of the expected 12. Investigations did not yield any results but the case was still active at the time of report writing. It is possible that the bottle had been missing before arrival in Ilu since it was discovered in a box that was assumed to be full.

Data Falsification

1. A supervisory team, comprising the Chief of Party, Technical Program Manager, Gambela Regional MFP, and Zonal IRS Coordinator traveled to Village 13 of Abobo district (in Gambela region) to conduct IRS supervision. The first three houses visited had been marked as sprayed but, upon inspection, the supervisors observed that the inside walls had not been sprayed. In some cases, the external surface of the doors had been sprayed to leave the scent of Actellic, but there was no trace of the insecticide on indoor surfaces. This finding raised questions about the district supervisor's leadership and triggered a robust data verification exercise in all 19 kebeles in Abobo district to assess the magnitude of the data falsification. The verification team found that approximately 95 percent of structures that had been recorded as sprayed had evidence of insecticide residue on the walls, which is within the expected range for a typical campaign and does not indicate a widespread data falsification issue. But in response to the weak spray supervision, the VectorLink team worked closely with the regional and district health authorities to replace the district supervisor and reinforce supervision of the Abobo operation. A Zonal IRS Coordinator (Abt staff) was posted in Abobo for the duration of the re-visits. Mobilization and supervision strategies will be revised in 2019.

9. GENDER MAINSTREAMING

VectorLink Ethiopia recognizes gender equality and female empowerment as development goals in their own right as well as approaches to achieving its vector control goals. The project identifies and then addresses inequalities between men and women across spray operations.

To ensure that all program activities align with USAID's policy on Gender Equality and Female Empowerment, VectorLink Ethiopia included modules on gender in all of the trainings. To emphasize its importance at the district level, all the district and zonal MFPs and supervisors were taken through an orientation in gender awareness and integration during TOT to ensure they can take the lead in addressing gender issues. After these presentations, it was clear that most participants appreciated the idea of integrating more women in the spray teams to increase women's participation in IRS. The VectorLink project in collaboration with all governmental stakeholders in an effort to promote the involvement of women in IRS, set a minimum target of 20% women to be recruited as seasonal workers per district in all the PMI-supported districts. The target was lower than last year because the project was targeting new districts and therefore needed to be conscious about the challenges of engaging women's involvement in IRS. Overall, women accounted for 35.7 percent (n=1,419) of all personnel engaged in the 2018 spray campaign as compared to 32.1 percent in the 2017 campaign (Table 17).

As in the operational sites in the old districts, separate shower rooms and toilets were constructed for female and male actors in the new districts. Given some concerns about privacy with this year's toilets, the program will use pre-fabricated bathrooms next year and will incorporate sanitary napkins for women to reduce this barrier to their participation in IRS.

VecorLink Ethiopia in collaboration with Zonal and District health management teams will continue to focus on female participation in IRS by identifying female IRS champions in the district for the 2019 campaign. The female IRS champions will advocate integration of women in IRS operations and encourage other women in the districts to get involved.

TABLE 17: FEMALE ENGAGEMENT IN IRS IMPLEMENTATION BY REGION

Region	Male	Female*	Total	% Female
Benishangul-Gumuz	1,172	797	1,969	40.5%
Gambela	856	402	1,258	31.9%
Oromia	529	220	749	29.4%
Total	2,557	1,419	3,976	35.7%

* The breakdown of women's roles are as follows: 3 TLs, 24 SQLs, 82 SOPs, 112 porters, 78 washers, 23 water fetchers, 1 storekeeper, and 1 storekeeper assistant, and 1,095 mobilizers

10. CAPACITY BUILDING

In addition to conducting and supporting IRS, one of VectorLink Ethiopia's main objectives is to enhance the technical knowledge and management capacity of Federal Government staff to implement IRS by:

- Training, capacity building, and advocacy at the national and district level as a means of achieving IRS sustainability. This included building the capacity of government officials to plan and conduct high-quality IRS.
- Daily monitoring of the IRS program via supervision of data collection and data entry using the VectorLink Access database and the M&E supervisory tools. VectorLink Ethiopia also implemented DOS to supervise the quality of IRS.
- Logistics assessments and coordination of all procurements, delivery, and storage of spray pumps, spare parts, insecticides, and PPE.
- Safe and correct insecticide application, thus minimizing human and environmental exposure to IRS insecticides, in compliance with the PERSUAP and SEA.
- Coordination of sensitization and mobilization activities to raise the populations' awareness and acceptance of IRS and to encourage ownership.
- Entomological surveillance including assessing malaria vector density and species composition in intervention areas, establishing vector feeding time and location, monitoring the quality of insecticide application and insecticide decay rates, and assessing vector susceptibility to multiple insecticides.
- Provision of high-level supervision and monitoring of IRS activities during implementation.

In 2018, the VectorLink Ethiopia project continued capacity-building initiatives aimed at enhancing the ability of FMOH staff to effectively implement, monitor, and supervise IRS and adhere to EC procedures. Although there was no specific training for national-level staff, the project incorporated them into IRS training for regional and district staff. It built the capacity of these latter staff to train supervisors and SOPs at the district level. In total, 22 regional and district staff were trained in TOT and supervisory skills. The project also gave them tools on IRS planning and implementing, M&E, procurement, and logistics.

The VectorLink project also provided technical support to the NMCP in training 243 participants from eight regions of Ethiopia (all except Tigray). The project provided trainers and training materials for the national-level TOT on IRS, and spray pump use and maintenance. Observations during the campaign suggest that more accountability is needed for government staff to feel responsible for adherence to PMI BMP including frequent field supervision and DOS.

The project continued to support Addis, Jimma, Mekelle, Jigjiga, Arba Minch, and Gondar universities with the aim of building capacity for entomological monitoring and insecticide resistance testing. It is hoped that universities will serve as resource centers for entomology monitoring and training for the country. The VectorLink project has planned a training for the Ethiopia Public Health Institute (EPHI) entomology staff in general entomology. Furthermore, the project provided on-the-job mentoring and technical support to EPHI staff in insecticide resistance testing and advanced entomological techniques. Additionally the project procured entomological equipment worth $110,000 and handed it over to EPHI in May 2018.

The Acting EPHI Director (middle right) accepts entomology equipment from the VectorLink Ethiopia project (middle left) at the EPHI office in Addis Abba in May 2018

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11. CHALLENGES, LESSONS LEARNED, AND RECOMMENDATIONS

11.1 CHALLENGES

The VectorLink Ethiopia project faced numerous challenges during the 2018 IRS campaign. Major challenges included the following:

Staffing and Supervision

- The recruitment of all seasonal workers was done by the RHBs through the DHO. Because these offices did not adhere to selection criteria, some seasonal workers (SOPs and SQLs) did not meet the criteria, and they were difficult to train and supervise. Also, very few women were recruited.
- The RHBs and respective DHOs were also responsible for mobilization – including identifying, training, and supervising HEW mobilizers – just as they had done for many years in Oromia under the AIRS project.
- RHB mobilization efforts were insufficient for the new districts in Gambela and Benishangul-Gumuz regions. Most urban areas, especially in Gambela, experienced high refusals of IRS. Especially in the kebeles with low acceptance of IRS and low spray coverage, the VectorLink supervisory team observed that the HEWs had not done any mobilization. This was because in most cases, they had not been adequately oriented to IRS mobilization, and they were busy with other DHO activities. The main reason for IRS refusal in urban areas was that most householders had a lot of household goods, which made it difficult to prepare their homes for IRS. Because they had not been mobilized, they were not convinced of the effectiveness of IRS and perceived it as an inconvenience or nuisance. Generally, the beneficiaries in Gambela were more resistant to IRS than in the other two regions. During spray implementation, the VectorLink team engaged local kebele and political leadership to better inform the communities and improve acceptance of IRS. This strategy proved successful.
- The VectorLink project had to deal with poor coordination and supervision by the RHB, mostly in Gambela and Benishangul-Gumuz regions, due to inadequate commitment from the DHO staff who were responsible for these tasks. DHO supervisors either did not visit the field to conduct supervision or, if they did, they did not use standard checklists for supervision. In some Gambela districts, most DHO supervisors never conducted regular morning mobilization meetings despite several reminders. VectorLink IRS supervisors observed that there was quality spraying in most districts. However, they also observed that in most Gambela districts, homes were inadequately prepared. In Abobo district, poor DHO supervision led to some cases of data falsification. To correct this, the spraying in the district was stopped and a verification exercise was conducted in all kebeles. The seasonal supervisor, who was hired by VectorLink project, was dismissed because he did not hold anyone accountable for good performance at best, or tolerated cheating at worst. The verification exercise did not detect any systematic data falsification and therefore spraying was re-started after re-training of SOPs and DHO supervisors.
- The SQL was responsible for collecting and reporting spray data for all four SOPs as well as using DOS to ensure the quality of their spraying. This gave the SQLs too much to manage without

adequate support by site leadership, and in many districts, spray quality suffered. It also meant that the SQLs did not record all the structures found. To remedy this, the VectorLink project hired more SQLs for Benishangul-Gumuz and the VectorLink supervisors prioritized data collection and spray quality during supervision.

- During the 2018 spray season, VectorLink Ethiopia recorded 32 missing bottles of Actellic 300 CS. This was attributed to weak supervision and lack of proper training on insecticide tracking. The project immediately strengthened supervision by sending the Logistics Coordinator to conducted on-site training for the storekeepers. The VectorLink team also prioritized storeroom management and insecticide tracking during supervision.

Planning and logistics

- Gambela and Benishangul-Gumuz regions have many remote and sparsely populated spray areas. The IRS teams had to travel very long distances on poor road only to find a very few structures. In the end, some areas were not reached or they were reached only at a very high cost per structure sprayed. The long distance between data centers and operation sites also led to delays in transmitting spray data and as a result the weekly data reporting was sometimes late.
- The cascade training was not supervised by VectorLink Zonal Coordinators because they were overwhelmed managing the preparation of storerooms, soak pits, and bathrooms in the 26 new districts (originally assigned to DHO staff who did not fulfill their responsibilities on time). This led to inadequately trained SOPs and SQLs in most of Gambela region and some districts in Benishangul-Gumuz.
- A large amount of insecticide was left over at the end of the spray season. This was partly due to overestimation of the structures by the DHO and partly due to the quantification method used, which assumed that surfaces areas (including ceilings) were greater than what was found. However, the leftover insecticide does not expire until February 2020, so it can be used in the 2019 spray campaign.
- While storekeepers managed most IRS commodities well, there was inadequate tracking of insecticides in most districts. VectorLink discovered that the storekeepers were not officially recording the full bottles of insecticide returned at the end of the day although they did so on an unofficial register. As soon as VectorLink discovered this, it sent the project Logistics Officer to provide on-site mentoring to all storekeepers on insecticide storage best practice and reminded them of the proper inventory control protocols.
- Generally, all wash areas were well secured and clearly marked as hazardous. But some of the tarpaulins were found to have holes in them. Some sites in Lare and Itang districts of Gambela region were completely waterlogged. In response, the project built an alternative soak pit in another location.

Security

- Security concerns negatively affected the spray campaign. To protect spray teams, VectorLink Ethiopia suspended spray activities for several days where civil unrest caused concern. This extended the length of the campaign, leading to more operational days and increased costs. It also forced spray dates to be changed, leading to some refusals of IRS. No incident was recorded as a result of the conflict.

11.2 LESSONS LEARNED

- It was evident that the spray systems for mobilization, training, and supervision that had previously been effective in Oromia region were insufficient for new districts in Gambela and Benishangul-Gumuz. VectorLink will review the IRS supervisory structure and responsibilities to ensure the

smooth implementation of future spray campaigns with robust spray quality and data quality assurance.

- There was poor acceptance of IRS in the urban areas of Gambela and Benishangul-Gumuz regions. VectorLink will work to engage kebeles leaders and district political leadership as mobilizers at the operational site level to increase acceptance of IRS.

- Most spray areas in Gambela and Benishangul-Gumuz regions were sparsely populated and very remote. The remoteness made it difficult for vehicles carrying spray teams to reach them. VectorLink will review its transportation system.

- In the future, VectorLink will develop more robust planning and tracking tools for starting up IRS operations in new districts and continue to explore cost-effective enumeration strategies. This lesson will be disseminated widely across all VectorLink countries.

- In some districts, spray actors were not eating breakfast as a team and therefore some skipped breakfast. This affected the daily spray outputs as some hungry SOPs stopped working early to prepare food. VectorLink should provide breakfast and water to spray teams to improve spray team efficiency and output.

- During the campaign, some SOPs were not wearing socks. They developed blisters, which made them less complaint with wearing boots. The project would like to procure socks for all spray team members to make wearing boots more comfortable.

11.3 RECOMMENDATIONS

- DHOs must use the standard criteria to screen and recruit seasonal workers for IRS. VectorLink recommended to all three RHBs that at least one project representative should participate in screening and hiring IRS seasonal workers.

- VectorLink will advocate for more involvement of women in the IRS program by encouraging more women to apply to recruitment adverts. The team will also use women HEWs to champion more womens' participation.

- The project needs to support and invest more in the implementation of systematic SBCC activities in collaboration with DHOs. The use of HEWs for social mobilization did not go well in 2018 because the HEWs lacked training and had competing tasks that made them unavailable. The project recommends recruiting community leaders, kebele administrators, and influential persons in the community as mobilizers.

- . Some kebeles are remote, and their sparse populations are geographically dispersed, requiring disproportionate resources for teams to reach. VectorLink will engage the RHBs and respective DHOs to look at the best ways to cover these remote kebeles as efficiently as possible.

- Zonal Coordinators must be present to emphasize the importance of certain VectorLink practices. Also, cascade training should be strengthened with a module on common challenging situations, identifying and solving problems with pumps, and so forth. Additionally, trainings need to emphasize the importance of recording all structures visited, including those that were not sprayed.

- To improve quality of spraying and of data collection, VectorLink Ethiopia will consider a revised data collection system and supervisory structure. Additionally, VectorLink will explore the possibility of translating all forms into Amharic and/or Oromiffa for use in the field.

- Since mop-up plays an important role in ensuring that all eligible structures are sprayed, VectorLink Ethiopia proposes to incorporate a mop-up strategy as a routine component of the spray campaign. The project will have one mop-up squad per district that will do mop-up immediately after a kebele has been sprayed.

- To improve supervision, supervisors must be committed and available throughout the campaign. Hence, selection of supervisors and TLs should focus on commitment and availability of individuals. The project recommended recruitment of these cadres from lower levels such as health facilities. Facility staff are more available and more committed than DHO staff, who are too busy managing concurrent programs to dedicate significant attention to IRS. There is also need to involve the

district political administration in IRS planning and operations to provide oversight supervision of district spray teams.

- To ensure that correct amounts of insecticides are estimated and procured, the project will use the current consumption rate and a more conservative estimation methods to avoid having a large amount of leftover insecticide.

- To improve inventory management in storerooms, VectorLink recommends recruiting and training seasonal storekeepers who have experience in storekeeping and a good record of respecting chain of command procedures. This will improve the overall quality of inventory management at district stores. To improve the quality of training at the district level, the project recommends hiring additional trainers (at least one per district). Additionally, more frequent verification of insecticide balances will be conducted remotely and in person.

- There is also need to emphasize program ownership to the districts so that districts can take responsibility for all the IRS activities at the district level.

- The project would benefit from building fixed soak pits using cement over the long term. This will avoid the need to renovate them each year to comply with EC standards.

- The project recommends purchasing pre-fabricated stalls to use as latrines and showers. The stalls are not permanent but they can assembled and dissembled repeatedly over several years, improving the sustainability and environmental impact of the project. They also will improve privacy for spray personnel, and might increase the number of women willing to participate in IRS operations.

ANNEX A. 2018 PROCUREMENT LIST AND POST-SPRAY BALANCE

TABLE A-1: PPE AND OTHER SUPPLIES PROCURED

Items	Quantity before the campaign	Quantity procured	Total	Quantity used	Quantity damaged	Quantity remaining after campaign
International Procurement						
Hudson X-Pert sprayer	538	1,500	2,038	-	54	**1,984**
Ceramic nozzle tips (8002E)	3,321	7,042	10,363	-	604	**9,759**
CFV (Complete with gasket)	4,539	1,502	6,041	-	2,261	**3,780**
CFV gaskets	1,802	1,529	3,331	30	111	**3,190**
Rubber gloves - short (pair)	-	2,500	2,500	2,500		**-**
Rubber gloves – medium (pair)	10,250	2,500	12,750	2,853		**9,897**
Mouth/nose masks/respirator	43,196	186,600	229,796	67,354		**162,442**
Spare part kit (Spray pumps)	123	185	308	17		**291**
Helmets	2,342	1,536	3,878	-	62	**3,816**
Face shields	3,016	6,050	9,066	6,558	62	**2,446**
Face shield carrier	3,016	6,050	9,066	6,558	62	**2,446**
Rubber boots	994	1,806	2,800	-	88	**2,712**
Charcoal	-	30	30	20		**10**
Local Procurement						
Aprons	248	121	369	215		**154**
Coveralls	2,849	6,287	9,136	-	942	**8,194**
Washing basins	126	163	289	-	44	**245**
Funnels with strainer	452	340	792	-	439	**353**
Warning sign – For stores and soak pits	132	110	242	-	29	**213**
Duffle bags	61	257	318	-	8	**310**
Canvas tents	109	235	344	-	4	**340**
Tool kits bag	147	168	315	-	34	**281**
Combination plier 8"	-	206	206	-	16	**190**
Adjustable wrench 12"	-	206	206	-	14	**192**
Screw driver	-	206	206	-	18	**188**
Water tankers 2,000L	37	56	93	-	3	**90**

Items	Quantity before the campaign	Quantity procured	Total	Quantity used	Quantity damaged	Quantity remaining after campaign
Bathing soap	-	20,650	20,650	9,064		**11,586**
Laundry soap	1,455	8,526	9,981	7,367		**2,614**
Mattresses	880	1,197	2,077	-	9	**2,068**
220 liter barrel	193	416	609	-	27	**582**
20 liter jerrican	528	392	920	-	126	**794**
20 liter bucket with cover	628	419	1,047	-	89	**958**
Neck protection	411	1,754	2,165	-	70	**2,095**
Spray operator bag	110	1,063	1,173	-	50	**1,123**
Polyethylene sheet 2 x 3 meters	61	921	982	-	885	**97**
Polyethylene 8 x 4 meters	-	52	52	-	52	**-**
Fire extinguisher 6kg	17	26	43	-		**43**
Fire extinguisher 3kg	22	26	48	-		**48**
Batteries pairs	584	6,085	6,669	6,006		**663**
Torches	413	1,098	1,511	-	504	**1,007**
Reflective jacket	322	211	533	-	184	**349**
2 liter jug with handle	435	392	827	-	50	**777**
Graduated cylinder – 1000ml	151	210	361	-	16	**345**
Towel	704	1,027	1,731	537		**1,194**
Whistle	17	28	45	-	7	**38**
Calculator	19	26	45	-	4	**41**
Shovel with handle	27	26	53	-	10	**43**
Chalk	-	370	370	320		**50**
Thermometer	36	59	95	-	12	**83**
Dust brush with pan	18	28	46	-	5	**41**
Pad lock	328	156	484	-	76	**408**
Spray training wall	244	98	342	-	211	**131**
Generator set	12	20	32	-	12	**20**
Rope, 100mt	129	26	155	-	37	**118**
Laptops for data capture	72	6	78	-	-	**78**

ANNEX B. MONITORING AND EVALUATION PLAN

TABLE B-1: MONITORING AND EVALUATION PLAN

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
Objective 1: Implementation of Malaria Vector Control Interventions													
1.1	**Successfully execute IRS and other malaria vector control programs**												
1.1.1	Number and percentage of complete annual country work plans developed and submitted on-time	Project records Annually	Country	1; 100%	1;100%								
1.1.2	Number of eligible structures targeted for spraying	Data source: Previous spray campaign data, enumeration data (targets); Daily Spray Operator Forms (results) Reporting frequency: Daily per spray campaign	By Spray Campaign	595,618[2]	574,042[3]								
1.1.3	Number of eligible structures sprayed with IRS	Data source: Daily Spray Operator Forms Reporting frequency: Daily per spray campaign	By Spray Campaign	506,275[4]	472,569[5]								
1.1.4	Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	Project records Annually	Country	85%	97%								

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[2] Number of eligible structures targeted based on number of structures found in 2017 (18 districts) and microplanning data from RHBs (26 districts).

[3] Number of targeted structures is lower than the Y1 target because the IRS team couldn't visit/access conflict areas, road blocks and high river levels prevented access in some districts and, an overestimation of structures in some new PMI supported districts inflated the campaign target.

[4] 85% of target (85% * 595,618)

[5] Number of eligible structures sprayed with IRS is low due to: 1. IRS team couldn't visit/access the conflicts areas 2. Road blocks and high river levels at some districts 3. Overestimation of structures in some new PMI supported districts.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.1.5	Number of people protected by IRS	Data source: Daily Spray Operator Forms Reporting frequency: Daily per spray campaign	By Spray Campaign By Gender By pregnant women By children <5 years old	1,622,386	1,264,189[6] Pregnant women= 28,944 Children <5= 213,459 Male: 633,359 Female: 630,830								
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)	Project Annually	Country	1; 100%	1; 100%								
1.1.7	Number of IRS country programs that conduct a Post-spray Data Quality Audit within 90 days of spray completion	Data Collection Forms Annually	Country	N/A	N/A								
1.1.8	Number of Insecticide Treated Nets (ITNs) distributed, by channel	Project Records Annually	Country Channel	N/A	N/A								
1.1.9	Number and percentage of ITN country programs that conduct at least one process assessment of the quality of ITN distribution planning, the quality of household registration, and or ITN distribution implementation during a mass ITN distribution campaign	Project Records Annually	Country Channel	N/A	N/A								
1.1.10	Number and percentage of ITN country programs with operational routine monitoring systems for continuous ITN distribution, disaggregated by channel	Project Records Annually	Country Channel	N/A	N/A								
1.1.11	Number and percentage of countries completing ITN durability monitoring data collection on time as planned in a given project year	Project Records Annually	Country	N/A	N/A								

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[6] Sex segregation was done based on the 2017 projection in the document "Federal Democratic Republic of Ethiopia Central Statistical Agency Population Projection of Ethiopia for All Regions at Woreda Level from 2014 – 2017," where males comprise 50.1% of the population and females 49.9%.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.2	**Provide technical assistance and planning support for IRS and other integrated malaria vector control activities**												
1.2.1	Number of VC project training workshops targeting NMCP and other host country staff	Project Training Records Annually	Country Technical Area Job Function	0	0								
1.2.2	Number of NMCP and other vector control host country staff accessing DHIS2	DHIS2 Logs Annually	Country Job Function	0	0								
1.3	**Ensure safe and judicious use of insecticides and other malaria vector control products**												
1.3.1	Number of vector control personnel trained in environmental compliance and personal safety standards in vector control implementation	Data source: Project records – Training reports Reporting frequency: Each spray season	By Sex (# and %) Job Function	2,628	2,751[7] Male: 2,445 (89%) Female: 306 (11%)								
1.3.2	Number of health workers receiving insecticide poisoning case management training	Project Training Records Annually	By Sex (# and %)	132	103 Male: 90 (87%) Female: 13 (13%)								
1.3.3	Number of adverse reactions to pesticide exposure documented	Incident Report Forms Annually	Country Type of Exposure	0	0								
1.4	**Strengthen capacity of NMCPs, vector control personnel, and other institutions to implement and manage IRS and other vector control activities**												
1.4.1	Total number of people trained to support VC in targeted areas	Project Training Records Annually	By Sex (# and %) VC Intervention Type	4,539	4,371[8] Male: 2,953(68%) Female: 1,418 (32%)								
1.4.2	Number of people trained during IRS Training of Trainers	Project Training Records Annually	By Sex (# and %)	257	276 Male: 268(97%) Female: 8 (3%)								
1.4.3	Total number of people hired to support VC in target districts	Project Records Annually	By Sex (# and %) Job Function VC Intervention Type	4,528	4,366[9] Male: 2,948(68%) Female: 1,418 (32%)								

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[7] TOT participants (276), SQL (393), SOP (1378), Porter (324), Washer (82), Driver (129), Guard (81), Storekeeper (44) and Storekeeper assistant (44)

[8] TOT (276), DECs (49), Pesticide poison management (103), HEW (1468), SQL (393), SOP (1378), Porter (324), Washers (82), Drivers (129), Guards (81), Store keepers (44) and Temporary Store Keepers (44).

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.4.4	Number of government/district officials who acted as supervisors during VC campaigns	Project Records Annually	Country VC Intervention Type	266	276[10]								
1.5	**Promote gender equality in all facets of planning and implementation**												
1.5.1	Number of women hired to support VC campaigns	Project Records Annually	Country Returning female seasonal workers hired in a more senior capacity	1,358; (30%)	1,418[11] ; (32%)								
1.5.2	Number and percentage of women hired in supervisory roles in target areas for vector control activities	Project Records Annually	Country VC Intervention Type Job Function	63; 10%	34[12];(5%)								
1.5.3	Number and percentage of staff (permanent and seasonal) who have completed gender awareness training	Project Training Records Annually	Country Sex Job Function	375[13]; 100%	394; 105% Male:382 Female:12								
1.5.4	Number and percentage of women in senior leadership roles in VectorLink country offices	Project Records Annually	Country Sex (# and %)	N/A	N/A								
1.6	**Implement and support social behavioral change communication and mobilization activities**												
1.6.1	Number of radio spots and talk shows aired	Project Records Annually	Country VC Intervention Type	N/A[14]	N/A								
1.6.2	Number of print materials disseminated	Project Records Annually	Country VC Intervention Type	5,817[15]	6,561								
1.6.3	Number of people reached with vector control and/or SBCC messages via door-to-door messaging	Project Records Annually	Country VC Intervention Type Sex	N/A	N/A								

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[9] Supervisors (276), DECs (49), Pesticide poison management (103), HEW (1468), SQL (393), SOP (1378), Porter (324), Washers (82), Drivers (129), Guards (81), Store keepers (44) and Temporary Store Keepers (44).

[10] MFPs- Regional, Zonal, and District (66), Environmental Compliance (42), Vice Heads (43), Information, Education and Communication (44) and Team Leaders (81)

[11] Supervisors (8); DECs (4); Pesticide poison management (13); HEW (1,095); SQL (24); SOP (82); Porter (112); Washers (78) ;Store keepers (1) and Temporary Storekeepers (1)

[12] In 2017, the community based IRS (CB IRS) approach was used in 5 districts and by design it involves women as SQLs since most SQLs are female HEWs. In 2018 district-based IRS was implemented which meant that SQLs were recruited from the general public and few women were interested in getting involved in IRS.

[13] 30 VectorLink staff, 257 Supervisors, 44 Storekeepers, 44 Temporary Storekeepers

[14] Radio spots are not used in Ethiopia.

[15] Posters focusing on IRS will be prepared and distributed for the 26 new districts.

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
1.6.4	Number and percentage of people who feel that the proposed action (sleeping under an ITN/accepting IRS) will reduce their risk of malaria	Project Records Annually	Country	N/A	N/A								
1.6.5	Number and percentage of people with a favorable attitude toward the practice/product (i.e., ITNs, IRS)	Project Records Annually	Country VC Intervention Type	N/A	N/A								
1.6.6	Number and percentage of people who believe that the majority of their friends and community members practice the behavior	Project Records Annually	Country VC Intervention Type	N/A	N/A								
1.7	**Environmental compliance**												
1.7.1	Number and percentage of SEAs (with EMMPs) or Letter Reports submitted at least 60 days prior to the commencement of vector control campaigns	Project Records Annually	Country	1; 100%	1;100%								
1.7.2	Number and percentage of permanent and mobile soak pits (MSPs) inspected and approved prior to IRS campaigns	Project Records Annually	Country Soak Pit Type	115; 100% 85 fixed soak pits 30 MSPs	110;96% 80 fixed soak pits; 94% 30 MSPs; 100%								
1.7.3	Number and percentage of storehouses inspected and approved prior to IRS campaigns	Project Records Annually	Country Storehouse Type	46; 100% 2 Central Warehouses and 44 Store rooms	46;100 2 Central Warehouses and 44 Store rooms								
1.7.4	Number and percentage of fixed soak pits that are compliant with PMI's Best Management Practices	Project Records Annually	Country	85; 100%	80; 100%%								
2. Entomological and Epidemiological Data to Drive Decision-Making													
2.1	**Vector control activities monitored via entomological and epidemiological data**												
2.1.1	Number and percentage of project-supported entomological sentinel sites established to monitor vector bionomics and behavior (vector species, distribution, seasonality, feeding time, and location)	Entomological Reports Annually	Country VC Intervention Type	3[16]; 100%	3;100%								

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[16] The selected sites are: Abaya, Bambasi, and Lare

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
2.1.2	Number and percentage of entomological monitoring sentinel sites measuring all five basic PMI entomological monitoring indicators (i.e., species composition, abundance, and seasonality of malaria vector; insecticide susceptibility and resistance intensity; mechanism of resistance; quality assurance and residual efficacy monitoring of IRS programs; or vector behavior: feeding time &, location)	Entomological Reports Annually	Country VC Intervention	13; 100%	13;100%								
2.1.3	Number and percentage of entomological monitoring sentinel sites measuring at least one advanced PMI indicator (i.e., identification of mosquito infectivity; parity rates; or blood-meal analysis)	Entomological Reports Annually	Country VC Intervention	3[17]; 100%	3;100%								
2.1.4	Number and percentage of insecticide resistance testing sites that tested at least one insecticide from pyrethroid, organophosphate, carbamate, clothianidin, and chlorfenapyr insecticides	Entomological Reports Annually	Country Insecticide Type	4[18]; 100%	4;100%								
2.1.5	Number of wall bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS	Entomological Reports Annually	Country	36[19]	48[20]								
2.1.6	Number and percentage of cone bioassays conducted within two weeks of spraying with greater than 98% test mortality recorded	Entomological Reports Annually	Country	36[21]:100%	48[22];133%								

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[17]   The sites are: Abaya, Bambasi, and Lare

[18]   The sites are: Abaya, Amibara, Halaba, and Ziway

[19]   12 houses from 3 kebeles will be used for wall bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS.

[20]   12 houses from 4 kebeles will be used for cone bioassays within 2 weeks of spraying to evaluate the quality of IRS

[21]   12 houses from 3 kebeles will be used for cone bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS.

[22]   12 houses from 4 kebeles will be used for cone bioassays within 2 weeks of spraying to evaluate the quality of IRS

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
2.1.7	Number of wall bioassays conducted after the completion of spraying at monthly intervals to evaluate insecticide decay	Entomological Reports Annually	Country Insecticide Type	252[23]	96[24] Ongoing								
2.1.8	Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites	Entomological Reports Annually	Country Insecticide Type	80[25]	26[26] Ongoing								
2.1.9	Number of countries with an integrated vector control analytics dashboard available for decision making	Project Records Annually	Country	N/A	N/A								
2.1.10	Number of staff (VectorLink-contracted or non-VectorLink) trained in entomological monitoring	Project Training Records Annually	Country Sex (# and %) Job Function	8[27]	4[28] Male: 3(75%) Female: 1(25%)								
2.2	**NMCPs develop country-level IRS and other malaria vector control 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	Project Records Annually	Country	0									
2.2.2	Number and percentage of countries with integrated data and visualization landscaping for vector control decision making complete	Project Records Annually	Country	0	0								
2.2.3	Number and percentage of countries that implement sub-national insecticide as part of an IRM strategy	Project Records Annually	Country	0	0								
2.3	**Build capacity of NMCPs and local institutions to collect, analyze, and use data for strategic malaria control decision-making**												
2.3.1	Number of individuals trained from NMCPs and national institutions to review and interpret data for integrated vector control decision making	Project Training Records Annually	Country Job Function Organization	TBD	0[29]								

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[23] 36 bioassays per month for 7 months will be conducted in 3 kebeles

[24] Will continue up to December

[25] 80 Tests: Permethrin=12, Propoxur=12, DDT=12, Bendiocarb=12, Deltamethrin=12, Pirimiphos-methyl=12; clothianidin=4; chlorfenapyr=4

[26] Will continue through October

[27] Six universities (Gondar, Jigjiga, Mekelle, Addis Ababa, Arba Minch, and Jimma) and insectaries

[28] Two universities (Jigjiga, and Dire Dawa) and Oromia Public Health Research Capacity Building and Quality Assurance Laboratory (Adama)- 2 Entomologists and 2 Ento Technicians

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
2.3.2	Proportion of targeted individuals who report using new analytical tools and/or skills in their planning, resourcing, implementation, or measurement activities	Capacity Assessments Thrice Over Project Life	Country Job Function Organization	100%	0								
3. Procure insecticides for IRS and support the delivery and storage of IRS and other malaria vector control products													
3.1	**Cost-effective procurement mechanism established**												
3.1.1	Number and percentage of insecticide procurements that had a pre-shipment QA/QC test at least 60 days prior to spray campaign	Procurement Records Annually	Country Insecticide Type	2; 100%	2;100%								
3.1.2	Number and percentage of insecticide procurements received on-time to allow for the initiation of spray operations as scheduled	Procurement Records Annually	Country Insecticide Type	2; 100%	2; 100%								
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	Procurement Records Annually	Country VC Intervention Type	1; 100%	1; 100%								
3.1.4	Number and percentage of targeted countries with local procurements for PPE received on-time to allow for the initiation of spray operations as scheduled	Procurement Records Annually	Country	1; 100%	1; 100%								
3.1.5	Number and percentage of countries with PPE procured according to workforce composition	Procurement Records Annually	Country	N/A	N/A								
3.2	**Robust inventory management and logistics systems established**												
3.2.1	Number and percentage of logistics and warehouse managers trained in vector control supply chain management	Project Training Records Annually	Country VC Intervention Type Sex	88[30]; 100%	88;100% Male: 86 (98%) Female: 2 (2%)								

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[29] This activity has not been planned for 2018.

[30] A total of 44 storekeepers and 44 temporary storekeepers

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
3.2.2	Number and percentage of operations site warehouses where physical inventories can be verified by daily stock records	Inventory and Stock Records Annually	Country Insecticide Type	46 (2 Central houses and 44 district store rooms), 100%	46; (100%)								
3.2.3	Number and percentage of IRS countries that successfully completed spray operations without an insecticide stock-out	Inventory and Stock Records Annually	Country Insecticide Type	1; 100%	1; (100%)								
4. Innovation													
4.1	**Conduct operational research or monitoring to scale up new tools, methods, and approaches**												
4.1.1	Number of operational research studies on promising new tools or new methods/approaches to existing tools that are implemented	Project Records Annually	Type of Innovation	TBD	0								
4.2	**Create and share knowledge through dissemination of best practices and lessons learned**												
4.2.1	Number of innovations, best practices, and other data or lessons learned shared with other partners or international institutions for global reporting on the Vector Learning Exchange	Project Records Annually	Country Technical Area	TBD	0								
4.2.2	Number of individual members who use the Vector Learning Exchange	Project Records Annually	N/A	29	30								
4.2.3	Number of symposia and/or presentations submitted to and accepted at global conferences	Project Records Annually	Country Technical Area	TBD	0								
4.2.4	Number of success stories written or videos produced and shared on the VectorLink project website	Project Records Annually	Country	0	0								
4.2.5	Number of peer-reviewed journal articles submitted and accepted	Project Records Annually	Technical Area	1	0								
4.2.6	Number of critical guidance, standards, or plans that incorporate disseminated findings/best practices	Project Records Annually	Technical Area	1	1								
4.3	**Develop and deploy cost-savings approaches**												
4.3.1	Number of innovative or novel approaches implemented to achieve cost savings in IRS and integrated malaria vector control programs	Project Records Annually	Country VC Intervention Type	0									

#	Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregation(s)	Annual Targets and Results										
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Target	Result	Target	Result	Target	Result	Target	Result	Target	Result
4.3.2	Number of cost effectiveness assessments of existing approaches in the implementation of IRS and integrated malaria vector control programs	Project Records Annually	Country VC Intervention Type	0	0								
4.4	**Cultivate public-private partnerships**												
4.4.1	Number of private sector entities engaged with to establish public private partnerships to increase the quality and coverage of malaria vector control activities globally	Project Records Annually	Country Private Sector Organization	1	2[31]								

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[31] "Tewodros Fikru Rubber and plastic products manufacturing Factory" is a privately owned company that recycles the empty bottles into electric conduits. "Ethiopian Pulp and Paper production Factory" is a government owned company that recycles Actellic boxes into other re-usable boxes.

ANNEX C. DATA COLLECTION AND QUALITY ASSURANCE TOOLS

TABLE C-1: ETHIOPA IRS 2018 DATA COLLECTION TOOLS

Data Collection Tool	Usage
Training Participants Registration Form	Used by the lead trainer at training workshops to capture the positions/titles of trainees and number of people trained, disaggregated by participants' sex.
Daily Spray Operator Form	Used by SQLs during spray operations to capture structures found, structures sprayed and not sprayed, population protected and not protected, and mosquito net and insectcide information. This tool also captures geography, spray actors' names and codes, household names, IRS numbers, structure type, gender of respondent, and other primary data indicators.
Daily Squad Leader Summary Form	Used by SQLs both to check the data quality on the Daily Spray Operator Form and to summarize the daily data from each Daily Spray Operator Form for which they are responsible.
Daily Team Leader Summary Form	Used by TLs both to check the data quality on the Daily Spray Operator Form and to summarize the daily data from each SQL for which they are responsible. This tool is used to assess and manage squad performance on a daily basis.
Daily District Malaria Focal Person Summary Form	Used by district MFP during spray operations to summarize the daily data from each TL they supervise. This tool is mainly used to manage team performance on a daily basis.

TABLE C-2: DATA QUALITY ASSURANCE TOOLS

Data Quality Assurance Tool	Purpose and Usage
Data Collection Verification (DCV) Form	Purpose: • To check the accuracy of data collected in the field, i.e., ensure that the data written on the Daily Spray Operator Forms matches the information reported by households and/or the data recorded on the IRS Cards disseminated to households. Used during field audits by: • VectorLink M&E and Database Managers • VectorLink Operations Manager • VectorLink Spray Operations Coordinator • VectorLink Zonal Supervisors • Zonal District MFPs • District Heads and Deputies • District Environmental Compliance Experts
Data Entry Site Supervision Checklist	Purpose: • To check the application of data entry and documentation protocols and provide on-the-spot support to data entry clerks (DECs) Used during visits to data entry centers by: • M&E Manager • Database Manager • IT Specialist
Daily Squad Leader Summary Form	Purpose: • To check the completeness and correctness of data collected in the field. Used in the field post-data collection by: • SQLs on daily basis to retrospectively check 100% of the forms filled by themselves.
Daily Team Leader Summary Form	Purpose: • To check the completeness and correctness of data collected in the field. Used in the field post-data collection by: • TLs on a daily basis to check 50% of the forms filled by the SQLs under their supervision.

TABLE C-3: METHODS FOR DATA QUALITY ASSURANCE AND CONTROL

Quality Assurance/ Quality Control Issue	Method/Tools for Quality Assurance

Spray data integrity	• Used standardized data collection forms
	• Used locally translated data collection forms during training
	• Comprehensive training for spray data collection and protocols
	• Multiple levels of supervision
	• SOPs are supervised directly by their SQL and TL
	   – Supervisors monitor TLs and verify Daily Spray Operator Forms.
	   – TLs, and IEC and EC experts monitor and verify data capture by SQLs.
	   – District MFP verifies and runs random spot checks on data collection.
	• Use of EE and DCV forms to ensure complete and accurate data collection

Spray data entry and management	• Data entry training for all DECs and spray supervisors
	• Prompt field data entry and transfer; data collection forms arrive at data entry sites daily and data entry is done on a daily basis
	• Data verification via double-data entry system
	   – Initial data entry of totals per data collection form
	   – Follow-up entry of detailed data, i.e., per individual household
	• Use of Microsoft Access-based IRS Cleaning/Reporting tool to clean data on a daily basis
	• Database designed with locks and validation checks

Data security	• Paper data collection forms stored systematically in binders and filed at district level for permanent reference • Database designed with passwords to restrict unauthorized entry • Databases backed up daily on the data entry server laptop, on DropBox, and on external pen drives every day

TABLE C-4: TRAINING SUMMARY

District	Team leaders			Squad leaders			Spray operators			Porters			Washers			Security guards			Water fetchers			Store Keepers			Store Coordinators			Data Entry Clerk			Drivers		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Homosha	1		1	9		9	25		25	6		6		2	2	1		1	2		2	1		1	1		1	1		1	2	0	2
Menge	4		4	24		24	66		66	16		16		4	4	2		2	2	2	4	1		1	1		1	2		2	6	0	5
Sherkole	2		2	13		13	36		36	9		9		2	2	2		2	2		2	1		1	1		1	1		1	4	0	4
Bambasi	2		2	14	1	15	41		41	6	4	10		2	2	2		2	2		2	1		1	1		1	2		2	4	0	4
Assosa	4		4	18	4	22	56	5	61	13	2	15		4	4	2		2	1	3	4	1		1	1		1	2		2	5	0	5
Oda Buldigilu	3		3	13	3	16	45		45	8	3	11	3		3	2		2	3		3	1		1	1		1	1		1	4	0	4
Kumruk	1		1	6		6	18		18	4		4		1	1	1		1	1		1	1		1	1		1	1		1	2	0	2
Sedal	1		1	4	1	5	14		14	1	2	3	0	1	1	1		1	1		1	1		1	1		1	1		1	2	0	2
Belo Jegenfoy	2		2	6	1	7	20		20		4	4	1	1	2	2		2		1	1	1		1	1		1		1	1	2	0	2
Agalo Mete	1		1	6		6	15		15	3	1	4		1	1	1		1	1		1	1		1	1		1	1		1	2	0	2
Kamashi	1		1	4		4	12		12	3		3		1	1	1		1	1		1	1		1	1		1	1		1	2	0	2
Yaso	1		1	6		6	15		15	3	1	4		1	1	1		1		1	1	1		1		1	1	1		1	2	0	2
Mandura	2		2	7		7	29		29	5		5			1	2		2	1		1	1		1	1		1	1		1	2	0	2
Bullen	2		2	9	3	12	31		31	7	1	8		2	2	2		2	1	1	2	1		1	1		1	1		1	2	0	2
Wombera	2		2	10	0	10	27		27	4	3	7		2	2	2		2	2		2	1		1	1		1	1		1	2	0	2
Dangure	2		2	8	1	9	31		31	4	3	7		2	2	2		2	1	1	2	1		1	1		1	1		1	3	0	3
Dibate	2		2	9	2	11	44		44	11		11	3	3		2		2	3	0	3	1		1	1		1	2		2	4	0	4
Guba	1		1	5		5	16		16	4		4		2	2	1		1	1		1			1			1			1	2	0	2
Pawi Woreda	2		2	10	2	12	32		32	5	3	8		2	2	2		2		2	2	1		1	1		1	1		1	2	0	2
Mao-Komo Special	3		3	21		21	54		54	10	4	14		3	3	2		2	3		3	1		1	1		1	2		2	4	0	4
Gambela Z	1		1	3		3	16		16	3		3		1	1	2		2			1	1		1	1		1	1		1	3	0	3
Gog	1	1	2	6		6	19	5	24	0	6	6		1	1	2		2			1	1		1	1		1	1		1	2	0	2
Abobo	2	0	2	6		6	24		24	6		6		1	1	2		2			1	1		1	1		1	1		1	2	0	2
Dimma	1		1	2	1	3	10	4	14	2	1	3		1	1	2		2			1	1		1	1		1	1		1	2	0	2
Jor	1		1	3		3	14		14	3		3		1	1	2		2			1	1		1	1		1	1		1	2	0	2

District	Team leaders			Squad leaders			Spray operators			Porters			Washers			Security guards			Water fetchers			Store Keepers			Store Coordinators			Data Entry Clerk			Drivers		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Akobo	2		2	8		8	20	14	34		8	8		2	2	2		2	2		2	1		1	1		1	1		1	2	0	2
Jikow	2		2	7		7	25	5	30		6	6		2	2	2		2	2		2	1		1	1		1	1		1	3	0	3
Lare	3		3	11		11	45		45	10	1	11		3	3	2		2	3		3	1		1	1		1	1		1	4	0	4
Makuey	1		1	6		6	23		23	6		6		1	1	2		2	1		1	1		1	1		1	1		1	2	0	2
Wanthoa	2		2	7		7	28		28	2	5	7		2	2	2		2		2	2	1		1	1		1	1		1	3	0	3
Godare	2		2	12	1	13	53		53	5	8	13		3	3	2		2	3		3	1		1	1		1	1		1	3	0	3
Mengeshi	1	1	2	7		7	29	1	30	5	2	7		2	2	2		2	2		2	1		1	1		1	1		1	5	0	5
Itang Special	3		3	12		12	49		49	10	2	12		3	3	2		2	3		3	1		1	1		1	1		1	4	0	4
Gambela Town	3		3	8	3	11		45	45	6	5	11	1	1	2	2		2	2		2	1		1	1		1	1		1	3	0	3
Abay Chomen	3		3	11		11	43	1	44		11	11		3	3	3		3	3		3	1		1	1		1	1		1	2	0	2
Abe Dengoro	1		1	5		5	26		26		5	5		1	1	2		2	1		1	1		1	1		1	1		1	4	0	4
Amuru	1		1	5		5	19	2	21		4	4		1	1	2		2	0	1	1	1		1	1		1	1		1	2	0	2
Jardega Jarte	1		1	3		3	15		15	3		3		1	1	2		2	1		1	1		1	1		1	1		1	2	0	2
Goro	2		2	7		7	28		28	7		7		2	2	2		2	2		2	1		1	1		1	1		1	3	0	3
Ilu	2		2	7	1	8	32		32	8		8		2	2	2		2		2	2	1		1	1		1	1		1	4	0	4
Waliso	2		2	7		7	28		28	5	2	7		2	2	2		2	0	2	2	1		1	1		1	1		1	3	0	3
Abaya	0	1	1	8		8	40		40	0	8	8		2	2	2		2	2		2	1		1	1		1	1		1	4	0	4
Gelana	1		1	10		10	45		45	3	7	10		2	2	2		2		2	2	1		1	1		1	1		1	4	0	4
Melka Soda	1		1	6		6	38		38	6		6		1	1	1		1	1		1	1		1	1		1	1		1	3	0	3
Total	78	3	81	369	24	393	1296	82	1378	212	112	324	4	78	82	81	0	81	58	23	81	43	1	44	43	1	44	45	4	49	129	0	129

TABLE C-5: START AND END DATES OF THE SPRAY CAMPAIGN FOR EACH DISTRICT

Region	Zone	District	Spray Start Date	End Date	Number of spray days	Remark
Gambela	Agnuwa	Abobo	May 21,2018	June 11,2018	21	Mop-up conducted from July 2-6, 2018
		Dimma	May 21,2018	June 11,2018	19	
		Gambela Z	May 21,2018	June 09,2018	17	
		Gog	May 22,2018	June 09,2018	16	
		Jor	May 21,2018	June 02,2018	13	
	Gambela Town	Gambela Town	May 22,2018	June 13,2018	21	Mop-up conducted from July 2-7, 2018
	Itang Special	Itang Special	May 22,2018	June 09,2018	17	
	Majang	Godare	May 21,2018	June 08,2018	17	
		Mengeshi	May 21,2018	June 10,2018	19	
	Nuer	Akobo	May 23,2018	June 13,2018	17	
		Jikow	May 22,2018	June 09,2018	17	
		Lare	May 21,2018	June 11,2018	15	
		Makuey	May 21,2018	June 09,2018	18	
		Wanthoa	May 21,2018	June 08,2018	17	
Benishangul-Gumuz	Assosa	Homosha	June 12,2018	July 13,2018	26	
		Menge	June 12,2018	July 15,2018	27	Interrupted for 8 days due to civil unrest
		Sherkole	June 12,2018	July 23,2018	30	Interrupted for 11 days due to civil unrest
		Bambasi	June 11,2018	July 26,2018	34	Interrupted for 5 days due to civil unrest
		Assosa	June 12,2018	July 29,2018	31	Interrupted for 13 days due to civil unrest
		Oda Buldigilu	June 12,2018	July 19,2018	30	Interrupted for 3 days due to civil unrest
		Kumruk	June 12,2018	July 17,2018	26	Interrupted for 8 days due to civil unrest
	Kamashi	Sedal	June 12,2018	July 17,2018	23	Interrupted for 3 days due to civil unrest
		Belo Jegenfoy	June 13,2018	July 17,2018	24	

Region	Zone	District	Spray Start Date	End Date	Number of spray days	Remark
		Agalo Mete	June 13,2018	July 23,2018	27	Interrupted for 3 days due to civil unrest
		Kamashi	June 14,2018	July 16,2018	28	
		Yaso	June 13,2018	July 17,2018	28	
	Metekel	Mandura	June 13,2018	July 16,2018	33	
		Bullen	June 14,2018	July 16,2018	25	
		Wombera	June 15,2018	July 23,2018	31	
		Dangure	June 13,2018	July 20,2018	33	
		Dibate	June 13,2018	July 19,2018	32	
		Guba	June 14,2018	July 25,2018	32	
		Pawi Woreda	June 12,2018	July 17,2018	31	
	Mao-Komo Special		June 11,2018	July 24,2018	21	Interrupted for 23 days due to civil unrest
Oromia	Horo Gudro Wellega	Abay Chomen	June 11,2018	July 15,2018	31	
		Abe Dengoro	June 12,2018	July 14,2018	28	
		Amuru	June 11,2018	July 16,2018	31	
		Jardega Jarte	June 11,2018	July 9,2018	25	
	South West Shoa	Goro	June 11,2018	July 16,2018	31	
		Ilu	June 11,2018	July 14,2018	29	
		Waliso	June 11,2018	July 15,2018	29	
	West Guji	Abaya	July11,2018	July 29,2018	17	Postponed for 33 days due to civil unrest
		Melka-Soda	July12,2018	July 28,2018	14	Postponed for 33 days due to civil unrest
		Gelena	July16,2018	July 31,2018	14	Postponed for 33 days due to civil unrest

TABLE C-6: SUMMARY OF THE TYPE OF STRUCTURES FOUND AND SPRAYED

Zone	District	Sleeping/Living Structure			Kitchen		Animal Shed		Latrine		Other Structure		Total	
		Found	Sprayed	% of Sleeping/ Living	Found	Sprayed	Found	Sprayed	Found	Sprayed	Found	Sprayed	Found	Sprayed
Agnuwa	Agnuwa	14,724	14,152	96.12%	2,663	2,644	1,026	1,026	1,788	1,769	24	24	20,225	19,615
	Abobo	3,653	3,479	95.24%	1,359	1,347	524	524	991	982			6,527	6,332
	Dimma	2,551	2,529	99.14%	579	578	270	270	426	426	20	20	3,846	3,823
	Gambela Z	2,737	2,619	95.69%	83	80	8	8	14	12			2,842	2,719
	Gog	3,240	2,983	92.07%	557	554	187	187	354	346	1	1	4,339	4,071
	Jor	2,543	2,542	99.96%	85	85	37	37	3	3	3	3	2,671	2,670
Gambela Town	Gambela Town	7,256	5,531	76.23%	810	634	134	124	1,175	1,012	50	49	9,425	7,350
	Gambela Town	7,256	5,531	76.23%	810	634	134	124	1,175	1,012	50	49	9,425	7,350
Itang Special	Itang Special	6,131	6,096	99.43%	800	792	576	575	92	92	11	11	7,610	7,566
	Itang Special	6,131	6,096	99.43%	800	792	576	575	92	92	11	11	7,610	7,566
Majang	Majang	11,608	11,242	96.85%	2,647	2,616	1,410	1,406	821	794	1,531	1,511	18,017	17,569
	Godare	6,914	6,827	98.74%	1,070	1,068	459	459	199	199	995	993	9,637	9,546
	Mengeshi	4,694	4,415	94.06%	1,577	1,548	951	947	622	595	536	518	8,380	8,023
Nuer	Nuer	32,206	32,065	99.56%	4,908	4,870	4,224	4,203	2,140	2,117	212	209	43,690	43,464
	Akobo	4,801	4,801	100.00%	2,023	2,023	1,060	1,060	876	876	15	15	8,775	8,775
	Jikow	6,751	6,699	99.23%	480	467	369	368	75	75	29	29	7,704	7,638
	Lare	9,053	9,051	99.98%	958	958	847	847	312	312	19	19	11,189	11,187
	Makuey	4,420	4,365	98.76%	1,130	1,108	1,112	1,093	726	706	23	21	7,411	7,293
	Wanthoa	7,181	7,149	99.55%	317	314	836	835	151	148	126	125	8,611	8,571
Assosa	Assosa	69,745	68,657	98.44%	36,272	35,545	5,843	5,781	24,004	23,767	13,946	13,718	149,810	147,468
	Assosa	18,128	17,925	98.88%	9,247	9,131	1,765	1,744	5,268	5,250	1,058	1,037	35,466	35,087
	Bambasi	7,441	7,072	95.04%	4,742	4,475	1,406	1,371	2,405	2,368	1,361	1,259	17,355	16,545
	Homosha	5,883	5,778	98.22%	3,477	3,357	138	137	528	526	1,345	1,307	11,371	11,105
	Kumruk	5,643	5,643	100.00%	2,133	2,133	192	192	1,287	1,287	1,236	1,236	10,491	10,491
	Menge	12,359	12,345	99.89%	7,323	7,313	1,065	1,065	6,810	6,807	5,649	5,646	33,206	33,176
	Oda Buldigilu	10,573	10,201	96.48%	5,220	5,011	909	904	4,978	4,803	2,280	2,218	23,960	23,137
	Sherkole	9,718	9,693	99.74%	4,130	4,125	368	368	2,728	2,726	1,017	1,015	17,961	17,927
Kamashi	Kamashi	20,728	20,594	99.35%	8,124	8,106	2,187	2,185	2,991	2,988	684	684	34,714	34,557
	Agalo Mete	4,607	4,586	99.54%	1,717	1,709	152	152	960	960			7,436	7,407
	Belo Jegenfoy	4,561	4,558	99.93%	1,848	1,848	252	252	605	605	110	110	7,376	7,373

Zone	District	Sleeping/Living Structure			Kitchen		Animal Shed		Latrine		Other Structure		Total	
		Found	Sprayed	% of Sleeping/ Living	Found	Sprayed	Found	Sprayed	Found	Sprayed	Found	Sprayed	Found	Sprayed
	Kamashi	3,707	3,668	98.95%	1,433	1,431	390	390	303	302	5	5	5,838	5,796
	Sedal	3,257	3,257	100.00%	1,622	1,622	446	446	351	351	441	441	6,117	6,117
	Yaso	4,596	4,525	98.46%	1,504	1,496	947	945	772	770	128	128	7,947	7,864
Mao-Komo Special	Mao-Komo Special	5,567	5,206	93.52%	2,676	2,575	1,358	1,332	3,084	3,009	691	660	13,376	12,782
	Mao-Komo Special	5,567	5,206	93.52%	2,676	2,575	1,358	1,332	3,084	3,009	691	660	13,376	12,782
Metekel	Metekel	49,595	48,518	97.83%	11,727	11,616	2,443	2,431	3,944	3,936	598	596	68,307	67,097
	Bullen	6,085	5,772	94.86%	2,328	2,270	450	443	69	67	3	3	8,935	8,555
	Dangure	8,053	7,746	96.19%	384	374	18	18	64	63			8,519	8,201
	Dibate	10,419	10,355	99.39%	3,564	3,564	430	430	145	145	19	19	14,577	14,513
	Guba	4,830	4,802	99.42%	149	149	89	89	372	372	316	316	5,756	5,728
	Mandura	9,955	9,896	99.41%	1,275	1,270	624	624	2,791	2,787	54	52	14,699	14,629
	Pawe	6,918	6,623	95.74%	2,558	2,523	381	376	312	311	149	149	10,318	9,982
	Wombera	3,335	3,324	99.67%	1,469	1,466	451	451	191	191	57	57	5,503	5,489
Horo Gudro Wellega	Horo Gudro Wellega	22,661	21,749	95.98%	14,179	13,811	5,488	5,329	5,359	5,205	1,237	1,180	48,924	47,274
	Abay Chomen	8,515	7,750	91.02%	2,880	2,730	572	500	1,492	1,458	282	257	13,741	12,695
	Abe Dengoro	8,673	8,646	99.69%	6,541	6,426	1,996	1,941	2,977	2,861	923	893	21,110	20,767
	Amuru	3,100	3,093	99.77%	2,709	2,704	1,735	1,733	692	692	15	15	8,251	8,237
	Jardega Jarte	2,373	2,260	95.24%	2,049	1,951	1,185	1,155	198	194	17	15	5,822	5,575
South West Shoa	South West Shoa	29,507	27,284	92.47%	5,918	5,554	7,396	6,956	98	98	436	372	43,355	40,264
	Goro	11,341	10,730	94.61%	1,931	1,795	1,094	1,007	5	5	91	57	14,462	13,594
	Ilu	8,967	8,600	95.91%	2,457	2,360	4,229	4,063	75	75	240	228	15,968	15,326
	Waliso	9,199	7,954	86.47%	1,530	1,399	2,073	1,886	18	18	105	87	12,925	11,344
West Guji	West Guji	17,975	17,645	98.20%	6,078	6,069	2,464	2,461	1,232	1,232	156	156	27,905	27,563
	Abaya	7,431	7,184	96.70%	2,247	2,243	985	984	286	286	139	139	11,088	10,836
	Gelana	6,364	6,281	98.70%	1,504	1,499	713	711	114	114	11	11	8,706	8,616
	Melka Soda	4,180	4,180	100.00%	2,327	2,327	766	766	832	832	6	6	8,111	8,111
Grand Total		287,588	278,739	96.88%	96,796	94,832	34,549	33,809	46,727	46,019	19,576	19,170	485,236	472,569

TABLE C-7: MOBILE SPRAY SUPERVISION PERFORMANCE 2018

Supervision Forms	Completed
Spray Operator Morning Mobilization + Transportation Vehicle Inspection	91
Storekeeper Performance	95
End of Day Clean-up	74
Homeowner Preparation and Spray Operator Performance	489
Data Collection Verification (DCV)	594
All Forms	1,343

TABLE C-8: SUMMARY OF 2018 SPRAY RESULTS

Region	Zone	District	Original Target	Adjusted Target	Progress (%)	Structures Found	Sprayed Structures Sprayed	Spray Coverage (%)	Population Protected Population Protected	Pregnant Women	Children <5	Total Population found	% Population Protected
Gambela	Agnuwa***	Agnuwa Total	29,337	29,337	66.86%	20,225	19,615	96.98%	45,762	822	7,294	47,583	96.17%
		Abobo	7,990	7,990	79.25%	6,527	6,332	97.01%	11,306	120	1,563	11,769	96.07%
		Dimma	3,856	3,856	99.14%	3,846	3,823	99.40%	6,910	146	860	6,965	99.21%
		Gambela Z	5,105	5,105	53.26%	2,842	2,719	95.67%	7,663	176	1,398	7,962	96.24%
		Gog	8,112	8,112	50.18%	4,339	4,071	93.82%	12,804	204	2,557	13,808	92.73%
		Jor	4,274	4,274	62.47%	2,671	2,670	99.96%	7,079	176	916	7,079	100.00%
	Gambela Town***	Gambela Town Total	14,954	14,954	49.15%	9,425	7,350	77.98%	29,847	792	6,829	40,214	74.22%
		Gambela Town*	14,954	14,954	49.15%	9,425	7,350	77.98%	29,847	792	6,829	40,214	74.22%
	Itang Special***	Itang Special Total	17,026	17,026	44.44%	7,610	7,566	99.42%	25,206	1,243	5,213	25,330	99.51%
		Itang Special	17,026	17,026	44.44%	7,610	7,566	99.42%	25,206	1,243	5,213	25,330	99.51%
	Majang***	Majang Total	29,378	29,378	59.80%	18,017	17,569	97.51%	44,670	378	4,467	46,018	97.07%
		Godare	18,693	18,693	51.07%	9,637	9,546	99.06%	26,625	198	2,244	26,958	98.76%
		Mengeshi	10,685	10,685	75.09%	8,380	8,023	95.74%	18,045	180	2,223	19,060	94.67%
	Nuer***	Nuer Total	54,577	54,577	79.64%	43,690	43,464	99.48%	155,897	9,816	38,989	156,432	99.66%
		Akobo	11,394	11,394	77.01%	8,775	8,775	100.00%	34,278	2,797	9,437	34,278	100.00%
		Jikow	9,998	9,998	76.40%	7,704	7,638	99.14%	31,588	1,011	9,019	31,776	99.41%

Region	Zone	District	Original Target	Adjusted Target	Progress (%)	Structures Found	Sprayed		Population Protected			Total Population found	% Population Protected
							Structures Sprayed	Spray Coverage (%)	Population Protected	Pregnant Women	Children <5		
		Lare	15,511	15,511	72.12%	11,189	11,187	99.98%	36,212	3,273	7,351	36,221	99.98%
		Makuey	7,673	7,673	95.05%	7,411	7,293	98.41%	21,754	1,555	4,021	21,978	98.98%
		Wanthoa	10,001	10,001	85.70%	8,611	8,571	99.54%	32,065	1,180	9,161	32,179	99.65%
Subtotal			145,272	145,272	145,272	98,967	95,564	96.56%	301,382	13,051	62,792	315,577	95.50
Benishangul-Gumuz	Assosa	Assosa Total	153,951	153,224	96.24%	149,810	147,468	98.44%	266,927	3,864	43,656	270,959	98.51%
		Assosa	36,231	36,231	96.84%	35,466	35,087	98.93%	66,880	747	9,162	67,438	99.17%
		Bambasi**	20,514	19,787	83.62%	17,355	16,545	95.33%	34,340	306	4,054	35,997	95.40%
		Homosha	12,754	12,754	87.07%	11,371	11,105	97.66%	19,258	262	3,446	19,532	98.60%
		Kumruk	9,266	9,266	113.22%	10,491	10,491	100.00%	19,157	252	3,510	19,157	100.00%
		Menge	33,650	33,650	98.59%	33,206	33,176	99.91%	52,626	1,189	11,038	52,687	99.88%
		Oda Buldigilu	23,102	23,102	100.15%	23,960	23,137	96.57%	38,738	402	5,015	40,138	96.51%
		Sherkole	18,434	18,434	97.25%	17,961	17,927	99.81%	35,928	706	7,431	36,010	99.77%
	Kamashi	Kamashi Total	39,382	39,382	87.75%	34,714	34,557	99.55%	97,680	1,685	17,773	98,257	99.41%
		Agalo Mete	7,583	7,583	97.68%	7,436	7,407	99.61%	19,893	293	3,874	19,991	99.51%
		Belo Jegenfoy	11,364	11,364	64.88%	7,376	7,373	99.96%	21,337	307	3,491	21,359	99.90%
		Kamashi	5,734	5,734	101.08%	5,838	5,796	99.28%	15,517	190	2,232	15,665	99.06%
		Sedal	6,953	6,953	87.98%	6,117	6,117	100.00%	18,889	328	3,740	18,889	100.00%
		Yaso	7,748	7,748	101.50%	7,947	7,864	98.96%	22,044	567	4,436	22,353	98.62%
	Mao-Komo Special***	Mao-Komo Special Total	28,869	15,672	81.56%	13,376	12,782	95.56%	28,318	349	4,907	29,803	95.02%
		Mao-Komo Special**	28,869	15,672	81.56%	13,376	12,782	95.56%	28,318	349	4,907	29,803	95.02%
	Metekel***	Metekel*** Total	108,774	107,254	62.56%	68,307	67,097	98.230%	217,431	3,877	32,914	221,973	97.95%
		Bullen	16,068	16,068	53.24%	8,935	8,555	95.75%	31,924	469	4,726	33,423	95.52%
		Dangure**	15,015	13,495	60.77%	8,519	8,201	96.27%	28,419	824	4,323	29,555	96.16%
		Dibate	22,217	22,217	65.32%	14,577	14,513	99.56%	50,026	671	7,398	50,287	99.48%
		Guba	9,397	9,397	60.96%	5,756	5,728	99.51%	17,409	237	2,325	17,498	99.49%
		Mandura	16,021	16,021	91.31%	14,699	14,629	99.52%	43,112	1,025	7,911	43,350	99.45%
		Pawe	16,331	16,331	61.12%	10,318	9,982	96.74%	28,367	335	3,222	29,616	95.78%
		Wombera	13,725	13,725	39.99%	5,503	5,489	99.75%	18,174	316	3,009	18,244	99.62%
Subtotal			330,976	315,532	83.00%	266,207	261,904	98.38%	610,356	9,775	99,250	620,992	98.29%

Region	Zone	District	Original Target	Adjusted Target	Progress (%)	Structures Found	Sprayed		Population Protected			Total Population found	% Population Protected
							Structures Sprayed	Spray Coverage (%)	Population Protected	Pregnant Women	Children <5		
Oromia	Horo Gudro Wellega	Horo Gudro Wellega Total	44,765	44,765	105.60%	48,924	47,274	96.63%	107,574	1,648	13,248	109,778	97.99%
		Abay Chomen	11,464	11,464	110.74%	13,741	12,695	92.39%	27,091	168	2,620	28,544	94.91%
		Abe Dengoro	19,768	19,768	105.05%	21,110	20,767	98.38%	38,538	565	3,836	38,611	99.81%
		Amuru	8,526	8,526	96.61%	8,251	8,237	99.83%	28,491	680	4,509	28,533	99.85%
		Jardega Jarte	5,007	5,007	111.34%	5,822	5,575	95.76%	13,454	235	2,283	14,090	95.49%
	South West Shoa	South West Shoa Total	44,874	39,667	101.51%	43,355	40,264	92.87%	120,410	1,329	13,818	129,233	93.17%
		Goro	12,777	12,777	106.39%	14,462	13,594	94.00%	44,392	436	5,618	46,437	95.60%
		Ilu**	20,214	15,007	102.13%	15,968	15,326	95.98%	38,531	474	3,619	39,913	96.54%
		Waliso*	11,883	11,883	95.46%	12,925	11,344	87.77%	37,487	419	4,581	42,883	87.42%
	West Guji	West Guji Total	29,731	28,806	95.68%	27,905	27,563	98.77%	124,467	3,141	24,351	126,435	98.44%
		Abaya	11,482	11,482	94.37%	11,088	10,836	97.73%	45,490	754	7,530	46,851	97.10%
		Gelana**	10,001	9,076	94.93%	8,706	8,616	98.97%	49,042	1,364	10,937	49,649	98.78%
		Melka Soda	8,248	8,248	98.34%	8,111	8,111	100.00%	29,935	1,023	5,884	29,935	100.00%
Subtotal			119,370	113,238	101.65%	120,184	115,101	95.77%	352,451	6,118	51,417	365,446	94.44%
Grand Total			595,618	574,042	82.32%	485,358	472,569	97.37%	1,264,189	28,944	213,459	1,302,015	97.09%

* The low spray coverage in Gambela Town and Waliso is due to large-scale community refusals, specifically in urban areas.

** A number of structures were not sprayed or visited due to the reasons stated below:

  i.   Bambasi: A total of 727 structures (1,516 estimated population) in three villages could not be accessed because of active conflict in the area;

  ii. Ilu: Four villages with 5,207 structures (14,272 estimated population) were reassigned to a non-VectorLink district through the government repositioning system;

  iii. Gelana: Due to conflict and road blockages, a total of 925 structures (5,770 estimated population) were not visited by the spray team;

  iv. Mao-Komo: Security issues in 17 villages caused the VectorLink team to exclude a total of 13,197 structures (19,861 estimated population) from the target area;

  v.   Dangure: Due to high river levels, a total of 1,520 structures (4,564 estimated population) in two villages were not covered by the spray team. Data were not collected on 122 non-sprayedstructures. However, the 122 structures with their residents (366) were included in calculating the coverage. (Figures found from Micro-planning data.)

*** New PMI-supported zones

TABLE C-9: NUMBER AND USE OF MOSQUITO NETS

Zone	District	Total # of Mosquito Nets Found (Avg # nets/ sleeping structure)	# of Pregnant Women Sleeping Under Mosquito Nets (% pregnant women)	# of Children <5 Sleeping Under Mosquito Nets (% < 5)
Agnuwa	Agnuwa	18,091 (1.23)	619 (71.89)	5,871 (77.78)
	Abobo	3,677 (1.01)	104 (84.55)	1,359 (85.31)
	Dimma	2,120 (0.83)	103 (67.32)	696 (80.18)
	Gambela Zuria	2,763 (1.01)	115 (61.83)	1,113 (77.78)
	Gog	6,610 (1.15)	164 (73.54)	1,998 (72.92)
	Jor	2,921 (0.67)	133 (75.57)	705 (76.92)
Gambela Town	Gambela Town	4,882 (0.67)	258 (25.02)	1,940 (19.50)
	Gambela Town	4,882 (0.67)	258 (25.02)	1,940 (19.50)
Itang Special	Itang Special	6,796 (1.11)	519 (41.59)	2,668 (51.01)
	Itang Special	6,796(1.11)	519 (41.59)	2,668 (51.01)
Majang	Majang	11,024 (0.95)	199 (47.61)	3,241 (69.97)
	Godare	6,458 (0.93)	79 (35.75)	1,567 (69.00)
	Mengeshi	4,566 (0.97)	120 (60.91)	1,674 (70.90)
Nuer	Nuer	53,062 (1.65)	8,243 (83.79)	32,406 (82.85)
	Akobo	14,414 (3.00)	2,622 (93.74)	8,654 (91.70)
	Jikow	9,803 (1.45)	948 (93.40)	8,381 (92.40)
	Lare	12,608 (1.39)	2,494 (76.20)	5,970 (81.16)
	Makuey	6,614 (1.50)	1,403 (89.25)	2,694 (65.90)
	Wanthoa	9,623 (1.34)	776 (65.71)	6,707 (73.20)
Assosa	Assosa	137,493 (1.97)	3,241 (82.87)	40,044 (90.89)
	Assosa	33,537 (1.85)	683 (90.46)	8,796 (95.53)
	Bambasi	15,138 (2.03)	271 (84.69)	3,888 (92.46)
	Homosha	12,124 (2.06)	242 (91.32)	3,398 (97.20)
	Kumruk	10,225 (1.81)	196 (77.78)	2,798 (79.72)
	Menge	26,291 (2.13)	947 (79.45)	9,911 (89.69)
	Oda Buldigilu	18,550 (1.75)	334 (80.10)	4,134 (80.46)
	Sherkole	21,628 (2.23)	568 (80.00)	7,119 (95.56)
Kamashi	Kamashi	36,410 (1.76)	1,454 (85.78)	15,845 (88.73)
	Agalo Mete	8,146 (1.77)	291 (99.32)	3,875 (99.54)
	Belo Jegenfoy	6,510 (1.43)	215 (70.03)	2,577 (73.80)
	Kamashi	5,813 (1.57)	161 (84.74)	1,973 (87.96)
	Sedal	8,276 (2.54)	294 (89.63)	3,460 (92.51)
	Yaso	7,665 (1.67)	493 (85.44)	3,960 (88.20)
Mao-Komo Special	Mao-Komo Special	11,005 (1.98)	282 (76.84)	4,559 (90.49)
	Mao-Komo Special	11,005 (1.98)	282 (76.84)	4,559 (90.49)

Zone	District	Total # of Mosquito Nets Found (Avg # nets/ sleeping structure)	# of Pregnant Women Sleeping Under Mosquito Nets (% pregnant women)	# of Children <5 Sleeping Under Mosquito Nets (% < 5)
Metekel	Metekel	75,817 (1.53)	3,235 (81.53)	27,979 (83.64)
	Bullen	10,973 (1.80)	358 (72.62)	3,954 (80.45)
	Dangure*	10,573 (1.33)	679 (79.23)	3,613 (81.25)
	Dibate	12,613 (1.21)	470 (69.73)	5,361 (72.32)
	Guba	8,359 (1.73)	198 (83.19)	2,022 (86.45)
	Mandura	15,746 (1.58)	950 (92.32)	7,517 (94.61)
	Pawe	10,884 (1.57)	339 (94.96)	3,185 (94.65)
	Wombera	6,669 (2.00)	241 (75.31)	2,327 (76.87)
Horo Gudro Wellega	Horo Gudro Wellega	8,199 (0.36)	407 (24.74)	3,382 (25.37)
	Abay Chomen	3,218 (0.38)	77 (45.03)	1,294 (49.00)
	Abe Dengoro	1,632 (0.19)	108 (19.12)	897 (23.33)
	Amuru	1,276 (0.41)	174 (25.59)	439 (9.74)
	Jardega Jarte	2,073 (0.87)	48 (19.43)	752 (32.22)
South West Shoa	South West Shoa	21,347 (0.72)	745 (51.99)	6,917 (47.00)
	Goro	1,729 (0.15)	125 (27.00)	1,367 (23.20)
	Ilu	12,463 (1.39)	328 (67.77)	2,266 (60.62)
	Waliso	7,155 (0.78)	292 (60.08)	3,284 (64.56)
West Guji	West Guji	11,421 (0.64)	890 (27.97)	7,055 (28.52)
	Abaya	1,329 (0.18)	40 (5.13)	501 (6.44)
	Gelana	9,922 (1.56)	806 (58.41)	6,336 (57.19)
	Melka Soda	170 (0.04)	44 (4.30)	218 (3.70)
Grand Total		395,547 (1.38)	20,092 (67.84)	151,907 (69.16)

* Data wasn't collected for 122 structures since they weren't originally recorded by SQLs.

ANNEX D. INSPECTION REPORTS AND SUPERVISION RESULTS

TABLE D-1: ENVIRONMENTAL MITIGATION AND MONITORING REPORT

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
1a. Pre-contract inspection and certification of vehicles used for pesticide or spray team transport	About 134 transport vehicles were inspected and approved. Two types of vehicles were hired for the operation, i.e., long-base vehicles (77) and mini-trucks (57).	The limitation noticed was the weak reinforcement of seats on the trucks. Missing seat belt for each seat is seen as a serious limitation Smart phone assisted use of check list was not so much successful because of the sickness of the ECO	Out of the 137 vehicles deployed for the operation, it was only about 84 which their inspection result was done by smart phone; the rest were paper based. All vehicles that fulfilled the required criteria were provided with a certificate that showed they met the criteria needed to be used for the IRS campaign.
1b. Driver training	All hired drivers attended an orientation that described the nature of the work they enrolled in; safety precautions; and materials they needed to keep secure during the spray campaign. Furthermore, all drivers were provided with a brief written guideline prepared in the local language for reference in case of emergency. However there were drivers mis- behaving in the operation.	The benches fixed/ welded on the mini-trucks do not tolerate the rough rural roads. Using mini size buses than trucks is preferred. We will do this for the next season. Those who did not obey the rule were fired and replaced by others.	To ensure the understanding of and better preparation of the drivers, VectorLink Ethiopia plans to prepare a short video of the training for the upcoming operations.
1c. Cell phone, personal protective equipment (PPE) and spill kits on board during pesticide transportation.	All participating drivers have a cell phone and their number is recorded. They were provided with basic PPE including respiratory masks, boots, and overalls at the target districts.	Drivers did not agree to wear used boots. They may need to come up with their own.	Availability of spill kits was confirmed during certification from the center for the mini-trucks and other vehicles that work at the districts.
1d. Initial and 30-day pregnancy testing for female candidates for jobs with potential pesticide contact.	All female actors at potential exposure to insecticide were screened for their pregnancy status.	All districts provided the test kits.	For the districts where the spray campaign lasted more than 30 days, a second pregnancy test was done. No individuals were identified as being pregnant.

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
1e. Health fitness testing for all operators	The screening was done by TLs and SQLs during the morning mobilization.		SQLs conducted daily health check screening for members of their squad.
1f. Procurement of, distribution to, and training on the use of PPE for all workers with potential pesticide contact.	Wearing full PPE has remained a requirement.	Securing boot in appropriate sizes was a concern.	Wearing used boots is not comfortable for the spray actors. Next year, the project will provide socks to remedy complaints about blisters.
1g. Training on mixing pesticides and the proper use and maintenance of spray pumps.	Training on mixing of insecticide (Actellic 300 CS) was done at TOT and during cascade training so that SOPs made no mistake in mixing that could compromise the quality of spray.	The deployment of pump technicians throughout the operations period helped to correct mistakes on the spot.	In addition to practical training, there were frequent and direct observations of SOPs performance.
1h. Provision of adequate facilities and supplies for end-of-day cleanup.	In 2018 operations, 80 fixed soak pits were used for clean-up procedure.	For sites in 15 districts where fixed soak pits do not work, mobile soak pits were used for 2-20 days	
1i. Enforce spray and clean-up procedures.	Triple-rinsing, used every day at the recommended site, i.e., soak pit, is a continuous activity that proceeds from the first day of the operation to the last.	A very shallow water table in many sites of Gambela region was a challenge in the 2018 operation.	Mobile soak pits were used as an alternative clean-up procedure.
2a. IEC campaigns to inform homeowners of responsibilities and precautions.	Different mode of community mobilization outlets were used. Besides community gatherings in churches, mosques, and kebeles, mobilizers used door-to-door alerting of villagers one day before spray operations.	Better mobilization activity was recorded in the 2018 spray campaign.	
2b. Prohibition of spraying houses that are not properly prepared.	All actors and supervisors were to verify proper preparation of houses before they started spraying. However, out of 489 inspections 18 red flags were seen because of the missing flash light by the SOPs	In all non-compliant cases, actions were taken to address the situation including covering immovable materials with plastic sheets. Further onsite procurement of flash light was made to alleviate the gap	
2c. Two-hour exclusion from house after spraying	Householders stayed out of the house for 2 hrs. All houses were to be ventilated for 30 minutes	No outstanding point on this matter.	The key messages were adequately communicated.
2d. Instruct homeowners to wash itchy skin and go to health clinic if symptoms do not subside.	This information is included in the important key messages that the SOPs convey before they leave the sprayed house.	No outstanding point on this matter.	The key messages were adequately communicated.

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
3a. Indoor spraying only.	The eligible sites for spraying are mostly indoors.	Spraying ineligible structures has significant EC impact and was corrected on the spot.	
3b. Training on proper spray technique	Practical training provided to the SOPs on how to maintain speed, rhythm, and swath has improved spray quality significantly	Intensive training and every morning rehearsals should continue to keep the quality of spraying high.	Based on 2018 experience, intensive training focused on practical sessions and supported by direct supervision led to improved quality of spraying.
3c. Maintenance of pumps	Besides the dedicated pump technicians, SOPs, Supervisors, and TLs were trained on pump maintenance. Pumps were checked daily before use. Pump parts found to be faulty were replaced.	Dedicated pump technicians were helpful and are recommended throughout the operations. An observation of 36 pumps out of 453 inspections were noted in the operation	On the spot maintenance of the leaking pump was done by the SOPs and the pump technicians.
4a. Choose sites for disposal of liquid wastes, including mobile soak pit sites, according to PMI BMPs.	Though the sites selected for soak pit construction met the BMP requirement, new construction of housing/ offices is unacceptably encroaching on soak pit sites.	Demarcation of buffer zones should be considered for the newly constructed soak pits.	All stakeholders are informed of the situation so as to seek corrective measures.
4b. Construct fixed and mobile soak pits with charcoal to adsorb pesticide from rinse water.	All soak pits were constructed with five layers including sawdust, charcoal, bigger stones, smaller stones, and gravel as the top layer. They were sloped toward the bio bed.	The use of mobile soak pits in difficult conditions should continue to ensure compliance.	Fixed soak pits were lined with plastic sheet on the sides to prevent effluent leakage through the sides before going through the filtration layers.
4c. Maintain soak pits as necessary during season.	Soak pit maintenance is done on yearly basis.	Durable fencing material, like wire mesh, would help to reduce frequent maintenance work on the soak pit and temporary showers.	Wire mesh fencing has continued. Iron poles are also suggested for the future.
4d. Inspection and certification of solid waste disposal sites before spray campaign.	Solid contaminated waste generated by the spray operations, including empty bottles, cartons, and used masks, are being transported from the district stores to the central warehouse. Recyclers have been identified for the bottles and cartons.	The recommendation of Addis Ababa University researchers to incinerate the masks will be maintained.	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues Relating to Required Conditions	Remarks
4e. Monitoring waste storage and management during campaign.	Careful follow-up of waste handling was done during the campaign. The waste was segregated based on PMI BMPs. There were clearly labeled sacks/ boxes for used nose masks, gloves, and all other waste.	No outstanding issue.	
4f. Monitoring disposal procedures post-campaign.	The VectorLink Ethiopia ECO is monitoring the post-spray campaign solid waste collection.	As of now, the waste is being collected from the districts.	
5a. Maintain records of all pesticide receipts, issuance, and return of empty sachets/bottles.	Records of all pesticide receipts, issuance, and returned empties are being kept on stock cards with a back-up in a ledger.	No outstanding issue on this point.	
5b. Reconciliation of number of houses sprayed vs. number of sachets/bottles used.	VectorLink and temporary supervisors conducted regular insecticide reconciliation to avoid misuse.	No outstanding issue.	
5c. Visual examination of houses sprayed to confirm pesticide application.	DOS ensured that the spraying quality conducted this year is of good quality.	DOS has continued.	
5d. Perform physical inventory counts during the spray season.	Besides the weekly store condition supervision, close-out of inventory was done in all 44 districts.	Compensation payment was made by all workers who lost any item.	

TABLE D-2: REQUIREMENTS IDENTIFIED DURING FIRST ROUND PSECA FOR DISTRICT STORES

| Soak Pits | Regions | | | | | | | | | |
| | Oromia | | | Gambela | | | Benishangul-Gumuz | | | |
	West Guji	South West Shewa	Horro Guduru Wollega	Agnuwa	Nuer	Mejang	Assosa	Kamash	Metekel	Total
Number of soak pits in a critically-sensitive area (e.g., flood prone) and/ or overgrown with vegetation	0	0	0	0	0	0	0	0	0	0
Number of soak pits needing vegetation cleared	3	6	6	11	8	5	17	11	13	80
Number of soak pits needing maintenance of fence, gate, lock	3	6	6	11	8	5	17	11	13	80
Number of washing areas needing repair of slope, leak, or cracks	0	0	0	11	8	5	6	1	13	44
Number of soak pits needing lines to dry clothes	0	0	0	11	8	5	6	1	13	44
Number of soak pits needing the skull and cross-bones danger signs	3	6	6	11	8	5	17	11	13	80
Number of soak pits needing a temporary shower built	3	6	6	11	8	5	17	11	13	80

TABLE D-3: KEY GAPS IDENTIFIED DURING FIRST ROUND PSECA FOR SOAK PITS

| District Store | Region | | | | | | | | | |
| | Oromia | | | Gambela | | | Benishangul-Gumuz | | | |
	West Guji	South West Shewa	Horro Guduru Wollega	Agnuwa	Nuer	Mejang	Assosa	Kamash	Metekel	Total
Number of laminated correct pesticides and safety sheets required	6	6	8	15	12	6	14	10	21	98
Number of health and safety procedure sheets needed for stores and vehicles	20	20	30	30	24	12	35	30	28	229
Number of emergency response procedure sheets required	20	20	30	30	24	12	35	30	28	229
Number of spill response procedure sheets needed	20	20	30	30	24	12	35	30	28	229
Number of fully stocked first aid kits needed	6	6	8	10	14	8	10	8	10	80

ANNEX E. INSECTICIDE USAGE BY DISTRICT

TABLE E-1: INSECTICIDE USE AND SPRAY OPERATOR PERFORMANCE

Zone	District	SOP Performance Average # of Unit Structures per SOP per Day	Insecticide used Actellic 300 CS in Bottles	Bottle Use and Distribution Average # of Bottles per SOP per Day	Average # of Structures Sprayed per Bottle
Agnuwa	Agnuwa	15.5	3,013	2.4	6.5
	Abobo*	17.8	923	2.6	6.9
	Dimma*	15.9	903	3.7	4.2
	Gambela Z*	11.2	358	1.5	7.6
	Gog*	13.1	442	1.4	9.2
	Jor*	23.2	387	3.4	6.9
Gambela Town	Gambela Town	10.3	2,080	2.9	3.5
	Gambela Town*	10.3	2,080	2.9	3.5
Itang Special	Itang Special	13.1	1,190	2.1	6.4
	Itang Special*	13.1	1,190	2.1	6.4
Majang	Majang	13.3	4,382	3.3	4.0
	Godare*	11.7	2,452	3.0	3.9
	Mengeshi*	15.8	1,930	3.8	4.2
Nuer	Nuer	17.9	7,074	2.9	6.1
	Akobo*	18.8	1,296	2.8	6.8
	Jikow*	16.1	1,692	3.6	4.5
	Lare*	17.8	1,053	1.7	10.4
	Makuey*	18.4	1,776	4.5	4.1
	Wanthoa*	18.6	1,257	2.7	6.8
Assosa	Assosa	21.0	25,002	3.6	5.9
	Assosa*	22.1	4,437	2.8	7.9
	Bambasi	14.0	3,312	2.8	5.0
	Homosha*	17.8	1,826	2.9	6.1
	Kumruk*	22.6	2,378	5.1	4.4
	Menge	27.2	6,454	5.3	5.1
	Oda Buldigilu	22.7	3,277	3.2	7.1
	Sherkole	19.3	3,318	3.6	5.4

Zone	District	SOP Performance	Insecticide used	Bottle Use and Distribution	
		Average # of Unit Structures per SOP per Day	Actellic 300 CS in Bottles	Average # of Bottles per SOP per Day	Average # of Structures Sprayed per Bottle
Kamashi	Kamashi	18.2	9,647	5.1	3.6
	Agalo Mete	18.8	2,180	5.5	3.4
	Belo Jegenfoy*	16.5	1,671	3.7	4.4
	Kamashi	17.3	1,868	5.6	3.1
	Sedal	19.5	1,852	5.9	3.3
	Yaso	19.3	2,076	5.1	3.8
Mao-Komo Special	Mao-Komo Special	15.0	2,606	3.1	4.9
	Mao-Komo Special*	15.0	2,606	3.1	4.9
Metekel	Metekel	13.8	16,960	3.5	4.0
	Bullen*	12.8	2,571	3.9	3.3
	Dangure*	13.3	1,437	2.3	5.7
	Dibate*	12.2	4,627	3.9	3.1
	Guba*	15.0	959	2.5	6.0
	Mandura*	20.1	3,454	4.7	4.2
	Pawe*	11.0	2,602	2.9	3.8
	Wombera*	14.3	1,310	3.4	4.2
Horo Gudro Wellega	Horo Gudro Wellega	17.3	17,721	6.5	2.7
	Abay Chomen	18.0	5,069	7.2	2.5
	Abe Dengoro	17.5	7,753	6.5	2.7
	Amuru	15.7	3,148	6.0	2.6
	Jardega Jarte	17.4	1,751	5.5	3.2
South West Shoa	South West Shoa	16.0	14,474	5.7	2.8
	Goro	16.9	4,190	5.2	3.2
	Ilu	16.9	6,080	6.7	2.5
	Waliso	14.0	4,204	5.2	2.7
West Guji	West Guji	15.8	10,748	6.2	2.6
	Abaya	16.1	3,726	5.5	2.9
	Gelana	13.9	3,940	6.4	2.2
	Melka Soda	18.2	3,082	6.9	2.6
Grand Total		16.9	114,897	4.1	4.1

* New PMI-Supported districts

ANNEX F. MOBILIZATION

TABLE F-1: IEC/ BCC MEETINGS AND PARTICIPANTS MOBILIZED

S.N	District	Number of Kebeles Mobilized	Number of Outreach Sessions	Number of People Mobilized			Number of HHs Mobilized	Number of HEWs		
				Male	Female	Total	HHs	M	F	Total
1	Akobo	21	63	855	1,805	2,660	7932	35	7	42
2	Jikow	23	46	4,835	6,725	11,560	6,019	24	32	56
3	Lare	28	56	24,257	23,306	47,563	10,340	30	26	56
4	Makuey	21	42	8,242	6,331	14,573	3,384	21	21	42
5	Wanthoa	23	46	16,086	14,848	30,934	6,741	24	21	45
6	Gambela Zuria	13	26	5,856	6,044	11,900	1,874	8	14	22
7	Gog	16	32	8,380	8,729	17,109	2,471	0	26	26
8	Abobo	19	18	8,380	8,729	17,109	3,719	0	31	31
9	Dimma	11	22	2,300	1,200	3,500	875	9	9	18
10	Jor	15	45	5,034	5,040	10,074	2000	28	2	30
11	Godare	14	28	23,789	27,578	51,367	11,171	8	20	28
12	Mengeshi	18	36	16,054	16,710	32,764	7123	11	15	26
13	Itang	23	46	21,204	24,565	45,769	15347	44	2	46
14	Gambela town	5	10	12,121	10,715	22,836	5422	0	23	23
15	Guba	17	34	13,000	12,000	25,000	4813	7	27	34
16	Dangur	15	93	7,434	4,360	11,794	2406	11	2	13
17	Pawe	17	38	9,761	7,031	16,792	8017	0	32	32
18	Mandura	20	42	2,690	1,793	4,483	5964	19	23	42
19	Bullen	15	287	906	454	1,360	6840	4	26	30
20	Dibate	25	149	19,465	18,834	38,299	9472	0	51	51
21	Wanbera	26	26	13,476	13,865	27,341	2724	9	38	47
22	Mao Komo	15	30	10,241	3,486	13,727	2782	0	26	26
23	Homosha	15	15	7,876	9,216	17,092	5116	0	30	30
24	Assosa rural	35	74	90,508	22,627	113,135	25141	0	148	148
25	Kurmuk	16	27	11,728	11,269	22,997	5110	4	28	32
26	Bambasi	37	78	28,319	11,692	40,011	8211	0	71	71
27	Menge	25	90	26,569	28,752	55,321	12287	8	38	46
28	Sherkole	19	38	11,000	10,000	21,000	8102	10	22	32
29	Oda bildigilu	15	32	12,642	4,240	16,882	9342	0	26	26

S.N	District	Number of Kebeles Mobilized	Number of Outreach Sessions	Number of People Mobilized			Number of HHs Mobilized	Number of HEWs		
				Male	Female	Total	HHs	M	F	Total
30	Belo Jiganfoy	10	40	16,645	13,458	30,103	5020	4	16	20
31	Sedal	15	30	4,740	2,316	7,056	1750	0	24	24
32	Agalo	14	30	18,262	13,030	31,292	7377	0	21	21
33	Kamashi	14	35	3,514	3,400	6,914	2071	0	28	28
34	Yaso	10	20	4,745	4,523	9,268	6392	5	15	20
35	Abay Chomen	15	31	21,010	21,226	42,236	14901	20	8	28
36	Abe Dongoro	12	24	14,562	14,521	29,083	6365	4	22	26
37	Amuru	15	33	11,195	15,200	26,395	8798	5	26	31
38	Jardaga Jarte	6	24	2,934	2,615	5,549	5680	0	10	10
39	Abaya	14	65	9,340	12,460	21,800	3705	0	5	5
40	Gelana	12	12	18,612	14,227	32,839	7011	5	19	24
41	Melka Soda	6	12	9,884	18,176	28,060	5446	1	5	6
42	Goro	19	38	26,113	26,234	52,347	10205	7	29	36
43	Waliso	9	56	18,562	9,284	27,846	16042	8	10	18
44	Ilu	12	54	17,962	15,784	33,746	7032	0	20	20
Total		745	1,995	621,088	508,398	1,129,486	308,540	373	1,095	1,468