



## U.S. PRESIDENT'S MALARIA INITIATIVE



# PMI | Africa IRS (AIRS) Project

## Indoor Residual Spraying (IRS 2) Task Order Six

# ETHIOPIA

# 2017 END OF SPRAY REPORT

SPRAY CAMPAIGN: JUNE 12 – JULY 18, 2017

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# AIRS ETHIOPIA 2017 END OF SPRAY REPORT

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# ACRONYMS

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<b>AIRS</b>	Africa Indoor Residual Spraying
<b>BGRHB</b>	Benishangul-Gumuz Regional Health Bureau
<b>CB IRS</b>	Community-based IRS
<b>DB IRS</b>	District-based IRS
<b>DCV</b>	Data Collection Verification
<b>DDT</b>	Dichlorodiphenyltrichloroethane
<b>DEC</b>	Data Entry Clerk
<b>DOS</b>	Directly Observed Spraying
<b>EC</b>	Environmental Compliance
<b>EE</b>	Error Eliminator
<b>FMOH</b>	Federal Ministry of Health
<b>HEW</b>	Health Extension Worker
<b>IEC</b>	Information, Education and Communication
<b>IRS</b>	Indoor Residual Spraying
<b>M&amp;E</b>	Monitoring and Evaluation
<b>MFP</b>	Malaria Focal Person
<b>MOH</b>	Ministry of Health
<b>MSP</b>	Mobile Soak Pit
<b>NMCP</b>	National Malaria Control Program
<b>ORHB</b>	Oromia Regional Health Bureau
<b>PMI</b>	President's Malaria Initiative
<b>PPE</b>	Personal Protective Equipment
<b>PSECA</b>	Pre-season Environmental Compliance Assessment
<b>SBCC</b>	Social Behavioral Change Communication
<b>SL</b>	Squad Leader
<b>SOP</b>	Spray Operator
<b>SQL</b>	Structured Query Language
<b>TL</b>	Team Leader
<b>TOT</b>	Training of Trainers
<b>USAID</b>	United States Agency for International Development
<b>USG</b>	U.S. Government
<b>WHO</b>	World Health Organization



# EXECUTIVE SUMMARY

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Abt Associates, through the President's Malaria Initiative (PMI) Africa Indoor Residual Spraying (AIRS) Project funded by the United States Agency for International Development (USAID) supports the implementation of indoor residual spraying (IRS) in Ethiopia with the overall goal of reducing the incidence and prevalence of malaria.

In 2017, the AIRS project expanded its coverage to 44 districts in 8 zones of Oromia region and 2 zones in Benishangul-Gumuz region. IRS was conducted in 18 new districts (8 in the Benishangul-Gumuz region and 10 in the Oromia region, replacing the 10 graduated districts) and 26 previously sprayed districts using Actellic 300 CS (Pirimiphos methyl, an organophosphate) from June 12 – July 18, 2017.

A total of 787,658 structures were targeted for IRS using the district-based IRS (DB IRS) model in 39 districts and the community-based IRS (CB IRS) model in 5 districts. District, zonal, regional government staff and AIRS Ethiopia technical staff provided supportive supervision in both models. The project also provided technical and logistics support to 34 districts, which graduated from PMI support in 2011 (24 districts) and 2017 (10 districts).

The following are project achievements and key highlights of the 2017 spray campaign (Table 1), which lasted 31 operational days:

- A total of 738,810 structures were sprayed out of 748,917 structures found by spray operators (SOPs) in the target districts, accounting for a coverage rate of 98.7%. In total, 1,877,154 residents were protected, including 269,299 (14.3%) children under five years old and 29,271 (1.6%) pregnant women.
- A total of 3,199 individuals were trained using U.S. Government (USG) funds to support IRS activities in the 44 districts. Of these, 1,805 were SOPs (1,780 males and 25 females), 506 were squad leaders (SLs) (326 males and 180 females), 446 were porters (208 males and 238 females), 121 were clinicians (97 males and 24 females), 40 were pump technicians (all are male) and 281 were supervisors (245 males and 20 females). Overall, 15.3% (n=490) of all trained IRS personnel for the 2017 spray round were female.
- A total of 250,918 bottles of Actellic 300 CS were used to spray 738,810 structures in 44 IRS districts, with a utilization ratio of approximately 1:2.9 (bottle to structures sprayed) leaving a balance of 70,985 bottles at the end of the spray round. The expiry date for all remaining bottles is March 2019 and they will be used in next year's campaign.
- The level of IRS acceptance using Actellic 300 CS in the 44 districts was generally high except for a few cases of refusals in some new and old districts.
- All IRS insecticide-contaminated wastes, including used masks, are being incinerated at the AIRS Project incinerator in Addis Ababa. Other solid wastes, including empty bottles, used gloves, worn-out boots, and paper cartons are being recycled.
- Wall bioassays conducted within one week of spraying to assess the quality of spraying in the target districts recorded 100% mortalities for susceptible *An. arabiensis*. At one month post spray, 100% mortality was also recorded.

**TABLE I. 2017 IRS CAMPAIGN SUMMARY RESULTS**

Insecticide Used	Organophosphate (Actellic 300 CS)
Number of districts covered by PMI-supported IRS	44
Number of structures found by SOPs	748,917
Number of structures sprayed by PMI-supported IRS	738,810
2017 spray coverage	98.7%
Population protected by PMI-supported IRS	Total Population: 1,877,154 Children under 5: 269,299 Pregnant women: 29,271
Dates of PMI-supported IRS campaign	June 12 – July 18, 2017
Length of campaign (total days)	31 days <sup>1</sup>
Number of people trained with U.S. Government funds to deliver IRS	3,199 (2,709 Males; 490 Females)

*Training wall during TOT session in Adama Town 2017*


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<sup>1</sup> Only one district “llu” took 31 days

# I. INTRODUCTION

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Malaria transmission in Ethiopia occurs up to 2000m elevations but has been reported to affect areas up to 2300m above sea level under abnormal weather conditions. The country's diverse ecology supports a wide range of transmission intensities. At least 75% of the country is malarious with about 60% of the total population living in areas at risk of malaria. More than 50 million people are at risk for malaria, and 4-5 million people are affected by malaria annually, primarily caused by *Plasmodium falciparum* and *P. vivax*, which are the dominant malaria parasites in the country. Malaria transmission peaks bi-annually from September to December and April to May, after the long and short rains, respectively. *Anopheles arabiensis* is the predominant vector with *An. pharoensis*, *An. funestus* and *An. nili* having a minor role in transmission of malaria. IRS is one of the malaria interventions recommended for use in the country. Based on the National Malaria Strategic Plan 2017– 2020, the Federal Ministry of Health (FMOH) targets IRS to areas where the malaria burden is high and in highland fringe areas with epidemic risk only.<sup>2</sup>

In 2017, AIRS Ethiopia conducted spraying in 44 districts supported by PMI and provided limited support to 34 graduated districts. In addition to conducting and supporting IRS, AIRS Ethiopia provided technical support through the following activities:

- Built capacity at the national, regional, district, and local levels to manage IRS operations, including planning, spraying, resource allocation, and monitoring and evaluation (M&E), including training 3,199 people to directly deliver IRS.
- Enhanced national-level capacity to do IRS implementation, entomological monitoring, and environmental compliance (EC) by conducting training for FMOH staff.
- Organized and conducted regional comprehensive workshops for regional and zonal/district health office staff to strengthen capacity for planning, implementation, and M&E of IRS operations.
- Conducted insecticide resistance (IR), wall bioassays, vector density, and behavioral studies.

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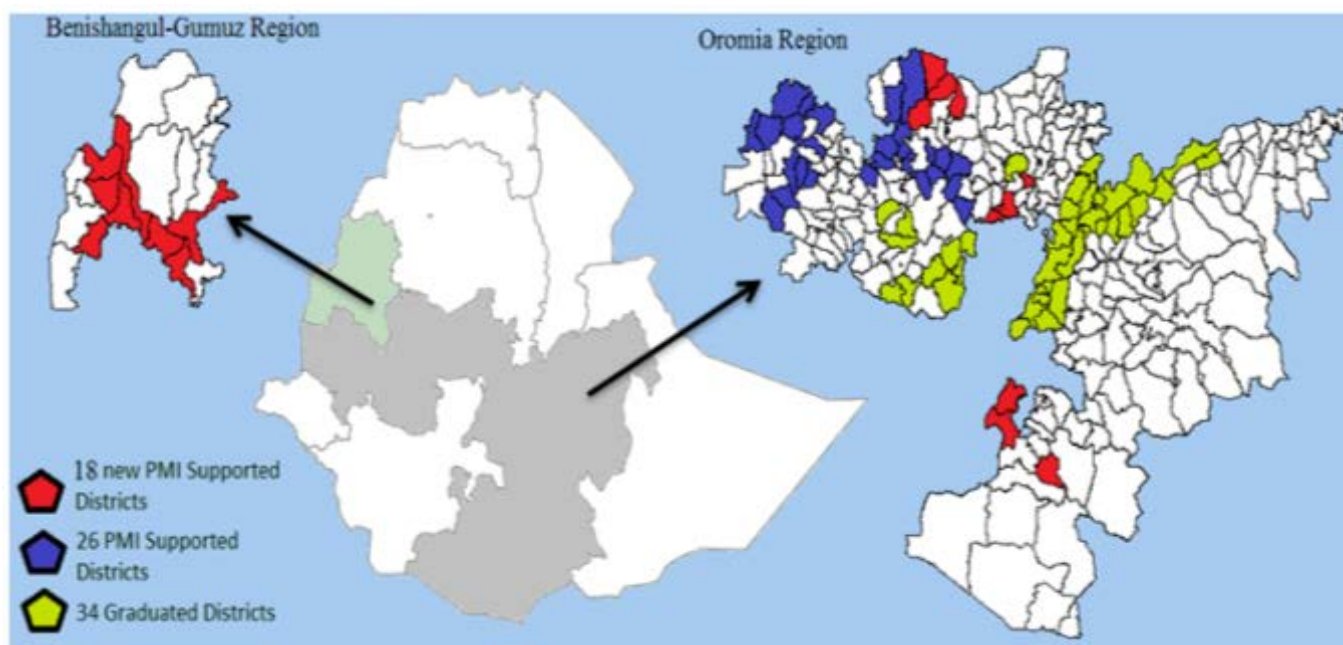
<sup>2</sup> Federal Democratic Republic of Ethiopia, Ministry of Health: National Malaria Strategic Plan 2017 – 2020.

## 2. PRE-SEASON ACTIVITIES

### 2.1 IRS TARGET DISTRICTS

AIRS Ethiopia supported 44 high-burden malaria districts in ten zones (eight in Oromia and two in Benishangul-Gumuz). The selection of the districts was done by Benishangul-Gumuz and Oromia regional health bureaus, FMOH, and PMI Ethiopia based on incidence of malaria and altitude. Selection of target villages (kebeles) in each of the districts was based on epidemiological data reported from health facilities and altitude. Table 2 shows the number and population of districts targeted for IRS in 2017 based on 2016 IRS performance data in both old and new districts. The district health management team shared the number of target structures in the new districts during reconnaissance visits and the microplanning workshop. As Figure 1 illustrates, the districts targeted for 2017 cover a large geographical area spanning over 1000 km between the districts in the south (West Guji) and those in northwest Benishangul-Gumuz.

**FIGURE 1. MAP OF PMI FULLY AND PARTIALLY SUPPORTED DISTRICTS IN 2017**



**TABLE 2. IRS TARGET DISTRICTS 2017**

Region	Zone	Number of Districts	Number of Target Structures	Total Population Targeted
Oromia	East Wollega	9	144,636	313,073
	Buno Bedele	1	141,036	86,004
	Kellem Wollega	5	77,698	229,089
	West Shewa	4	104,351	178,491
	West Wollega	7	37,670	360,061
	South West Shewa*	3	48,655	143,057
	West Guji*	3	55,456	195,733
	Horo Guduru Wollega*	4	65,376	144,433
<b>Sub Total</b>		<b>36</b>	<b>674,878</b>	<b>1,649,941</b>
Benishangul-Gumuz	Assosa*	4	76,189	103,295
	Kamashi*	4	36,591	231,640
<b>Sub Total</b>		<b>8</b>	<b>112,780</b>	<b>334,935</b>
<b>Grand Total</b>		<b>44</b>	<b>787,658</b>	<b>1,984,876</b>

\*New zones (comprising 18 districts) selected for IRS in 2017

## 2.2 INSECTICIDE SELECTION

Pirimiphos-methyl CS, an organophosphate, was utilized in the 2017 spray campaign in all 44 districts. The selection was based on data obtained from insecticide susceptibility tests conducted from 2014 to 2016, which showed that the main malaria vector, *An. gambiae* s.l., is susceptible to pirimiphos methyl in all sites where the testing was done. The quantity of pirimiphos-methyl purchased and used for the 2017 spray round was made possible through a copayment mechanism through NGenIRS, a UNITAID-funded partnership between the Innovative Vector Control Consortium (IVCC), PMI, and its IRS implementing partners including Abt Associates Inc. The copayment enabled the project to increase coverage by 36% (n=265,971 structures) in the target districts thus protecting some 675,776 persons who would otherwise have missed out on this critical malaria control intervention.

## 2.3 TECHNICAL SUPPORT TO THE FMOH AND UNIVERSITIES

AIRS Ethiopia participated in technical meetings as a member of the Technical Advisory Committee to the National Malaria Control Program (NMCP) and the national vector control working group. AIRS contributed to the development of the National Malaria Elimination strategy that was officially launched in 2017. The project also participated in scientific meetings organized by the NMCP and partners. AIRS Ethiopia organized training on updated World Health Organization (WHO) tube test guidelines for FMOH and EPHI staff and university researchers in Adama, Ethiopia. The project also provided \$5,000 support towards communication activities during World Malaria Day in April 2017.

## 2.4 IRS TRAINING

In 2017, the project conducted a series of training sessions aimed at enhancing IRS managers' skills to implement and supervise IRS operations, and to strengthen their training and coaching capabilities. These trainings were all aimed at improving SOP skills and performance, which has had great impact in the

quality of IRS. To achieve this, AIRS Ethiopia organized and conducted a focused IRS refresher training for 15 IRS master trainers (6 district and zonal malaria focal persons (MFPs) and 9 AIRS Zonal IRS coordinators) in April 2017.

The “Master Trainers” training built a critical mass of facilitators to manage both theoretical and practical training sessions on spray techniques during the training of trainers (TOTs). With this approach, a trainer to trainee ratio of 1: 6 was achieved.

The project also held two sessions of comprehensive IRS trainings for TOTs in May 2017, with a focus on practical training to enhance spraying techniques. A total of 281 health personnel from the 44 IRS target districts and 9 zones attended, out of which 22 (7.8%) were women. Participants included MFPs, Information, Education and Communication (IEC) coordinators, Environmental Health Officers and zonal representatives. The TOT was conducted in three sessions:

- May 8-12, 2017, Adama: 145 participants from East Wollega Zone (53), West Shewa Zone (24), and Horo Guduru Wollega Zone (26), South West Shewa Zone (20), West Guji Zone (20), and Oromia Regional Health Bureau (ORHB) (2) attended.
- May 15-19, 2017, Nekemte: 83 participants from West Wollega Zone (45), Kelem Wollega Zone (31), and Buno Bedele Zone (7) attended.
- May 22-26, 2017, Assosa: 53 participants from Kamashi Zone (28), Assosa Zone (21), and Benishangul-Gumuz Regional health Bureau (BGRHB) (4) attended.

The training, unlike in previous years, dedicated sufficient time (three days) to practical training on IRS techniques (Figure 2). The participants also developed detailed action plans including schedules for SOP training and supervision, mobilization and spray implementation.

The TOT participants subsequently conducted seasonal workers selection based on formal selection criteria and a six-day training for SOPs and porters (reserve SOPs), and SLs in their respective districts with emphasis on spray techniques. They also conducted orientations for mobilizers/Health Extension Workers (HEWs), washers, store assistants, and guards on spray operations, mobilization, EC, and safety and security. AIRS staff, seasonal supervisors and zonal MFPs provided supportive supervision during the cascade training.

Warehouse management training was conducted for district storekeepers and store supervisors focusing on stock management, storage of insecticides, and other IRS equipment, receipt and storage of IRS waste from the field, and warehouse security. AIRS Ethiopia also trained nurses and health officers from IRS target districts on pesticide poison management. Additionally, the project’s M&E team trained 53 data entry clerks (DECs) and hired 47 of them, with the remaining 6 kept as reserve. The breakdown of all trainings, by type of training, date and number of participants is shown in Table 3.

**TABLE 3. IRS TRAININGS CONDUCTED IN 2017 TO IMPROVE SPRAY QUALITY**

Type of Training	Dates	Participants Trained	Key Topic areas covered
Refresher Training of IRS master trainers	April 24 – 26, 2017	6 FMOH and 9 AIRS staff	IRS planning, implementation, supervision, mobilization, EC and spray techniques
Training of trainers: MFPs, team leaders and supervisors	May 8 – 26, 2017	281 FMOH staff	IRS planning, implementation, supervision, mobilization, EC and spray techniques



Training of squad leaders, spray operators and porters	June 5 – 10, 2017	2,757 SLs, SOPs and porters	Spray techniques, pump maintenance, safe handling of insecticides and environmental safety issues in IRS, community mobilization
Training IEC mobilizers	June 1 – 4, 2017	Kebele IEC mobilizers (1,142 HEWs) in 640 Kebeles	Community mobilization including IRS key messages – before, during, and after
Storekeepers and Store Supervisors	April 22 – 24, 2017	43 Storekeepers and 43 Store Supervisors	Store management and inventory tracking
Spray pump maintenance	May 20 – 21, 2017	19 pump technicians	Spray pump component parts and function; handling and operation of the spray pump; pump calibration
	May 23-24, 2017	21 pump technicians	
Health workers/ Poison management	May 9 & 16, 2017	121 health workers	Management of emergencies and insecticide poisoning on IRS
Data clerks	June 7 – 9, 2017	53 data clerks	IRS data collection and management, integrity, and security; IRS data entry and practice

A total of 3,199 spray actors<sup>3</sup>, of which 490 (15. 3%) were women, were trained to deliver IRS in 2017 (Table 4) with USG funds, a PMI indicator. All seasonal actors were examined for fitness before training with a structured checklist (Annex B-I).

Further training initiatives conducted in 2017 included:

- Entomology training conducted for participants from six universities and FMOH on revised WHO insecticide susceptibility test procedures (Addis Ababa, Arbaminch, Gondar, Jigjiga, Jimma, Mekelle Universities and NMCP, EPHI).

**TABLE 4. NUMBER OF PEOPLE TRAINED WITH USG FUNDS TO DELIVER IRS**

Type of Training	Males	Females	Total
IRS delivery TOT	258	23	281
Spray operations	2354	443	2797
Clinicians	97	24	121
<b>Total</b>	<b>2,709</b>	<b>490</b>	<b>3,199</b>

<sup>3</sup> Supervisors, Team Leaders, Squad Leaders, Spray Operators, Pump Technicians, Clinicians

**FIGURE 2. TRAINING OF TRAINERS PRACTICAL SESSION 2017**



*Trainees using water during a practical session on spray techniques in Adama in May 2017*

## 2.5 LOGISTICS NEEDS AND PROCUREMENT

The central AIRS Ethiopia warehouse in Addis Ababa continued to serve as the hub for storage of IRS commodities, including insecticides, before distribution to the target districts. Reference was made to inventory records from the previous IRS campaign, and a logistics needs assessment conducted at the end of the 2016 spray round, to develop the logistics and procurement plan. In developing this plan, the following were considered:

- Microplanning data based on 2016 IRS performance and target projections for new districts;
- Available stock of materials, consumables, and equipment;
- Transport arrangements for distribution of equipment, materials, and supplies; and
- Estimation of insecticide, personal protective equipment (PPE), and spray equipment required to meet any gaps.

Based on the information from each district, the AIRS Ethiopia team performed a detailed analysis to determine the total number of spray pumps, PPE, and other IRS materials required for the IRS activities in 2017.

Insecticide quantification in new districts was based on data from the government spraying reports from previous years that was shared by districts during microplanning sessions. The insecticide estimate was derived based on the number of target structures provided by the districts while the insecticide consumption rate (structures/ bottle) was based on the previous campaign in PMI supported districts where Actellic was applied using the control flow valve (CFV).

A full list of all PPE and materials procured for the 2017 IRS campaign is found in Table A-I in Annex A.

AIRS Ethiopia also established the number and type of vehicles required for IRS operations in each district based on the number of spray actors and topography of the spray areas. A total of 52 mini trucks with seating capacity of 25 spray actors and 82 long base trucks (4WD) with capacity of 12 were procured. The procurement was conducted through a competitive bidding process. Three local companies were selected to provide transport services for spray actors during IRS. The project further contracted the services of one company for the supply of 14 4WD station wagons for IRS supervision. The project also contracted two other companies to transport insecticide (47 trucks), distribute PPE and other IRS supplies to the districts (18 trucks), and collect empty pirimiphos-methyl bottles from the districts to Addis Ababa for recycling (38 trucks). Through the collaboration with ORHB, the project

was assigned 2 trucks from the Ministry to transport PPE to 7 districts, which were both inspected by the AIRS logistics team

## 2.6 HUMAN RESOURCE REQUIREMENTS

AIRS Ethiopia used the number of structures found in the 2016 spray campaign for both old PMI supported districts and new districts as a baseline to determine the number of seasonal workers needed for 2017 IRS activities. As in previous IRS campaigns, team leaders (TLs), SLs, and other supervisors were recruited from among health professionals working in the IRS target districts and zones. SOPs were recruited as seasonal staff from respective kebeles targeted for IRS in 2017. The project hired and trained one dedicated spray pump technician per district to manage pump maintenance and repairs throughout the spray campaign as a way of ensuring spray quality. All spray actors involved in the implementation of IRS in Ethiopia were government staff except SOPs, porters, washers, and a few pump technicians. Table 5 below shows the number of spray actors recruited and trained for the 2017 spray campaign.

In order to improve the quality of cascade trainings, overall IRS implementation and supervision, AIRS project hired nine fulltime zonal IRS coordinators. The zonal coordinators attended the master trainers training to improve their supervision and practical skills on spray techniques, and familiarize themselves with the BMP standards. The 9 Zonal Coordinators were assigned clusters of 4 districts each in view of geographic dispersion. This presented the opportunity for close supervision as they spent up to 60 days in the field. In their respective clusters, they paid close attention to Pre-IRS EC inspections; completion of all soak pit/ store renovations in time for IRS; support for cascade training and TOT participants as needed, all of which was made possible by the additional staffing. During IRS, they provided day-to-day support to the district teams, ensuring that assigned district staff were in the field to support the spray operators. Generally, the inclusion of the 9 new positions in 2017 allowed for adequate coverage and improved coordination and performance in 44 districts.

Overall, implementation of IRS operations in 2017 was conducted with the support of MFPs (44), TLs (81), SLs (506), SOPs (1,805), porters (446), mobilizers (1,142), washers (83), security guards (185), water fetchers (77), store Supervisors (43), store keepers (43), data clerks (47 of 53 trained), and drivers (129). Women accounted for 32.1% (n=1,565) of all personnel engaged in the 2017 spray campaign. Table D-4 in Annex D shows the number and type of spray actors per district.

**TABLE 5. NATIONAL AND DISTRICT HEALTH STAFF TRAINED IN 2017**

Categories of Persons Trained	Training on IRS Delivery								Other Trainings																
	Training of Trainers		Spray Operations		Pump Technician Training		Poison Management		National Training on Updated WHO tube test guidelines		Data Capture and Reporting		EC, Washing, Fire Safety and Operation Site Security		Store Management and Safety		SBCC, Mobilization and Enumeration		Transport Safety and Security		Refresher Training of Master Trainers		Total		
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
University Professors									13	2													13	2	15
Regional Supervisors	3	1																					3	1	4
Zonal Supervisors	16	1																			1		17	1	18
District Supervisors	124	12																			5		129	12	141
District MFPs	39	4																					39	4	43
Team Leaders	77	4																					77	4	81
AIRS Technical staff																					9		9	-	9
Data Entry Clerks											47	6											47	6	53
Clinicians							97	24															97	24	121
IEC Mobilizers																	166	976					166	976	1,142
Squad Leaders			326	180																			326	180	506
Spray Operators			1,780	25																			1,780	25	1,805
Porters*			208	238																			208	238	446
Washers													2	81									2	81	83

Categories of Persons Trained	Training on IRS Delivery								Other Trainings																
	Training of Trainers		Spray Operations		Pump Technician Training		Poison Management		National Training on Updated WHO tube test guidelines		Data Capture and Reporting		EC, Washing, Fire Safety and Operation Site Security		Store Management and Safety		SBCC, Mobilization and Enumeration		Transport Safety and Security		Refresher Training of Master Trainers		Total		
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
Drivers																			129				129	-	129
Security Guards													185										185	-	185
Pump technicians					40																		40	-	40
District Storekeepers															37	6							37	6	43
District Store Supervisors															38	5							38	5	43
<b>TOTAL M/F</b>	<b>259</b>	<b>22</b>	<b>2,314</b>	<b>443</b>	<b>40</b>	<b>-</b>	<b>97</b>	<b>24</b>	<b>13</b>	<b>2</b>	<b>47</b>	<b>6</b>	<b>187</b>	<b>81</b>	<b>75</b>	<b>11</b>	<b>166</b>	<b>976</b>	<b>129</b>	<b>-</b>	<b>15</b>	<b>-</b>	<b>3,342</b>	<b>1,565</b>	<b>4,907</b>
<b>TOTAL/Training</b>	<b>281</b>		<b>2,757</b>		<b>40</b>		<b>121</b>		<b>15</b>		<b>53</b>		<b>268</b>		<b>86</b>		<b>1,142</b>		<b>129</b>		<b>15</b>		<b>4,907</b>		

\*Porters serve as reserve spray operators

## 2.6.1 NEW DISTRICT MICRO PLANNING

Based on ORHB and PMI decision in 2017, 18 new districts were added (10 from Oromia and 8 from Benishangul-Gumuz). To obtain detailed data about the new districts AIRS conducted a two-day microplanning session (March 9 - 10, 2017) in Adama. A total of 51 malaria experts attended from Oromia and Benishangul-Gumuz regional states. AIRS supervisors and senior malaria experts from the regions facilitated the microplanning meetings (Table 6).

**TABLE 6. NEW DISTRICTS MICROPLANNING PARTICIPANTS 2017**

Region	Zone	Districts	Total	Male	Female	Remark
Oromia	Horo Guduru Wollega	4	9	9	0	
	South West Shewa	3	8	8	0	
	West Guji	3	8	8	0	
	Regional Health Bureau		2	2	0	Facilitators
Sub total		<b>10</b>	<b>27</b>	<b>27</b>	<b>0</b>	
Benishangul-Gumuz	Kamashi	4	10	10	0	
	Assosa	4	11	10	1	
	Regional Health Bureau		3	2	1	Facilitators
Sub total		<b>8</b>	<b>24</b>	<b>22</b>	<b>2</b>	
Grand Total		<b>18</b>	<b>51</b>	<b>49</b>	<b>2</b>	

During the meeting, AIRS supervisors and regional representatives briefly addressed the critical need for planning and identified localities to be sprayed in line with the national IRS guidelines and the districts' previous year's performance.

The meeting objectives included:

- Estimate the number of unit structures to be sprayed based on resource availability, and corresponding insecticide requirement;
- Assess the existing gaps in terms of technical capacity, availability of logistics and plan accordingly;
- Provide technical support and guidance to ensure high quality IRS in all targeted areas;
- Discuss the selection criteria of all spray actors, and share roles and responsibilities;
- Share best practices and learn from district experiences in managing spray operations;
- Strengthen partnerships with stakeholders in new districts; and
- Discuss store and soak pit rehabilitation, and role of districts in line with PMI's EC standards.

## 2.7 TECHNICAL ASSISTANCE TO 34 GRADUATED DISTRICTS

As part of the 2017 AIRS activity plan to organize a planning session for PMI graduated districts, AIRS project organized a microplanning workshop for 34 graduated districts. The objective of the microplanning workshop was to share lessons based on the IRS implementation model, identify IRS logistics, and determine insecticide needs for targeted structures and also identify the human resource need.

IRS planning workshops were organized for PMI graduated districts (March 7 - 8, 2017) in Adama. A total of 80 health staff and district managers attended the two day workshop including district MFPs, district health managers, zonal MFPs, and zonal health office staff (Table 7). The 34 graduated districts targeted a total of 600 malaria endemic villages (kebeles) with a total population of approximately 2.7 million. AIRS presented a refresher session on the main components of IRS (EC, Operations, stock management, and M&E). Based on an organized planning template, all districts completed their IRS implementation structure and previous year's performance. A plan was then developed collaboratively.

The following key factors were identified and action taken:

- At least 600 villages with 1,443,846 unit structures with a population of 2,708,225 persons were selected for the 2017 spray campaign and district specific implementation plans developed.
- The total insecticide requirement was estimated to be 195,810 sachets of bendiocarb and 736,548 sachets of propoxur, to be supplied by the government. At the time this report was written, the spray campaign in some graduated districts was ongoing and data will be available in November 2017.
- AIRS Ethiopia was tasked to provide PPE to ORHB as per the procurement plan shown in Annex A.

**TABLE 7. IRS PLANNING MEETING PARTICIPANTS FOR GRADUATED DISTRICTS**

SN.	Zone	# Districts	Total	Male	Female
1	East Shewa	10	22	21	1
2	West Shewa	1	2	2	0
3	Jimma	6	13	12	1
4	Buno Bedele	3	6	6	0
5	Arsi	4	12	10	2
6	West Arsi	6	12	12	0
7	West Hararge	3	9	9	0
8	Finfine	1	2	2	0
9	Oromia regional HB		2	2	0
<b>Total</b>		<b>34</b>	<b>80</b>	<b>76</b>	<b>4</b>

## 2.8 GENDER AND IRS IN ETHIOPIA

The PMI AIRS Project focuses on creating a more gender equitable project where spray campaigns support vector control goals while also promoting the inclusion of women across all aspects of IRS. The project seeks to increase the number of women hired as seasonal employees and to diversify the roles these women play in spray campaigns. Each female actor took a pregnancy test before the campaign and one during the campaign as a safety measure and, as a policy, those found to be pregnant were to be assigned other roles away from insecticide handling. Only 1 female actor tested positive on the second test and was assigned other roles for the remaining period of IRS.

The gender norms study continued in 2017 to better understand whether working on an explicitly gender equitable project impacts a seasonal worker's perceptions of gender norms and equality. Baseline data on gender norms was collected from a sample of seasonal workers before and at the end of the spray campaign. The data from these surveys is currently being analyzed and will be submitted to PMI in a separate report.

The AIRS Ethiopia team will use these findings to better engage with the NMCP and the local malaria focal points to dispel myths about women's abilities to work on an IRS campaign, strengthen recruitment and retention of women, and train supervisors and NMCP staff on gender equality.

In 2017, 18 districts were new and efforts were made to educate malaria supervisors from these zones and districts on gender equity and gender inclusion in the IRS activity. The AIRS team put special emphasis on the subject during TOT based on the fact that much of the population in some new districts in Oromia and much of Benishangul Gumuz are of Muslim faith, and tend to be more conservative, and that the districts were for the first time being introduced to the subject of gender equity. Overall, women accounted for 32.1% (n=1,565) of all personnel engaged in the 2017 spray campaign as compared to 36.8% in the 2016 campaign. Among the personnel involved in supervisory roles, 22 (7.8%) were women. Like in the operational sites in the old districts, separate shower rooms were constructed for female and male actors in the new districts.



### 3. INFORMATION, EDUCATION AND COMMUNICATION

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IEC activities are vital for IRS implementation to ensure successful spray campaigns by promoting community acceptance of the intervention. In 2017, the district MFPs and IEC/BCC focal persons organized and led one-day orientation sessions in all 44 target districts for community mobilizers. IRS key messages (pre-, during, and post-spray) including information on house preparation for IRS, avoidance of re-plastering of sprayed walls, and adherence to personal and environmental safety precautions was discussed.

Despite the generally high IRS acceptance levels witnessed over 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. The project will aim to incorporate even stronger approaches to community mobilization in future campaigns to further enhance IRS acceptability. Community mobilizers were engaged to ensure that households were adequately informed of actual spray dates, and that eligible structures were adequately prepared in advance of arrival of SOPs. In considering the use of Actellic 300 CS for the first time in 18 of the 44 districts, AIRS Ethiopia considered the need to develop and distribute a poster to enhance the mobilization activity. 8,000 posters were distributed and mobilizers posted them on their localities to provide specific messages to households on collaboration with spray actors, house preparation, and safety precautions to ensure high acceptance and a successful spray round.

The district IEC focal persons coordinated all mobilization activities through the kebele administration and other channels including kebele meetings, churches, and mosques. A total of 1,142 HEWs received one-day orientation on specific key IRS messages to be delivered to beneficiaries in their respective kebeles' modalities of conducting community outreach activities. A total of 640 kebeles were mobilized during 2,759 outreach sessions at marketplaces, schools, churches, mosques and population gatherings, although some HEWs were not fully engaged in the activity due to other competing health mobilization activities assigned to them by the district health offices that coincided with the period of the IRS campaign. About 414,646 households were contacted and 1,683,100 residents were mobilized. In some instances door-to-door mobilization was conducted, and mobilizers were embedded on IRS teams. The mobilizers and IRS supervision teams adequately managed any cases of refusals that emerged. Through these approaches, the campaign witnessed high IRS coverage and acceptance levels and structure readiness for IRS. In a few instances, such as in Dale Wabera and Abay Chomen districts, some refusals were observed, especially in the semi-urban areas, and could not be resolved. The key concern raised by residents was the staining of walls and the strong odor of Actellic. Future campaigns will require even stronger mobilization efforts and with special attention to districts where rates of refusal were high.

Table 8 shows the number of communication outreach sessions and population reached. In districts in the Benishangul-Gumuz region, where some of the structures are made of bamboo with wide gaps in between them, efforts were made through the mobilization teams to educate the communities on structure improvement. Subsequently some communities took the initiative to fill in some of the gaps in readiness for IRS. In the future, AIRS will ensure that this type of mobilization and sensitization occurs in advance so that these communities are eligible for spraying and spraying can occur on time.

**TABLE 8. IEC/ BCC SESSIONS AND MOBILIZED POPULATION**

S.N	District Status	District	Number of kebeles mobilized	Number of outreach sessions	Population mobilized			Number of HHs mobilized	Number of HEWs		
					Male	Female	Total		M	F	Total
1	Oromia (Old Districts)	Begi	15	55	27,602	26,521	54,123	11,277	0	21	21
2		Babogambel	12	45	26,051	29,568	55,619	18,337	6	18	24
3		Kondala	17	131	35,963	39,116	75,079	15,712	13	20	33
4		Nedjo	19	76	7,339	7,285	14,624	2,981	0	35	35
5		Kiltu Kara	13	143	14,797	15,614	30,411	7,623	0	26	26
6		Guliso	16	16	16,360	16,238	32,598	7,156	0	27	27
7		Mana Sibru	25	50	15,200	18,000	33,200	16,100	0	41	41
8		Chewaka	28	56	28,215	21,285	49,500	12,685	12	41	53
9		Gida Ayana	7	90	14,603	8,631	23,234	4,840	13	3	16
10		Gobu Sayo	6	30	19,864	212,763	232,627	8,717	0	18	18
11		Diga	11	33	21,120	17,280	38,400	9,600	0	13	13
12		Limu	7	21	13,745	15,948	29,423	4,578	0	14	14
13		Wayutuka	10	75	24,037	16,024	40,061	11,572	0	19	19
14		Guto Gida	11	34	10,652	9,842	20,494	5,883	2	20	22
15		Wama Hagalo	11	44	15,758	6,193	21,951	12,500	0	26	26
16		Bonaye Boshe	5	52	11,102	8,540	19,642	4,620	0	10	10
17		Sasiga	9	18	5,700	6,850	12,550	5,600	0	13	13
18		Seyo	10	10	17,589	8,913	26,502	7,655	0	8	8
19		Hawa Gelan	22	20	29,731	21,550	51,281	10,683	9	32	41
20		Lalo Kile	14	14	2,500	3,000	5,500	4,800	8	18	26
21		Dale Wabera	16	48	15,869	17,456	33,325	10,978	15	17	32
22		Dale Sedi	14	14	17,519	16,549	34,068	8,811	0	22	22
23		Nonno	14	240	9,800	3,500	13,300	10,900	0	20	20
24		Ilu Gelan	14	28	30,000	19,848	49,848	10,385	8	20	28
25		Dano	15	44	1,409	7,268	8,677	12,035	0	34	34
26		Bako	14	28	8,300	9,200	17,500	7,650	0	25	25

35	Oromia (New Districts)	Abay Chomen	14	143	24,664	25,472	50,136	9,706	5	51	56
36		Abe Dongoro	12	165	25,004	24,025	49,029	10,215	12	5	17
37		Amuru	15	112	20,081	21,126	41,207	9,590	28	5	33
38		Jardaga Jarte	5	130	13,770	10,916	24,686	5,143	4	9	13
39		Abaya	14	65	9,340	12,460	21,800	3,705	0	5	5
40		Gelana	12	29	11,742	19,437	31,179	2,071	1	21	22
41		Melka Soda	6	12	9,884	18,176	28,060	5,446	1	5	6
42		Goro	19	42	5,567	13,232	18,799	9,400	0	31	31
43		Waliso	9	27	23,847	22,912	46,759	9,741	3	13	16
44		Illu	18	54	29,200	28,400	57,600	12,000	0	25	25
27	Benishangul Gumuz (New Districts)	Bambasi	40	80	29,301	21,712	51,013	13,018	0	65	65
28		Menge	24	48	23,097	28,436	51,533	11,162	11	38	49
29		Sherkole	19	38	18,188	22,189	40,377	40,377	4	35	39
30		Oda Bildigilu	25	234	36,346	37,829	74,175	16,483	6	41	47
31		Sedal	15	68	12,100	10,974	23,074	3,205	0	15	15
32		Agalo	14	28	8,700	9,120	17,820	3,875	0	14	14
33		Kamashi	14	49	7,713	7,800	15,513	2,581	3	19	22
34		Yaso	10	20	8,251	8,552	16,803	3,250	2	18	20
Total			640	2,759	757,620	925,750	1,683,100	414,646	166	976	1,142

## 4. IMPLEMENTATION OF SPRAY ACTIVITIES

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### 4.1 SPRAY OPERATIONS AND SUPERVISION

IRS implementation was done in close collaboration with the government with all supervisors, including MFPs, IEC, EC, TLs, SLs, data clerks, storekeepers being drawn from among MOH personnel in the districts. The only seasonal spray personnel hired were SOPs and porters. The district health offices recruited all spray personnel (SOPs, TLs and SLs, mobilizers, coordinators, supervisors, storekeepers, etc.) based on recruitment criteria shared by ORHB and BGRHB. The number of spray operation teams was based on the number of structures found during the 2016 IRS campaign for old PMI supported districts and IRS performance in 2016 and microplanning data for new PMI districts. AIRS Ethiopia provided all technical (training, monitoring, entomology, etc.) and logistical (store, soak pit, PPE, equipment supply, insecticide, consumables, transport, etc.) support required for the operation in the 44 districts. 14 AIRS Ethiopia staff were deployed to the zones during implementation to provide supportive supervision, each in charge of 3–5 districts, working closely with regional, zonal and district MFPs.

IRS supervision was conducted by a team of AIRS Ethiopia staff, ORHB, BGRHB, Zonal MFPs, district staff and PMI. Standard AIRS paper and electronic supervision checklists were used by supervisors to ensure an objective assessment on spray quality, EC, M&E data, store management, etc. As part of the mHealth system, all zonal and district MFPs (52) and AIRS (15) were supplied with android smart phones equipped with mobile-based EC and supervisory forms. Upon completing a checklist and submission of a report on the mobile platform, a list of specific action points was generated and submitted to all supervisors so as to provide remedial action (Table 9). The implementation of this mHealth system was impacted by frequent internet and network coverage outages experienced in the country.

The project used two different models to deliver IRS to the 44 project districts: DB IRS (39 districts) and CB IRS (5 districts). In the DB IRS model, spray teams were organized at the district level and were accommodated in camps. Each district had 1-2 operational sites with soak pits and a temporary store in some cases. TLs and district MFPs developed mobilization and spray calendars with support from AIRS supervisors. TLs managed daily operations at the operational sites with the MFPs providing overall management oversight. TLs deployed the spray teams to the target villages on a daily basis. One SL was in charge of four SOPs and one porter. SOPs were each assigned 3-4 bottles to carry into the field. TLs supervised four squads equivalent to 4 SLs, 16 SOPs and 4 porters.

The CB IRS model was organized at the health post level in each kebele. The HEWs at the health post served as SLs with each HEW being in charge of four SOPs and one porter to mobilize and lead the campaign in the kebele. Trained district health office staff served as IRS supervisors and were assigned a cluster of 4-5 kebeles to oversee implementation of IRS and support the replenishment of supplies.

**TABLE 9. MOBILE SPRAY SUPERVISION PERFORMANCE 2017**

Supervision Forms	Completed
Spray Operator Morning Mobilization + Transportation Vehicle Inspection	234
Storekeeper Performance	216
End of Day Cleanup	252
Homeowner Preparation and Spray Operator Performance	728
DCV - Data Collection Verification	464
All Forms	1,894

This year, in addition to AIRS senior supervisors, the project recruited 9 full time Zonal IRS Coordinators, bringing the total number of supervisors to 14. AIRS Ethiopia assigned three to five districts to AIRS supervisors for facilitated supervision, better management of IRS quality, and high quality follow-up. All supervisors conducted supervision activities based on the supervision plan prepared ahead of the operation. Accordingly, continuous follow-up of activities over the course of the IRS operation were undertaken.

Supportive supervision focused on the following core activities: SOP training quality, spray quality, mobilization and community engagement on IRS in house preparation and readiness. In addition to this, as part of spray quality enhancement, the project focused on “Directly Observed Spraying” (DOS). Ten basic spray quality assurance parameters on insecticide mixing and SOP spray techniques were assessed daily by SLs for each SOP under their supervision and twice weekly by TLs for eight SOPs each. Whenever supervisors encountered areas of need on the part of the SOP, this was corrected on the spot through coaching to ensure improvement of the SOP’s spraying quality. A total of 24,266 supervision observations were conducted using the DOS checklist. Table D-5 in Annex D presents the use of the form and the checklist.

Overall, a cost saving of around 6% was achieved, mainly by replacing long base vehicles (with capacity to carry 12 spray operators) with larger trucks to accommodate larger number of spray actors. Through close supervision and tracking of vehicle usage by the Zonal Coordinators, IRS vehicles were released earlier than expected from the field, which contributed to the cost reduction. Some savings were also achieved in the training budget by organizing TOT and other IRS related trainings in strategic locations that reduced travel days for participants, thus reducing per-diem payments. ORHB provided 2 trucks that supported the transport of bulky PPE and equipment to 7 new districts in Oromia region.

## 4.2 COMMUNITY-BASED IRS

The project held a five-day district-level training to refresh the skills of HEWs in the five selected districts to serve as SLs. The CB model of IRS was implemented in one district from each five zones with a total of 98 villages targeted for IRS. The trained HEWs, in collaboration with their village leaders, then selected at least five literate community members (total 619) and trained them for six days on spray operations and mobilization. In most kebeles, four of the community members worked as SOPs and one served as a porter (or SOP replacement) in their villages. In selected high-population kebeles, AIRS Ethiopia assigned five or more community members as SOPs in order to accomplish the spray

campaign within the proposed schedule. Table 10 shows the 2017 spray performance for each CB IRS district.

The length of spray operations in the five CB IRS districts varied based on number of structures per kebele, with spray duration ranging from 10 – 23 days. Only one vehicle was provided to each district to provide logistical and supervisory support. Motorbikes provided by the district health office were used for supervision.

**TABLE 10. SPRAY OPERATION PERFORMANCE IN CB IRS DISTRICTS**

Zones	District	Structures Found	Structures Sprayed	Spray Coverage (%)	Total Population Protected	Pregnant Women Protected	Children <5 Protected
East Wollega	Sasiga	18,003	18,003	100.0	46,080	672	6,936
Buno Bedele	Chewaka	36,753	36,741	99.9	87,028	1,901	14,485
Kellem Wollega	Hawa Galan	36,624	36,498	99.7	122,454	4,349	16,097
West Shewa	Bako Tibe	18,577	18,577	100	41,520	479	5,235
West Wollega	Manasibu	41,446	41,439	99.9	82,452	700	7,920
<b>TOTAL</b>		<b>151,403</b>	<b>151,258</b>	<b>99.9</b>	<b>379,534</b>	<b>8,101</b>	<b>50,673</b>

### 4.3 LOGISTICS AND STOCK MANAGEMENT

Because the districts supported by the project increased from 36 in 2016 to 44 in 2017, and they were dispersed over a wide geographical area, special attention was given to logistic and warehouse management. The AIRS project recruited a Warehouse and Logistics Manager whose overall function was to manage both central and district warehouses, thereby addressing gaps in store management that had been flagged as a challenge in previous years. Furthermore, one store supervisor was recruited on a temporary basis in each of the 44 districts (in addition to the storekeeper) to ensure that all logistics and store management functions at the district level were conducted appropriately. Routine supervision and on the spot coaching was conducted to ensure proper handling and recording of items on store management forms at the district stores. A three-day training was given to the store keepers (44) and store supervisors (44) in two clusters.

Stores were renovated in each of the 18 new IRS districts to accommodate insecticide and other IRS supplies. The stores were located at district health facilities and the district health office was charged with ensuring the security of IRS equipment and supplies. The storage area in stores in the 26 old districts was increased with addition of an extra 9m<sup>2</sup> area to accommodate the bulky Actellic insecticide and other IRS materials. District level stores served as distribution centers for IRS materials, equipment and insecticides during the IRS operations (Figure 3).

**FIGURE 3. ACTELIC 300 CS AND TOOLS STORE IN NEW DISTRICT OF ABE DONGORO**



### 4.3.2 INSECTICIDE DISTRIBUTION AND MANAGEMENT

In 2017, a total of 305,916 bottles of Actellic 300 CS were procured. A distribution plan was prepared to ensure safe and timely delivery of the insecticide to the district stores. The distribution was successfully conducted in 43 of 44 districts under escort. The insecticide was dispatched to the target districts under escort by trained technicians, storekeepers and AIRS staff. One truck carrying insecticides to one of the new districts (Oda Bildigidu) district was involved in an accident (refer to Section 5.3.3. for more details).

To comply with the principle of “First Expiry First Out” (FEFO) and avoid any possibility of accumulation of obsolete insecticide stock, the balance remaining from the 2016 spray campaign (16,007 bottles in 17 old districts) was used first before the freshly procured 2017 stock. AIRS supervisors ensured that all the stock was completely utilized at least in the first week of IRS. The district stores were managed by a storekeeper, store supervisor and store assistant who ensured distribution and tracking of supplies and materials at the operation sites. All stock records were documented on ledger books and stock cards. Empty insecticide bottles were equally tracked daily at the operation sites and district stores. Upon receiving the insecticides from the district stores, TLs filled out and signed daily insecticide tracking forms (Form A), and then issued bottles to the SLs with a similar insecticide tracking form (Form B). The SLs handed the insecticides to the porters assigned to their squads, whose role was to carry and handle the mixing of the insecticides under the supervision of the SLs. Insecticide bottles were serialized and handed over to TLs and subsequently to SLs by serial number to ensure accurate tracking during the operations.

To limit the insecticide load carried by the porters, 3-4 bottles were handed over to the SOPs and insecticide mixing was done under strict supervision of SLs to minimize any chance of insecticide loss. At the end of each spray day, SLs turned in the used (empty) and unused (full) bottles to the TL, who returned them to the store. The reconciliation at the end of the day was managed using Form A at the district store and Form B at the operation site. The storekeepers recorded the full bottles on the incoming ledger books and stock cards, and updated the balance. Empty bottles were recorded on the daily utilization record form that tracks each store’s empty bottles and utilization trend. This reconciliation process enabled the storekeepers to ensure an effective daily inventory and to alert AIRS supervisors of discrepancies between the stock and the records. This strong follow up of insecticide helped to safeguard any loss of insecticide and therefore only one empty bottle was reported missing during the campaign (in Bako district). Three attempts to steal insecticide were reported – one in Sasiga district at the start of the campaign involving a storekeeper, another in Nedjo district at time of the insecticide vehicle accident involving residents from nearby villages, and lastly in Woliso district involving SOPs toward the end of the campaign – but all the insecticide was recovered through the concerted efforts of AIRS staff, local administration, police and MFPs. In addition, some IRS items were reported missing at the end of the spray campaign including flashlights (42), neck protection (26), coveralls (34), helmet (5) and a mobile phone (1) especially in new districts due to some gaps in stock tracking. Respective spray actors were charged for the items lost.

A total of 70,985 bottles of Actellic remained unutilized at the end of the spray campaign (expiration in May 2019) and 250,918 empty bottles have been collected from all the 44 districts and handed over to the selected recyclers. In addition, 10,454 kg of carton and other wastes are being transferred to the recyclers or incinerated.

A total of 134 vehicles were contracted to support IRS operations in the 44 districts out of which 52 vehicles were mini trucks and 82 were long base types.



## 5. ENVIRONMENTAL COMPLIANCE

In reference to the Supplemental Environmental Assessment (SEA) amended and approved in 2015, which will be in effect through 2020, and the letter report prepared for the year 2017, the AIRS project used Actellic 300CS (organophosphate) in all 44 target districts. Based on PMI BMPs, there was a strong monitoring system to ensure that EC requirements were adhered to during the IRS operation, so as to protect spray actors, beneficiaries and the environment from contamination. Activities performed to protect these potential components are discussed below.

### 5.1 PRE-SEASON ENVIRONMENTAL COMPLIANCE ASSESSMENTS

Two pre-season environmental compliance assessments (PSECA) were conducted for all 44 project districts using checklists installed on smartphones. The first-round PSECAs, focused on rehabilitation and construction needs for soak pits and stores. The first round PSECAs were performed well ahead of the TOT, and gaps identified and mitigation plans were communicated to the district staff. A second round of PSECAs was conducted one week before spray operations. The AIRS team verified that all gaps identified during the first round PSECA were resolved by stakeholders and that the operation sites were ready for the spray operations. Tables 11 and 12 summarize the requirements and key gaps identified during the first round PSECA.

**TABLE 11. REQUIREMENTS IDENTIFIED DURING FIRST ROUND PSECA FOR DISTRICT STORES**

District Store	Zone										Total
	West Wollega (7)	Kellem Wollega (5)	East Wollega (9)	West Shoa (4)	Buno Bedele (1)	S.W Shoa (3)	Horo Guduru (4)	West Guji (3)	Assosa (4)	Kemashi (4)	
Number of laminated pesticides and safety sheets required	39	31	26	28	30	6	8	6	8	8	190
Number of health and safety procedure sheets for stores and vehicles required	62	51	61	35	32	22	25	20	25	25	358
Number of emergency response procedure sheets required	62	51	61	35	32	22	25	20	25	25	358
Number of spill response procedure sheets required	62	51	61	35	32	22	25	20	25	25	358
Number of fully stocked first aid kits	2	3	4	5	1	3	3	3	3	3	30



required											
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Number in parenthesis indicate total number of stores per zone

**TABLE 12. KEY GAPS IDENTIFIED DURING FIRST ROUND PSECA FOR SOAK PITS**

Soak Pits	Zones										Total
	West Wollega (41)	Kellem Wollega (30)	East Wollega (25)	West Shoa (20)	Buno Bedele (28)	South west Shoa (6)	Horo Guduru (8)	West Guji (6)	Assosa (8)	Kamashi (8)	
Number of soak pits needing vegetation cleared	40	29	22	20	28	0	0	0	0	0	139
Number of soak pits needing maintenance of fence, gate, lock	40	29	22	20	28	0	0	0	0	0	139
Number of washing areas needing repair of slope, leak, or cracks	0	0	1	1	3	0	0	0	0	0	5
Number of soak pits needing lines to dry clothes	40	29	22	20	28	6	0	0	0	0	139
Number of soak pits needing the skull and cross-bones danger signs	6	5	12	3	3	6	8	6	8	8	65
Number of soak pits needing a temporary shower built	40	29	22	20	28	6	8	6	8	8	175

Number in parenthesis indicate total number of soak pits per zone

A total of 180 soak pits were used for the disposal of insecticide-contaminated effluent in 2017, of which 82 were in DB-IRS and 98 were in CB-IRS and old IRS-supported districts. Some 36 soak pits were constructed in the new PMI-supported districts and were all lined with plastic sheet on the sides to prevent any potential side leakage of effluent into the environment (Figure 4). Polyethylene plastic sheets were used as ground cover for the washing areas of the soak pits. In 2017, the AIRS project used mobile 14 soak pits (MSPs) in 11 sites.

In order to ensure adequate and standardized storage facilities the project renovated 25 old district stores and 18 others in new districts. AIRS staff and other IRS supervisors inspected the stores for appropriate management and EC. The project equipped the stores with fire extinguishers, shelves, pallets, first aid kits, dustbins, emergency spill kits, and thermometers to ensure health and environmental safety during the spray campaign.

**FIGURE 4. SOAK PIT AND PLASTIC SHEET LINING TO PROTECT SIDE LEAKAGE OF EFFLUENT IN AGALO METI DISTRICT**



Pregnancy screening was conducted for all 607 female spray actors involved in the IRS operation. The test was conducted two times during the spray campaign. One female porter was found to be pregnant on the second test and was assigned data filing and documentation duties. In 2017, all spray actors underwent medical fitness screening before they enrolled in the spraying operation and only those who fulfilled the criteria were enrolled. Some 25 actors were found to be unfit and were not enrolled in the campaign. The physical condition of SOPs was also assessed during training process by trainers including the MFPs. In addition, the SLs assessed the physical condition of each SOP and porter every day during morning mobilization sessions using the daily health check list (Annex D, Tab D-6).

The SOPs, SLs and TLs were provided with functional flashlights to check that the houses were adequately prepared for spraying and items removed or covered with plastic sheet before the spraying would commence. In addition, all SOPs were provided with full PPE (Figure 5).

**FIGURE 5. FEMALE SPRAY ACTORS IN FULL PPE DURING SPRAY OPERATIONS**



The project trained 121 clinical practitioners on insecticide exposure management in one day. Districts were notified of the need to have the recommended antidotes (atropine and diazepam) on hand. AIRS ensured that at least one of the antidotes was available in the health facilities in the operational sites. There were reports from field supervision that showed that SOPs frequently forgot to take along their

flashlights at the beginning of the spray campaign and the need to carry them was reinforced during the morning mobilization.

## 5.2 MID- AND POST-SEASON ENVIRONMENTAL INSPECTIONS

AIRS Ethiopia technical staff were involved in EC inspections and conducted routine supervision as well as the pre-spray, mid-spray and post-spray inspections in all target districts. The EC assessment and supervision were based on standard AIRS checklists. District and zonal MFPs were actively involved in supervision as well. Four major checklists (Morning Mobilization and Transport Vehicle Inspection; Home Owner Preparation and Spray Operator Performance; Storekeeper Performance; and End-of-Day Cleanup) were performed based on supervision plans developed by AIRS Ethiopia and shared with the districts and zones. Supervisors were charged with the task of providing corrections and guiding SOPs on the spot. At the end of each inspection, district health teams held a general discussion on the status, achievements, shortcomings, and constraints found, and forwarded the recommendations for further corrective actions to district health offices and to AIRS supervisors.

Ensuring EC on IRS needs the full attention of all the actors and district supervisors and AIRS staff play a critical role in this. For future spray seasons, the EC focal person assigned from the government in each district would be required to explicitly focus on EC roles and should not be involved in other health office functions. The mobile-based supervision tool needs to be installed ahead of time and checked for its functionality before the teams are deployed to the field. A detailed list of inspections and mitigation measures taken in the 2017 operation are described in Table B-I.

## 5.3 POST-SEASON DEMOBILIZATION AND WASTE DISPOSAL

### 5.3.1 CLOSURE OF STOREROOMS AND SOAK PITS

Post IRS assessment and supervision were conducted at all operational sites (soak pits) and stores based on standard smartphone checklists. Accordingly, there were no reported issues at any of the inspected sites. Collection of IRS commodities from temporary storerooms was done soon after completion of the spray campaign and all the items returned to the district stores. Soak pits were cleaned and closed while the temporary stores were cleaned and handed over to the health facility in charge. Contaminated wastes, including empty bottles and used masks, were collected to the district store for transportation to the central warehouse and subsequent disposal.

### 5.3.2 SOLID WASTE DISPOSAL

All solid wastes generated from the spray campaign were collected and segregated by type including used masks, worn gloves, plastic sheets, paper wrappings etc. Empty bottles were collected and managed using incoming ledgers books and stock cards at district and sub-district stores. The wastes are currently being collected from each district to Addis Ababa for subsequent disposal as was done in previous years. Two recycling firms were identified for the recycling of the 250,918 empty bottles generated during the spray campaign. Uncontaminated paper cartons (10,454 kg) are being delivered to the Ethiopia Pulp and Paper recycling company in Addis Ababa. The used masks and other paper related wastes (5 tons) are being incinerated at the AIRS project incinerator (Table 13). A second analysis of smoke emissions aimed at standardizing incineration conditions by the University of Addis Ababa is planned to be conducted before the end of the year.

**TABLE 13. SOLID WASTE MANAGEMENT DURING THE 2017 SPRAY CAMPAIGN**

Type of waste	Quantity	Disposal site	Disposing Company	Planned Management Mechanism
Actellic Bottles	250,918 bottles	Addis Ababa (Burayu and Alemgena Area)	1.Tewodros Fikru Plastic and Rubber Production 2.Fitsum International PLC	Recycling: Production of electric cable conduits
Insecticide Cartons	10,452 kg	Wonji- about 100km from Addis Ababa	Ethiopia Pulp and Paper production company	Recycling: Production of packaging materials
Used Masks	5,000 kg*	Addis Ababa- Burayu	AIRS-Ethiopia project	Incineration
Bendiocarb Sachet	3,000 kg*	Addis Ababa- Burayu	AIRS-Ethiopia project	

\*Includes wastes from 2015 and 2016 spray campaigns

### 5.3.3 INCIDENTS ENCOUNTERED DURING THE IRS OPERATION

The major incidents encountered this year included two vehicle accidents and cases of attempted insecticide theft.

On June 1, 2017 a truck transporting 10,092 bottles of insecticide and 54 spray pumps from central warehouse in Addis Ababa to Oda district of Benishangul-Gumuz region was involved in an accident at Dila (500 km from Addis Ababa) in West Wollega zone. The accident was occasioned by a technical problem with the truck leading to loss of control by the driver on a winding section of the road. It should be noted that the truck driver did not observe AIRS daytime vehicle movement policy and the accident could have been avoided if the technical problem was encountered during the day. A total of 5 bottles and 34 spray pumps were damaged. The rest were appropriately transferred to spare trucks and transported to the target district. Some 109 bottles that were initially stolen from the accident scene were all recovered through a concerted effort by AIRS staff, local administration and the police. The driver stayed in police custody for about 10 days and was released. All EC procedures were followed accordingly in managing the minor spillage encountered. The vendor confirmed that the insurance provider will reimburse the project for the damaged pumps.

A second vehicle accident occurred at Ano town of Gobu Sayo district on June 19, 2017, where a hired IRS vehicle knocked a pedestrian leading to a fractured leg. The driver escaped unhurt. The pedestrian received medical attention at a nearby district hospital. The vehicle was insured and the vendor pledged to cover all medical costs and any further assistance related to the incident as required by law.

An attempted theft of insecticide was reported in Woliso district involving four SOPs. An honest SOP reported the attempt to IRS supervisors and action was immediately taken. The already mixed insecticide that was transferred to 500 ml water plastic bottles was recovered immediately and the spray actors dismissed.

In Bako district, one empty bottle was not received from the spray team in one kebele toward the end of the campaign. The matter was reported to the police but it was not recovered. The coordinated stock management, close supervision, and robust insecticide tracking during the campaign minimized any likely loss of insecticide.

## 6. MID-SPRAY AND POST-SEASON ACTIVITIES

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### 6.1 MID-SPRAY REVIEW MEETING

In an effort to track performance and deal with emerging challenges in the target districts, the AIRS project organized mid-spray review meetings bringing together a cluster of districts based on geography from June 21st to 27th, 2017. The participants included district MFPs (44), district health office heads or vice heads, zonal MFPs (10) and all AIRS supervisors (15). The one-day meeting addressed key IRS implementation activities with a view of ensuring that any challenges were resolved and that all districts were up to speed to ensure achievement of their targets. The following areas were reviewed:

- IRS spray performance (daily output, data management, MFP summary reports);
- IRS operations (spray quality, insecticide usage, mobilization, house preparation);
- IRS supervision (DOS, use of checklists/ mHealth platform, supervision plan);
- Store management (commodity/ insecticide tracking, storekeeper performance, used of store management tools);
- EC (status of soak pits, use of PPE, waste segregation, medical check-ups and documentation); and
- IRS logistics and finance (IRS supplies, vehicle tracking and use, per-diem payments).

Based on discussions of spray implementation in the first 2 weeks of IRS, meeting participants made the following recommendations aimed at ensuring, among other things, that spray quality and IRS targets were achieved while observing IRS best management practices:

- District MFPs to take full responsibility of data tracking and reconciliation with view of ensuring data quality and timeliness in data entry;
- District MFPs and AIRS supervisors to ensure that DOS (Direct Observed Spraying) was implemented by TLs, SLs and other supervisors in order to enhance spray quality;
- Use of supervisory checklists was critical and should be enhanced in all districts;
- Districts presenting low daily SOP outputs were advised to revise their spray calendars by increasing their daily targets in order to meet operational targets;
- Supervisors to review insecticide usage rate in some districts especially Benishangul-Gumuz districts to establish reasons for the low usage rate through direct and indirect supervision in respective localities;
- MFPs to ensure that HEWs (mobilizers) fulfill their assignment by working with the spray teams
- MFPs and mobilizers in Benishangul-Gumuz to encourage communities to improve their structures by filling spaces between bamboo sticks to ensure eligibility for spraying;
- TLs and MFPs to ensure information dissemination on house preparation is delivered during morning sessions;
- Orientation of storekeepers is vital to ensure appropriate tracking of IRS commodities and insecticides through regular physical counts;

- IRS supervisors to ensure appropriate waste segregation in their districts;
- The teams were reminded of the need to ensure that all female actors took a 2<sup>nd</sup> pregnancy screening and that the daily medical checks by SLs and TLs was implemented;
- Shortages of IRS supplies were to be addressed urgently by MFPs and AIRS supervisors by ensuring that storekeepers provided accurate weekly consumption forecasts; and
- Vehicle tracking to be done by documenting days each vehicle provides required service to ensure accountability by vehicle vendors.

## 6.2 POST-SPRAY REVIEW MEETING

AIRS project conducted a post spray evaluation meeting on 8 – 9 August 2017 at Adama for 36 districts of Oromia region and on 12 August 2017 at Nekemte for 8 districts of Benishangul-Gumuz region to review overall implementation of the IRS activities, share experiences and discuss challenges with the aim of improving operations in future spray rounds and creating program ownership among stakeholders.

A total of 115 participants including district MFPs (40), zonal MFPs (8), district health office vice heads (40) and zonal heads (6), AIRS technical staff (16), ORHB staff (1) and BGRHB (2) participated (Annex C).

The two-day meeting covered presentations by zonal MFPs (8), district MFPs (5) and AIRS project technical team members (4). The presentations focused on overall performance, experiences and challenges in the following key areas:

- IRS planning including HR and insecticide quantification / spray and mobilization calendars;
- IRS implementation processes, spray coverage, and mobilization;
- IRS quality, recruitment of spray actors, and supervision;
- Data management;
- EC, house preparation, and waste management;
- Warehouse, IRS logistics management, and quantification of logistics; and
- Store management and insecticide tracking.

A number of key challenges and experiences were discussed, which require the attention of ORHB, BGRHB, district authorities and AIRS Ethiopia. Recommendations from the meeting included:

- Districts should ensure that planning data shared should be as accurate as possible and this should be validated by AIRS in future spray rounds.
- It is the responsibility of the districts to screen and recruit SOPs and SLs of good conduct to ensure that issues related to attempted theft on IRS commodities is minimized hence MFPs should not abdicate the role fully to administrators.
- To be able to improve SOP conduct it was recommended that feedback on actors' behavior/conduct be shared with the kebele leaders at the end of IRS.
- Supervision is a recognized pillar of IRS, hence selection of TLs as IRS supervisors should focus on commitment and availability for supervision. Consideration for selection of staff at lower levels of the health structure such as health facilities was recommended.
- Use of HEWs for social mobilization has come with challenges due to competing tasks and non-availability hence recruiting community leaders or influential persons in the community to serve as mobilizers should be considered.

- Absence of some TOTs especially TLs during cascade training affected training on spray techniques. It was recommended that districts and zones should consider only staff that are available and are committed to take up the roles on IRS.
- Beneficiaries in CB districts should take up on the construction of soak pits as their responsibility hence MFPs to make needed follow up with local administration.
- Program ownership must be taken by all district administrators; robust advocacy/sensitization at all administrative levels in the district, and especially with focus on new districts, should be undertaken.
- Daily SOP spray output should be set in view of variability in structure sizes, spatial distribution and topographical challenges between districts.
- Poor road conditions and near-inaccessibility in some of the new districts was highlighted and the meeting called for an earlier start of IRS to avoid the peak rainy period.
- Selection of IRS target districts by the regional health bureaus should also consider population density and spatial distribution of structures so as to maximize available resources and logistics. It was observed that IRS may not be particularly useful among pastoral communities in target districts in West Guji.

## 6.3 DE-MOBILIZATION AND LOGISTICS

As in previous spray rounds, AIRS Ethiopia ensured that all spray equipment, including spray pumps, PPE, plastic sheets, tents, and mattresses, were properly cleaned and returned to district stores during closeout supervised by the AIRS technical team. The team also ensured that all insecticide empty bottles and any used insecticide at the site stores were returned to the main district store. Subsequent to this, the AIRS team conducted comprehensive insecticide reconciliation in all districts and all unused insecticides and empty bottles were recorded. All empty bottles are being transferred to Addis Ababa for recycling. Soak pits were cleared of any wastes, covered with plastics sheets and secured under lock. A preliminary inventory of stock at the district stores was conducted at the end of IRS. However, the project will conduct a detailed inventory of all IRS-related materials in the 44 target districts by September 30, 2017.



## 7. ENTOMOLOGY

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AIRS Ethiopia conducts routine entomological monitoring in selected sites to provide data for decision-making. Data generated is used to justify decisions such as the type of insecticide and selection of target areas. It also helps to assess the quality of the vector control intervention as well as its efficacy. The project is implementing the following entomology activities in collaboration with local universities:

- IRS quality assurance and decay rate monitoring in 4 sites: Chewaka and Bako (CB IRS) and Nono and Goro (DB IRS, note that Nono is an old IRS district and a new ento site and Goro is a new IRS district);
- Vector density, species composition and behavior in 8 selected sites across the country (Nono, Goro, Abaya, Babile, Alamata, Arba Minch, Bambasi and Dangur agricultural site);
- Insecticide resistance monitoring in 17 sentinel sites; and
- Net bioassays in 4 sites.

This report highlights only the results of the wall bioassays conducted. Data on vector behavior, density, and insecticide resistance will be reported in the entomology progress report in September 2017 and the end of year report in February 2018.

### 7.1 DETERMINATION OF QUALITY OF SPRAYING AND DECAY RATE

The AIRS Ethiopia team conducted cone bioassay tests for quality check and decay rate in four sites, two each in DB IRS (Nono and Goro) and CB IRS (Chewaka and Bako) districts. Spraying in all project districts was done using Actellic 300 CS.

The tests were performed in 12 houses per site purposefully selected to represent different wall types and structures sprayed by different SOPs. A total of 48 houses were sampled in the four districts. The tests were carried out using known susceptible *An. arabiensis* colonies reared at the Malaria Control Training Center in Adama and Jimma University insectaries. Larvae were reared to adults; 2-3 days old sugar fed adults were exposed to the sprayed walls in the selected houses.

Results of the wall bioassay tests were conducted at time zero (100% mortality) and one month after spraying (100% mortality) with pirimiphos methyl; results are shown in Table 14. The high *An. arabiensis* mortality rates recorded showed that the application of the insecticide on wall surfaces was of adequate quality. The average mortality of mosquitoes declined to 94% at 2 months post spraying. Subsequent wall bioassay tests will be conducted monthly until mosquito mortality drops below 80% for two consecutive months to characterize the insecticide decay rates.



**TABLE 14. WALL BIOASSAY RESULTS FOR PIRIMIPHOS-METHYL**

Time	% Mortality of <i>An. arabiensis</i>																Overall mean
	Bako Tibe				Chewaka				Goro				Nono				
	Dung	Mud	Painted	Mean	Dung	Mud	Painted	Mean	Dung	Mud	Painted	Mean	Dung	Mud	Painted	Mean	
T0 (June 2017)	100 (90/90)	100 (180/180)	100 (90/90)	100	ND	100 (270/270)	100 (90/90)	100	100 (120/120)	100 (150/150)	100 (90/90)	100	ND	100 (180/180)	100 (180/180)	100	100
T1 (July 2017 )	100 (90/90)	100 (180/180)	100 (90/90)	100	ND	100 (270/270)	100 (90/90)	100	100 (132/132)	100 (157/157)	100 (101/101)	100	ND	100 (193/193)	100 (186/186)	100	100
T2 (Aug 2017)	88.8 (79/89)	74.4 (131/176)	84.4 (76/90)	81	ND	87.2 (231/265)	96.6 (84/87)	90	100 (134/134)	100 (168/168)	100 (104/104)	100	ND	98.9 (197/199)	98.9 (197/199)	99	94

ND: Not done due to absence of dung wall surfaces;

Figures in parenthesis indicate number of mosquitoes that died out of the total number tested

## 8. MONITORING AND EVALUATION

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### 8.1 APPROACH AND KEY OBJECTIVES

The key objectives of AIRS 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.

### 8.2 DATA COLLECTION AND DATA QUALITY ASSURANCE PROTOCOLS

Data was collected using standardized data collections forms designed to capture all core PMI indicators. AIRS Ethiopia has six forms to capture all AIRS process indicators at different levels:

- Training Participant Registration Form;
- Daily Spray Operator Form;
- Squad Leader Daily Summary Form;
- Directly Observed Spraying form;
- Team Leader Daily Summary Form; and
- District MFP Daily Summary Form.

The Daily Spray Operator Form is used as the only primary data source for data entry, analysis and reporting. District operations supervisors use the other three data summary forms to manage team and squad performance on a daily basis. The Direct Observed Spraying Form focuses on documenting spray quality procedures and providing continuous feedbacks and corrections. Table D-1 in Annex D presents the use of each form.

The PMI AIRS Project used three paper-based data quality assurance tools – the 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. In 2016, AIRS digitized the DCV form and integrated it with the mHealth system to enhance the data collection accuracy for supervision. These tools are fully described in Table D-2 in Annex D.

Additionally, AIRS Ethiopia used the AIRS Microsoft Access Database Cleaning/Reporting Tool to ensure high data quality. The tool is a database that links to the AIRS database 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 used by AIRS operations team members and/or FMOH supervisors to get updates and respond to spray coverage issues in real time. The data-cleaning function was used by DECAs 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 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. The data recording problems during the first week of the spray, especially in the new PMI-supported districts, were alleviated through onsite refresher training, which resulted in improvements in the observed gaps over the course of the campaign.

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. AIRS staff and FMOH supervisors captured issues and provided feedback during spray operations. 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**

<b>Errors/Issues Observed</b>	<b>Corrective Actions Taken</b>
<b>Missing house marking</b> <i>SLs did not mark visited structures with chalk</i>	Supervisors have provided on the job training for SLs and supported through frequent supervisions
<b>Incomplete Household records in the IRS card</b> <i>SLs did not record all the relevant information in the IRS card especially on new districts.</i>	The supervisory team identified the problem and carried out intensive onsite support and training. The support was given particularly to SLs who were found to commit the error frequently.
<b>Missing IRS card numbers</b> <i>Some households did not have IRS card number from previous spray seasons.</i>	The supervisory team facilitates the provision of replacement IRS cards. The team has also discussed the importance of retaining IRS cards with SOPs so that they can pass the information to households.

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

## 8.3 DATA ENTRY

AIRS Ethiopia employed 47 DECAs, one per district in 41 districts and two per district in 3 large districts. The 2017 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.

AIRS has retained the server-based data entry system in East Wollega zone where four DEC computers were connected to a single Structured Query Language (SQL) server. A single laptop was set up as a SQL server that was loaded with the necessary applications, database and system configurations to support multiple users. The server functioned as a central data bank for the client machines connected to it. In this way the DECAs entered data on their server-connected laptops that was then stored in a

single backend on the server and all data back-ups and transfer procedures were performed from the server. This system facilitated data aggregations and transfers and more centralized supervision of DEC's.

Data entry was carried out at two levels, first by “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.

## 8.4 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, second to a cloud back-up system (Dropbox), and third on an external memory drive that was provided to each DEC.

## 8.5 DATA CLEANING

The M&E Manager and Database Manager with the help of Data Center supervision checklist 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 aggregate details per form 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 DEC's cleaned spray data daily throughout the spray campaign, with final data cleaning completed 8 days after the end of the spray campaign.

## 8.6 REPORTING OF SPRAY DATA

Spray data was collected and entered into the database on a daily basis with some delays in some of the new districts. The main reasons for the delays were due to distance between operation sites and data centers and also the lack of experience of the newly recruited DEC's. The network connectivity problems also hindered the flow of reports from the DEC database to the central system. SLs collected the data while TLs checked and verified data. Further checks were completed by MFPs and district IEC Officers. District DEC's checked the completeness and accuracy of daily spray data variables before entering the data into the database. Weekly IRS progress reports were shared with the AIRS 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 AIRS Ethiopia supervisors, the AIRS Operations Director and the Technical Project Manager. The persistent connectivity problem also impacted the flow of reports of through this data exchange which decreased the ability to monitor campaign progress and coverage in real-time.

All AIRS Ethiopia performance indicators are presented in an M&E Plan matrix in Annex E. Details of some key IRS indicators, such as number of structures sprayed, people protected, and insecticide-treated net availability and use, are provided in the following sections of the report.

## 8.7 NUMBER OF STRUCTURES FOUND, SPRAYED, AND SPRAY COVERAGE

A total of 748,917 structures were found by SOPs during the 2017 spray campaign across all the 44 districts. Of the structures found 738,810 structures were sprayed, and an overall spray coverage of 98.7 percent was achieved. District-level data is presented in Table 16. In total, SOPs found 575,935 sprayable structures and sprayed 567,876 (98.6 %) of them. Of the total structures sprayed, living/sleeping and kitchen structures represented 76.9% (n= 567,876) while the rest of the structures including cowsheds, toilets and others constituted 23.1% (n= 170,934). Other structures reported in the category include: houses inside church/mosque compound that is used rarely as sleeping quarters, houses used for guests, houses used for study room for children. Kitchens in Ethiopia are occasionally used as sleeping quarters among the local communities. Previous entomological data has confirmed high densities of resting *Anopheles* mosquitoes in cowsheds and toilets. Despite having been included in the original targets for Benishangul-Gumuz, structures with walls made up of corrugated iron sheets and made of bamboo/ sticks that had previously been sprayed by the government were not sprayed during the 2017 spray campaign, unless they were appropriately modified, because they were not considered “sprayable” under PMI’s structure definition. Table 16 presents the spray data disaggregated by structure type.

## 8.8 POPULATION PROTECTED

A total of 1,877,154 people were protected through the project in 2017. This population includes 29,271 pregnant women and 269,299 children under five years of age. The vulnerable groups accounted for 15.9% of the total population protected through IRS.

**TABLE 16. SUMMARY OF 2017 SPRAY RESULTS**

Zone	District	Structures Found	Sprayed					Total Population	% Population Protected
			Structures Sprayed	Spray Coverage (%)	Population Protected	Pregnant Women	Children <5		
<b>East Wollega</b>	<b>East Wollega</b>	<b>144,945</b>	<b>144,640</b>	<b>99.79%</b>	<b>321,858</b>	<b>4,524</b>	<b>41,318</b>	<b>322,908</b>	<b>99.67%</b>
	Boneya Boshe	12,177	12,165	99.90%	21,383	221	2,777	21,449	99.69%
	Dega	16,117	16,064	99.67%	40,574	618	6,304	40,704	99.68%
	Gida Ayana	21,866	21,849	99.92%	46,565	922	4,874	46,589	99.95%
	Gobu Sayo	14,991	14,989	99.99%	27,019	210	3,159	27,025	99.98%
	Guto Gida	15,902	15,724	98.88%	42,846	664	5,355	43,556	98.37%
	Limmu	11,453	11,410	99.62%	24,364	368	2,766	24,478	99.53%
	Sasiga*	18,003	18,003	100.00%	46,080	672	6,936	46,080	100.00%
	Wama Hagalo	16,735	16,735	100.00%	38,010	607	5,900	38,010	100.00%
	Wayu Tuka	17,701	17,701	100.00%	35,017	242	3,247	35,017	100.00%
<b>Buno Bedele</b>	<b>Buno Bedele</b>	<b>36,753</b>	<b>36,741</b>	<b>99.97%</b>	<b>87,028</b>	<b>1,901</b>	<b>14,485</b>	<b>87,059</b>	<b>99.96%</b>
	Chewaka*	36,753	36,741	99.97%	87,028	1,901	14,485	87,059	99.96%
<b>West Wollega</b>	<b>West Wollega</b>	<b>143,540</b>	<b>143,124</b>	<b>99.71%</b>	<b>376,056</b>	<b>4,444</b>	<b>47,259</b>	<b>377,319</b>	<b>99.67%</b>
	Babo Gambel	18,257	18,255	99.99%	54,056	358	6,085	54,067	99.98%
	Begi	17,376	17,376	100.00%	49,853	657	8,379	49,853	100.00%
	Guliso	14,302	13,956	97.58%	32,059	224	3,525	33,092	96.88%
	Kiltu Kara	12,816	12,816	100.00%	32,582	104	2,718	32,582	100.00%
	Kondala	21,589	21,589	100.00%	83,912	2,138	15,510	83,912	100.00%
	Manasibu*	41,446	41,439	99.98%	82,452	700	7,920	82,469	99.98%
	Nejo	17,754	17,693	99.66%	41,142	263	3,122	41,344	99.51%
<b>Kellem Wollega</b>	<b>Kellem Wollega</b>	<b>98,533</b>	<b>96,207</b>	<b>97.63%</b>	<b>252,502</b>	<b>5,657</b>	<b>30,330</b>	<b>257,939</b>	<b>97.20%</b>
	Dale Sadi	17,058	17,058	100.00%	34,937	515	4,767	34,937	100.00%

Zone	District	Structures Found	Sprayed					Total Population	% Population Protected
			Structures Sprayed	Spray Coverage (%)	Population Protected	Pregnant Women	Children <5		
	Dale Wabara**	17,551	15,487	88.24%	32,962	264	3,741	37,358	88.2%**
	Hawa Galan*	36,624	36,498	99.66%	122,454	4,349	16,097	123,061	99.51%
	Lalo Kile	11,857	11,721	98.85%	24,807	202	2,074	25,240	98.28%
	Sayo	15,443	15,443	100.00%	37,342	327	3,651	37,342	100.00%
<b>West Shoa</b>	<b>West Shoa</b>	<b>76,277</b>	<b>75,850</b>	<b>99.44%</b>	<b>169,138</b>	<b>1,812</b>	<b>21,850</b>	<b>170,724</b>	<b>99.07%</b>
	Bako Tibe*	18,577	18,577	100.00%	41,520	479	5,235	41,520	100.00%
	Danno	22,204	22,102	99.54%	50,496	469	6,890	50,935	99.14%
	Ilu Gelana	19,323	19,104	98.87%	39,208	395	4,964	39,938	98.17%
	Nonno	16,173	16,067	99.34%	37,914	469	4,761	38,331	98.91%
<b>Horo Gudro Wellega</b>	<b>Horo Guduro</b>	<b>47,742</b>	<b>44,765</b>	<b>93.76%</b>	<b>109,533</b>	<b>1,445</b>	<b>14,605</b>	<b>113,471</b>	<b>96.53%</b>
	Abay Chomen***	12,863	11,464	89.12%	22,917	234	2,469	24,967	91.79%***
	Abe Dengoro	20,973	19,768	94.25%	40,879	474	4,965	41,793	97.81%
	Amuru	8,802	8,526	96.86%	31,483	584	5,204	32,225	97.70%
	Jardega Jarte	5,104	5,007	98.10%	14,254	153	1,967	14,486	98.40%
<b>South West Shoa</b>	<b>South West Shoa</b>	<b>46,959</b>	<b>44,874</b>	<b>95.56%</b>	<b>137,573</b>	<b>1,771</b>	<b>17,387</b>	<b>143,056</b>	<b>96.17%</b>
	Goro	13,234	12,777	96.55%	43,650	564	6,035	45,034	96.93%
	Ilu	21,042	20,214	96.07%	53,607	439	5,819	55,304	96.93%
	Waliso***	12,683	11,883	93.69%	40,316	768	5,533	42,718	94.38***
<b>West Guji</b>	<b>West Guji</b>	<b>30,450</b>	<b>29,731</b>	<b>97.64%</b>	<b>153,427</b>	<b>3,663</b>	<b>35,523</b>	<b>157,354</b>	<b>97.50%</b>
	Abaya	11,872	11,482	96.71%	53,309	1,038	10,502	55,247	96.49%
	Gelana	10,329	10,001	96.82%	58,734	1,645	14,722	60,721	96.73%
	Melka Soda	8,249	8,248	99.99%	41,384	980	10,299	41,386	100.00%
<b>Assosa</b>	<b>Assosa</b>	<b>95,700</b>	<b>95,051</b>	<b>99.32%</b>	<b>190,419</b>	<b>2,613</b>	<b>32,426</b>	<b>191,461</b>	<b>99.46%</b>

Zone	District	Structures Found	Sprayed					Total Population	% Population Protected
			Structures Sprayed	Spray Coverage (%)	Population Protected	Pregnant Women	Children <5		
	Bambasi	20,514	20,140	98.18%	40,049	441	4,721	40,837	98.07%
	Menge	33,650	33,618	99.90%	54,137	1,169	13,257	54,137	100.00%
	Oda	23,102	23,070	99.86%	61,401	506	6,596	61,461	99.90%
	Sherkole	18,434	18,223	98.86%	34,832	497	7,852	35,026	99.45%
Kamashi	Kamashi	28,018	27,827	99.32%	79,620	1,441	14,116	80,135	99.36%
	Agalo Meti	7,583	7,538	99.41%	20,560	345	3,655	20,584	99.88%
	Kamash	5,734	5,700	99.41%	15,454	182	2,127	15,538	99.46%
	Sedal	6,953	6,947	99.91%	20,301	399	3,751	20,304	99.99%
	Yaso	7,748	7,642	98.63%	23,305	515	4,583	23,709	98.30%
Grand Total		748,917	738,810	98.7%	1,877,154	29,271	269,299	1,901,426	98.7%

\*Community-Based districts

\*\* Data was not collected on 2,064 structures in Dale Wabera due to partial village-level refusals. To get a total population estimate, the population protected was divided by the total number of structures sprayed ( $32,962/15,487=2.13$ ) to obtain the average population per structure. This was then multiplied by the 2,064 structures, which gives us an estimated population of 4,397 in the 2,064 structures for which household-level data was not collected, thus making the “total population” approximately 37,358.

\*\*\* The proportion of population protected quite low due to refusals in the district



**TABLE 17. SUMMARY OF STRUCTURES FOUND AND SPRAYED BY TYPE AND COVERAGE**

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
East Wollega	<b>East Wollega</b>	<b>62,413</b>	<b>62,196</b>	<b>99.7%</b>	<b>47,917</b>	<b>47,842</b>	<b>24,383</b>	<b>24,379</b>	<b>5,774</b>	<b>5,774</b>	<b>4,458</b>	<b>4,449</b>	<b>144,945</b>	<b>144,640</b>
	Boneya Boshe	4119	4107	99.7%	3229	3229	4102	4102	488	488	239	239	12177	12165
	Dega	7905	7876	99.6%	6992	6969	1137	1136	34	34	49	49	16117	16064
	Gida Ayana	10626	10621	100.0%	6903	6900	1598	1598	1748	1748	991	982	21866	21849
	Gobu Sayo	4970	4969	100.0%	4513	4512	4872	4872	59	59	577	577	14991	14989
	Guto Gida	7896	7753	98.2%	5260	5227	2104	2102	243	243	399	399	15902	15724
	Limmu	5171	5144	99.5%	4124	4109	871	870	1264	1264	23	23	11453	11410
	Sasiga*	9074	9074	100.0%	5686	5686	1359	1359	1750	1750	134	134	18003	18003
	Wama Hagalo	6269	6269	100.0%	5598	5598	4049	4049	114	114	705	705	16735	16735
	Wayu Tuka	6383	6383	100.0%	5612	5612	4291	4291	74	74	1341	1341	17701	17701
Buno Bedele	<b>Buno Bedele</b>	<b>17,388</b>	<b>17,380</b>	<b>100.0%</b>	<b>9,097</b>	<b>9,095</b>	<b>9,817</b>	<b>9,815</b>	<b>325</b>	<b>325</b>	<b>126</b>	<b>126</b>	<b>36,753</b>	<b>36,741</b>
	Chewaka*	17388	17380	100.0%	9097	9095	9817	9815	325	325	126	126	36753	36741
West Wollega	<b>West Wollega</b>	<b>66,173</b>	<b>65,910</b>	<b>99.6%</b>	<b>43,043</b>	<b>42,940</b>	<b>24,140</b>	<b>24,095</b>	<b>2,402</b>	<b>2,398</b>	<b>7,782</b>	<b>7,781</b>	<b>143,540</b>	<b>143,124</b>
	Babo Gambel	8774	8772	100.0%	5046	5046	1904	1904	310	310	2223	2223	18257	18255
	Begi	8293	8293	100.0%	5532	5532	2273	2273	20	20	1258	1258	17376	17376
	Guliso	6375	6160	96.9%	4381	4294	2890	2846	168	168	488	488	14302	13956
	Kiltu Kara	5957	5957	100.0%	4681	4681	2169	2169	1	1	8	8	12816	12816
	Kondala	14108	14108	100.0%	3681	3681	2161	2161	24	24	1615	1615	21589	21589
	Manasibu*	14941	14938	100.0%	14662	14659	10073	10072	319	319	1451	1451	41446	41439
	Nejo	7725	7682	99.4%	5060	5047	2670	2670	1560	1556	739	738	17754	17693
Kellem Wollega	<b>Kellem Wollega</b>	<b>59,483</b>	<b>58,383</b>	<b>97.2%</b>	<b>20,340</b>	<b>19,694</b>	<b>14,988</b>	<b>14,585</b>	<b>2,302</b>	<b>2,199</b>	<b>1,420</b>	<b>1,346</b>	<b>98,533</b>	<b>96,207</b>
	Dale Sadi	6163	6163	100.0%	5041	5041	5112	5112	705	705	37	37	17058	17058

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
	Dale Wabera**	7691	6783	88.2%	5322	4703	3168	2796	814	711	556	494	17551	15487
	Hawa Galan*	34011	33897	99.7%	1667	1666	919	919	16	16	11	0	36624	36498
	Lalo Kile	4574	4496	98.3%	3200	3174	3645	3614	224	224	214	213	11857	11721
	Sayo	7044	7044	100.0%	5110	5110	2144	2144	543	543	602	602	15443	15443
West Shoa	<b>West Shoa</b>	<b>32,518</b>	<b>32,211</b>	<b>99.1%</b>	<b>23,430</b>	<b>23,346</b>	<b>15,748</b>	<b>15,715</b>	<b>1,435</b>	<b>1,433</b>	<b>3,146</b>	<b>3,145</b>	<b>76,277</b>	<b>75,850</b>
	Bako Tibe*	8394	8394	100.0%	5227	5227	4457	4457	139	139	360	360	18577	18577
	Danno	9423	9333	99.0%	7945	7933	4165	4165	138	138	533	533	22204	22102
	Ilu Gelan	7604	7472	98.3%	5134	5077	5163	5133	416	416	1006	1006	19323	19104
	Nonno	7097	7012	98.8%	5124	5109	1963	1960	742	740	1247	1246	16173	16067
Horo Gudro Wellega	<b>Horo Guduro</b>	<b>25,068</b>	<b>23,655</b>	<b>94.4%</b>	<b>13,063</b>	<b>12,304</b>	<b>3,016</b>	<b>2,761</b>	<b>4,796</b>	<b>4,338</b>	<b>1,799</b>	<b>1,707</b>	<b>47,742</b>	<b>44,765</b>
	Abay Chomen	7631	6742	88.4%	2519	2263	321	301	1943	1759	449	399	12863	11464
	Abe Dengoro	9117	8815	96.7%	6324	5936	1753	1538	2707	2438	1072	1041	20973	19768
	Amuru	5803	5627	97.0%	2394	2314	284	277	54	52	267	256	8802	8526
	Jardega Jarte	2517	2471	98.2%	1826	1791	658	645	92	89	11	11	5104	5007
South West Shoa	<b>SW Shoa</b>	<b>33,788</b>	<b>32,314</b>	<b>95.6%</b>	<b>5,675</b>	<b>5,450</b>	<b>6,936</b>	<b>6,661</b>	<b>72</b>	<b>71</b>	<b>488</b>	<b>378</b>	<b>46,959</b>	<b>44,874</b>
	Goro	11277	10906	96.7%	1108	1085	752	723	15	15	82	48	13234	12777
	Ilu	12715	12235	96.2%	3021	2896	4998	4828	10	9	298	246	21042	20214
	Waliso	9796	9173	93.6%	1546	1469	1186	1110	47	47	108	84	12683	11883
West Guji	<b>West Guji</b>	<b>23,487</b>	<b>22,840</b>	<b>97.2%</b>	<b>4,258</b>	<b>4,213</b>	<b>1,569</b>	<b>1,561</b>	<b>959</b>	<b>943</b>	<b>177</b>	<b>174</b>	<b>30,450</b>	<b>29,731</b>
	Abaya	8927	8593	96.3%	1797	1765	480	473	561	545	107	106	11872	11482
	Gelana	8253	7941	96.2%	1083	1070	778	777	155	155	60	58	10329	10001
	Melka Soda	6307	6306	100.0%	1378	1378	311	311	243	243	10	10	8249	8248
Assosa	<b>Assosa</b>	<b>42,623</b>	<b>42,285</b>	<b>99.2%</b>	<b>22,510</b>	<b>22,330</b>	<b>3,371</b>	<b>3,359</b>	<b>17,735</b>	<b>17,703</b>	<b>9,461</b>	<b>9,374</b>	<b>95,700</b>	<b>95,051</b>

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
	Bambasi	9038	8849	97.5%	5793	5674	1250	1238	3450	3429	983	950	20514	20140
	Menge	12969	12951	99.8%	8259	8253	1376	1376	5785	5785	5261	5253	33650	33618
	Oda	10691	10669	99.8%	3921	3915	641	641	5076	5073	2773	2772	23102	23070
	Sherkole	9925	9816	98.9%	4537	4488	104	104	3424	3416	444	399	18434	18223
Kamashi	Kamashi	17,306	17,180	99.3%	6,355	6,308	1,281	1,275	2,782	2,771	294	293	28,018	27,827
	Agalo Meti	4695	4690	99.9%	1668	1637	135	132	1050	1044	35	35	7583	7538
	Kamashi	3378	3356	99.3%	1476	1468	350	349	510	507	20	20	5734	5700
	Sedal	3986	3985	100.0%	1753	1750	363	362	621	620	30	230	6953	6947
	Yaso	5247	5149	98.1%	1458	1453	433	432	601	600	9	8	7748	7642
Grand Total		380,247	374,354	98.5	195,688	193,522	105,249	104,206	38,582	37,955	29,151	28,773	748,917	738,810

\*Community-Based IRS districts

\*\* Data by structure type for 2,064 structures in Dale Wabera were not collected. To get estimates for those 2,064 structures, we compared the totals from each structure type to the total data and used this to get average proportions. The average distribution of structure types was applied to the 2,064 structures.



## 8.9 AVAILABILITY AND USE OF MOSQUITO NETS

Across the 44 districts, households reported having a total of 375,258 mosquito nets at the time the SOP visited during the 2017 spray campaign. Some 16,883 (57.7%) of 29,271 pregnant women were reported as having slept under a mosquito net the night prior to the SOP's visit (Table 18). Additionally, 156,011 (57.9%) of 269,299 children under five years of age were reported as having slept under a mosquito net the previous night (Table 18). The overall proportion of both pregnant women and children <5 reported to have slept under a mosquito net the night preceding the SOP's visit was 57.9%.

**TABLE 18. NUMBER AND USE OF MOSQUITO NETS**

Zone	District	Total # of Mosquito Nets Found (Av # nets/ Sleeping structure)	# of Pregnant Women Sleeping Under Mosquito Nets (% Pregnant women sleeping under net)	# of Children <5 Sleeping Under Mosquito Nets (% < 5 sleeping under net)
East Wollega	<b>East Wollega</b>	<b>62,759 (1.00)</b>	<b>2,825 (62.28)</b>	<b>26,938 (65.01)</b>
	Boneya Boshe	5,530 (1.34)	162 (72.32)	2,137 (76.87)
	Dega	7,993 (1.01)	400 (64.62)	4,406 (69.66)
	Gida Ayana	8,507 (0.80)	625 (67.79)	3,067 (62.90)
	Gobu Sayo	3,298 (0.66)	110 (52.38)	1,913 (60.54)
	Guto Gida	7,726 (1.00)	452 (67.46)	3,981 (73.10)
	Limmu	1,976 (0.38)	43 (11.62)	492 (17.77)
	Sasiga*	9,395 (1.03)	368 (54.76)	3,919 (56.50)
	Wama Hagalo	14,758 (2.35)	597 (98.35)	5,827 (98.76)
	Wayu Tuka	3,576 (0.56)	68 (28.10)	1,196 (36.83)
Buno Bedele	<b>Buno Bedele</b>	<b>8,699 (0.50)</b>	<b>1,056 (55.32)</b>	<b>7,313 (50.47)</b>
	Chewaka*	8,699 (0.50)	1,056 (55.32)	7,313 (50.47)
West Wollega	<b>West Wollega</b>	<b>88,098 (1.34)</b>	<b>2,528 (56.80)</b>	<b>32,423 (68.46)</b>
	Babo Gambel	13,733 (1.57)	253 (70.67)	4,535 (74.53)
	Begi	14,199 (1.71)	652 (99.24)	8,365 (99.83)
	Guliso	13,116 (2.13)	176 (77.19)	2,844 (79.07)
	Kiltu Kara	11,287 (1.89)	88 (84.62)	2,572 (94.63)
	Kondala	5,038 (0.36)	639 (29.89)	4,671 (30.12)
	Manasibu*	20,065 (1.34)	513 (73.18)	6,762 (85.32)
	Nejo	10,660 (1.39)	207 (78.11)	2,674 (85.02)
Kellem Wollega	<b>Kellem Wollega</b>	<b>53,474 (0.92)</b>	<b>4,380 (77.28)</b>	<b>20,882 (68.62)</b>
	Dale Sadi	8,294 (91.35)	468 (90.87)	4,160 (87.27)
	Dale Wabara**	2,132 (0.31)	66 (25.00)	729 (19.49)
	Hawa Galan*	37,693 (1.11)	3,621 (83.09)	13,615 (84.19)
	Lalo Kile	4,941 (1.09)	200 (98.04)	2,058 (97.95)
	Sayo	414 (0.06)	25 (7.65)	320 (8.76)
West Shoa	<b>West Shoa</b>	<b>42,671 (1.33)</b>	<b>1,354 (74.23)</b>	<b>17,625 (80.20)</b>
	Bako Tibe*	11,702 (1.39)	287 (59.92)	3,548 (67.77)
	Danno	10,601 (1.14)	393 (83.09)	5,591 (80.86)

Zone	District	Total # of Mosquito Nets Found (Av # nets/ Sleeping structure)	# of Pregnant Women Sleeping Under Mosquito Nets (% Pregnant women sleeping under net)	# of Children <5 Sleeping Under Mosquito Nets (% < 5 sleeping under net)
	Ilu Gelana	11,580 (1.55)	328 (82.21)	4,540 (90.28)
	Nonno	8,788 (1.25)	346 (73.15)	3,946 (82.24)
Horo Guduro	<b>Horo Guduro</b>	<b>11,399 (0.48)</b>	<b>395 (26.26)</b>	<b>3,999 (26.67)</b>
	Abay Chomen	1,865 (0.28)	51 (20.00)	508 (19.10)
	Abe Dengoro	5,098 (0.58)	212 (44.26)	2,260 (44.88)
	Amuru	1,246 (0.22)	74 (12.29)	566 (10.69)
	Jardega Jarte	3,190 (1.29)	58 (34.52)	665 (33.17)
	<b>South West Shoa</b>	<b>25,687 (0.79)</b>	<b>1,046 (57.06)</b>	<b>8,672 (48.36)</b>
South West Shoa	Goro	7,394 (0.68)	310 (52.09)	3,009 (48.29)
	Ilu	6,867 (0.56)	102 (22.82)	1,299 (21.83)
	Waliso	11,426 (1.25)	634 (79.25)	4,364 (75.88)
	<b>West Guji</b>	<b>7,638 (0.34)</b>	<b>799 (21.42)</b>	<b>5,644 (15.53)</b>
West Guji	Abaya	3,048 (0.36)	216 (20.28)	1,435 (13.25)
	Gelana	963 (0.12)	97 (5.76)	481 (3.16)
	Melka Soda	3,627 (0.58)	486 (49.59)	3,728 (36.20)
	<b>Assosa</b>	<b>62,348 (1.48)</b>	<b>1,825 (69.34)</b>	<b>25,654 (78.59)</b>
Assosa	Bambasi	13,874 (1.58)	296 (65.78)	3,876 (80.03)
	Menge	23,155 (1.79)	1,005 (85.60)	12,500 (93.89)
	Oda	8,532 (0.79)	213 (42.09)	3,164 (47.92)
	Sherkole	16,787 (1.71)	311 (61.95)	6,114 (77.56)
	<b>Kamashi</b>	<b>12,485 (0.73)</b>	<b>675 (46.49)</b>	<b>6,861 (48.29)</b>
Kamashi	Agelo Meti	1,294 (0.28)	49 (14.20)	579 (15.82)
	Kamashi	1,002 (0.29)	34 (15.58)	530 (24.81)
	Sedal	6,408 (1.60)	314 (78.70)	3,059 (81.55)
	Yaso	3,781 (0.73)	278 (52.95)	2,693 (57.75)
	<b>Grand Total</b>	<b>375,258 (1.00)</b>	<b>16,883 (57.84)</b>	<b>156,011 (57.88)</b>

\*Community-Based districts

\*\*Data on mosquito nets in Dale Wabera was not collected for 2,064 structures due to neighborhood-level refusals

## 8.9.1 INSECTICIDE CONSUMPTION AND SOP PERFORMANCE INDICATORS

During the 2017 spray campaign the project used Actellic 300 CS (pirimiphos methyl, an organophosphate) in all 44 districts. For all 18 new districts (Bambasi, Menge, Oda, Agalo Meti, Sherkole, Kamash, Sedal, Yaso, Goro, Ilu, Woliso, Abaya, Gelana, Melka Soda, Amuru, Abay Chomen, Abe Dongoro and Jardega Jarte) the insecticide was being used for the first time. A total of 250,918 bottles of insecticide were consumed leaving a balance of 70,985 bottles. The expiry date of the remaining insecticide stock is March 2019 and AIRS Ethiopia will ensure that they will be fully utilized during the 2018 spray round.

On average SOPs sprayed 16.9 unit structures per day and 2.9 unit structures with one bottle of insecticide. The consumption rate was, however, variable between districts from 2.3 to 10 structures per bottle. Due to the small sizes of structures in the 4 target districts in Assosa zone, the consumption rate was comparatively higher than other zones. The average 2.6 structures per insecticide bottle consumption rate

from 2016 remains the same in 2017 on average consumption among the 26 old districts but was considerably higher (up to 7) in the new PMI-supported districts. All empty bottles in our possession were transported from the districts to Addis Ababa for recycling. Table 19 provides detailed insecticide usage and SOP performance per district.

**TABLE 19. INSECTICIDE USE AND SPRAY OPERATOR PERFORMANCE**

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
East Wollega	<b>East Wollega</b>	16.6	55,017	6.3	2.6
	Boneya Boshe	17.5	4,767	6.8	2.6
	Dega	16.2	6,001	6.1	2.7
	Gida Ayana	15.9	7,857	5.7	2.8
	Gobu Sayo	16.7	5,885	6.5	2.5
	Guto Gida	18.9	5,976	7.2	2.6
	Limmu	16.1	4,574	6.5	2.5
	Sasiga	17.5	6,584	6.4	2.7
	Wama Hagalo	15.4	6,630	6.1	2.5
	Wayu Tuka	16.5	6,743	6.3	2.6
Buno Bedele	<b>Buno Bedele</b>	17.6	13,831	6.6	2.7
	Chewaka	17.6	13,831	6.6	2.7
West Wollega	<b>West Wollega</b>	17.1	50,366	6.0	2.8
	Babo Gambel	17.1	5,773	5.4	3.2
	Begi	16.7	5,962	5.7	2.9
	Guliso	16.5	4,901	5.8	2.8
	Kiltu Kara	18.7	5,004	7.3	2.6
	Kondala	17.4	7,676	6.2	2.8
	Manasibu	17.7	14,926	6.4	2.8
	Nejo	15.6	6,124	5.4	2.9
Kellem Wollega	<b>Kellem Wollega</b>	17.1	37,715	6.7	2.6
	Dale Sadi	18.4	6,533	7.1	2.6
	Dale Wabara	14.9	6,446	6.2	2.4
	Hawa Galan	18.6	14,085	7.2	2.6
	Lalo Kile	15.7	4,626	6.2	2.5
	Sayo	16.4	6,025	6.4	2.6
West Shoa	<b>West Shoa</b>	16.0	30,360	6.4	2.5
	Bako Tibe	16.6	7,709	6.9	2.4
	Danno	16.0	8,719	6.3	2.5
	Ilu Gelana	14.7	7,756	6.0	2.5

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
	Nonno	17.3	6,176	6.6	2.6
Horo Guduro	<b>Horo Guduro *</b>	<b>14.2</b>	<b>14,734</b>	<b>4.7</b>	<b>3.0</b>
	Abay Chomen	12.8	3,208	3.6	3.6
	Abe Dengoro	15.1	7,054	5.4	2.8
	Amuru	13.1	3,141	4.8	2.7
	Jardega Jarte	17.1	1,331	4.5	3.8
South West Shoa	<b>South West Shoa*</b>	13.8	17,402	5.4	2.6
	Goro	14.0	4,377	4.8	2.9
	Ilu	14.7	8,708	6.3	2.3
	Waliso	12.4	4,317	4.5	2.8
West Guji	<b>West Guji*</b>	11.9	11,187	4.5	2.7
	Abaya	11.0	3,825	3.6	3.0
	Gelana	11.0	3,827	4.2	2.6
	Melka Soda	15.0	3,535	6.4	2.3
Assosa	<b>Assosa*</b>	26.9	13,296	3.8	7.1
	Bambasi	18.6	3,086	2.9	6.5
	Menge	42.1	4,638	5.8	7.2
	Oda	21.0	3,746	3.4	6.2
	Sherkole	33.3	1,826	3.3	10.0
Kamashi	<b>Kamashi*</b>	16.2	7,010	4.1	4.0
	Agelo Meti	16.8	2,015	4.5	3.7
	Kamashi	15.1	1,565	4.2	3.6
	Sedal	16.2	1,726	4.0	4.0
	Yaso	16.4	1,704	3.7	4.5
<b>Grand Total</b>		<b>16.9</b>	<b>250,918</b>	<b>5.7</b>	<b>2.9</b>

\*New PMI-Supported zones



## 9. CAPACITY BUILDING AND SUPPORT TO FMOH

### 9.1 FMOH CAPACITY BUILDING

In 2017, the PMI AIRS Ethiopia project continued capacity building initiatives aimed at enhancing competency of MOH staff in effective implementation of IRS in the country with adherence to EC procedures. A number of training initiatives have been conducted in entomological monitoring, EC and IRS planning and implementation.

Entomology training on new WHO tube test guidelines was conducted at the Malaria Control Training Center, Adama Town from June 5-9, 2017, with participants drawn from six universities, EPHI and FMOH (Figure 6). The AIRS project provides support to six universities (Arba Minch, Mekele, Gonder, Haromaya, Jigjiga and Jimma). A total of 15 entomologists attended.

AIRS Ethiopia has continued to provide support to Jimma University in the form of consumables and equipment to enhance their capacity for conducting laboratory molecular assays.

Spray operations training conducted by AIRS Ethiopia as part of TOT in 2017 enhanced the capacity of 281 FMOH staff in IRS planning and implementation. The trained personnel in turn facilitated the training of SOPs and other actors at the district level. Besides, AIRS Ethiopia conducted Training of master trainers to enhance the TOT trainer's competency in IRS planning and implementation as well as facilitation skills. In order to enhance spray quality, all AIRS training initiatives paid special attention to spray techniques and supervision.

**FIGURE 6. ENTOMOLOGY TRAINING ON WHO SUSCEPTIBILITY TESTING IN ADAMA IN 2017**



# 10. CHALLENGES, LESSONS LEARNED AND RECOMMENDATIONS

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## 10.1 CHALLENGES

The main challenges experienced during the IRS campaign included:

- Refusals by households to spray their structures due to strong and long-lasting odor of Actellic and competing farming activities that took them away from home.
- Delays in delivery of hired IRS operation vehicles leading to low performance and disruption of the spray calendars.
- Overestimation of target structures in most new districts gave the appearance that the team's progress was low, when in reality it was not. The overestimation also resulted in a large amount of insecticide that was left over at the end of the spray campaign.
- Population movement in pastoral communities in West Guji zone leading to unavailability of structures for spraying due to extended absence of household owners.
- Insecurity during the first week of IRS in Gelena district, West Guji zone, forced the team to adapt the spray calendar.
- The sheer number of districts (44 districts with 18 new ones) in a large geographical area stretching over 1000 km between the south (West Guji) and the northwest (Benishangul-Gumuz) posed a challenge that required an upfront and coordinated approach to planning on logistics, supervision for the achievements accomplished.
- Inability of vendors to provide IRS vehicles on time leading to delay in IRS start up in some districts.
- Lack of commitment of some district government staff and competing MOH activities in new districts and some old districts leading to limited supervision of spray actors.
- Gaps in mobilization occasioned by absence of HEWs in some villages due to competing activities.
- Attempts of insecticide theft by spray actors in some districts.
- Flooding of soak pits in two districts of South west Showa (Ilu and Goro) due to high water table.
- Network connectivity and electric power was intermittent in several districts leading to delays in data entry and reporting of the M&E system and the PMT.
- Inaccessibility of target sites and poor roads led to reduced spray performance in some districts.
- Frequent blocking of CFVs that reduced the performance of SOPs.
- Gaps in store management in some districts due to low quality of hired government staff as storekeepers and competing activities from their normal duties leading to limited attention to the assigned IRS roles.

## 10.2 LESSONS LEARNED AND RECOMMENDATIONS

- Comprehensive planning and validation of IRS baseline data provided by government in new districts is critical in setting accurate spray targets and quantification.
- Continued practical training of IRS supervisors, TOTs and SOPs involved in IRS implementation with focus on spray techniques has continued to improve spray quality as well as data quality.

- Supervision of IRS is important in achieving spray quality and recruitment and subsequent training of IRS zonal coordinators as master trainers helped in enhancing practical training on spray techniques due to low trainer to trainee ratio (1: 6).
- SLs are key to IRS success and training of these key actors should be handled by AIRS staff in collaboration with the TOTs to ensure communication of uniform training messages and enhancing their data management skills.
- Involvement of FMOH staff that serve as supervisors on IRS by the District Health Office should take their availability and commitment to the activity into consideration and hence recruitment of IRS supervisors from lower levels of the district's health management structure (e.g. health centers) should be considered to minimize absenteeism.
- District IRS management teams should adhere to approved recruitment guidelines to ensure appropriate personnel are engaged for IRS.
- Mobilization is critical for successful IRS operations and efforts should be taken to enhance the supervision of community mobilizers (HEWs) to ensure better community acceptance and participation in IRS.
- Conduct advocacy and sensitization meetings in new districts by involving district/ zonal political and administration bodies for overall program support.

# ANNEX A: 2017 IRS PROCUREMENT

**TABLE A-I. PPE AND OTHER SUPPLIES PROCURED**

Items	Unit of Measurement	44 Districts (39 DB IRS & 5 CB IRS)	34 Graduated Districts	Non-PMI Districts	Total
International Procurement					
Actellic 300CS (833ml Bottles)	Bottles	305,916			305,916
Ceramic Nozzle Tips (8002E)	Each	4352	2000	1,500	7852
Gaskets for CFV	Each	2852			2852
Control Flow valves ( CFV)	Each	2822			2822
Rubber Gloves - short (pair)	Pair	3000	3000	2500	750
Rubber Gloves – medium (pair)	pair	4300	1800	1500	7500
Rubber Gloves – large (pair)	Pair	2237	1200	1000	4437
Mouth/nose masks (pieces)	Each	18,778			18,778
Spray pumps	Each	718	0	0	718
Helmets	Each	2637	500	500	3637
Face sheilds	Each	1985	1000	1000	3985
	Local Procurement				
Cover all	Pcs	5728	1000		6728
Canvas tent	Pcs	133			133
Neck protection	Pcs	1622			1622
Torch AA size	Pcs	392			392
Torch A size	Pcs	392			392
Spray Operator bag	Pcs	764			764
Duffle bag	Pcs	205			205
Tool kit	Pcs	172			172
Generator	Pcs	6			6
Warning sign- (Stores & Soak pits)	Pcs	128			128
Graduated Cylinder – 1000ml	Pcs	174			174
Calculator	Pcs	33			33
Reflective jacket	Pcs	183			183
Towel (30cmx30cm)	Pcs	1844			1844
Laptops, HP Pro 450 Core i3	Pcs	10			10
UPS, 5000VA with Installation	Pcs	1			1
Mattress foam standard size	pcs	1116			1116
Barrel 220 liters	Pcs	239			239
Fire extinguisher 6Kg powder	Pcs	18			18
Fire extinguisher 3kg	Pcs	36			36
Water tank 2000lt, Fiber glass	Pcs	55			55
First Aid kit	box	55			55

# ANNEX B: INSPECTION REPORTS AND SUPERVISION RESULTS

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## 2017 MID- AND POST-SPRAY INSPECTION REPORTS

### INTRODUCTION

The IRS Ethiopia project conducted 2017 spray operations from June 12<sup>th</sup> to July 18<sup>th</sup> in all 44 PMI-supported districts. The project used two models of IRS to deliver the service to the 36 project districts: district-based IRS (DB IRS – 39 districts) and community-based IRS (CB IRS – 5 districts) delivered through the national health extension program.

The entire AIRS Ethiopia technical team, including Operations Managers, M&E Manager, M&E coordinator and IRS Zonal Coordinators, was involved in EC inspections for the duration of IRS. The team members were divided in clusters of 3-5 districts to conduct supervision and pre-, mid-, and post-spray inspections of the spray campaign to all districts. In addition, AIRS supervisors were tasked with strengthening the quality of the operation through intensive supervision.

During the supervision and environmental inspection visits, the team used project-wide AIRS checklists to observe soak pits, bathrooms, insecticide storage conditions, community involvement, house preparation, IEC, and performance of SOPs. District and Zonal MFPs were actively involved as supervisors using checklists installed on smart phones. At the end of each inspection, district supervisory team held a general discussion on the status, achievements, shortcomings, and constraints and then forwarded the recommendations to district offices for corrective actions to be taken.

### GENERAL OBSERVATIONS

In 2017, all the soak pits in DB IRS districts and CB IRS districts were inspected by district MFPs and AIRS supervisors prior to the start of spray operations. The EC gaps identified during the inspections were shared and discussed with all stakeholders during the TOT and roles on implementing corrective measures were shared and addressed accordingly. All project-supported districts have stores in which to keep insecticides and other IRS materials. Due to limited space in some stores to accommodate insecticide amounts received, the district provided an alternative space. Insecticide-contaminated wastes such as empty bottles, used masks, torn gloves, and contaminated cartons have been collected and stored at the district stores before shipping to Addis Ababa for subsequent disposal. Empty bottles and cartons will be provided to the recyclers as per signed MOUs for recycling. Incineration of the used masks will proceed at the projects incinerators after the proposed second smoke testing by Addis Ababa University confirms that it is safe to use the facility for the incineration.

### MID-INSPECTION OBSERVATIONS

Although there was a challenge of getting timely supervision reports because of the limited connectivity, most districts properly followed procedures established for tracking the insecticide usage. The storekeepers numbered/serialized all the bottles and distributed them to each spray team by serial number.

- Most of the districts had proper working soak pits and cleaning procedures were followed correctly. MSPs were used in some sites as an alternative where there was likelihood of soak pit flooding due to high water table.

- Insecticide and other IRS materials were properly kept in separate double lockable store rooms to prevent insecticide contamination.
- The majority of home owners removed their belongings, including food items from the houses prior to spraying. In a few cases where this was not done, SOPs and SLs provided support.
- AIRS project provided all districts with plastic sheets to cover household items that were kept inside during spraying.

**FIGURE B-1. END OF DAY CLEAN UP ACTIVITY IN NEDJO DISTRICT 2017**



## POST-SPRAY ACTIVITIES AND INSPECTIONS

Collection of contaminated IRS wastes (empty bottles, cartons and used masks) from districts collected to the central warehouse in Addis Ababa is ongoing.

- PPE, including coveralls, were properly washed and stored in the district stores.
- Spray pumps were cleaned and stored.
- All unused insecticide is stored safely in the district stores for onward transfer to Addis Ababa central warehouse.
- Soak pits are cleaned, covered and locked.



- Polyethylene sheets used as ground cover on soak pit sites were washed and stored in district stores.
- Plastic sheets were properly collected from SOPs, washed and stored properly.

### **Recommendations**

Availability of appropriate storage space was a challenge at most health posts in CB IRS districts and security at the facilities remains a concern. Due to lack of space IRS supplies are usually stored in poor conditions and occasionally in rooms with medical supplies. In other instances, medical personnel are forced to attend to patients in open spaces including corridors while they give away their patient rooms for temporary storage of IRS materials. The district health management team in CB IRS districts should explore availability of alternative and appropriate storage space including use of any available space at health centers.

**TABLE B-I. ENVIRONMENTAL MITIGATION AND MONITORING REPORT**

<b>Mitigation Measure</b>	<b>Status of Mitigation Measures</b>	<b>Outstanding issues relating to required conditions</b>	<b>Remarks</b>
<b>Ia. Pre-contract inspection and certification of vehicles used for pesticide or spray team transport</b>	A total of about <b>141</b> transport vehicles were inspected and approved for use following the screening done from June 5 to 12 2017. Two types of vehicles were hired for the operation: long-base vehicles and mini trucks.	The limitation noticed was the weak reinforcement of seats on the trucks	All vehicles that fulfilled the required criteria were provided with a certificate that showed they met the criteria for the IRS campaign.
<b>Ib. Driver training</b>	All hired drivers were provided with an orientation, which described the nature of the work that 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.	The most common reason for drivers to not pass the pre-contract inspection were the inability show that they had a spill kit and first aid kit.  Therefore, preparation of the two items from the project side could help solve this problem in the future.	To ensure the understanding of and better preparation of the drivers, AIRS Ethiopia is planning to prepare a short video clip of the training for the upcoming operations.
<b>Ic. Cell phone, personal protective equipment (PPE) and spill kits on board during pesticide transportation.</b>	The drivers shared their phone numbers during the screening period. They were provided with basic PPE including respiratory masks, boots and overalls at the target districts.	Following an accident encountered by one hired truck while transporting insecticide to the districts, the project ensured that danger signs were placed visibly on the trucks to warn other drivers.	Availability of spill kits was confirmed during certification from the center for the mini trucks and other vehicles that work at the districts. Provision of spill kit for trucks will be made mandatory in coming spray rounds.

<b>Mitigation Measure</b>	<b>Status of Mitigation Measures</b>	<b>Outstanding issues relating to required conditions</b>	<b>Remarks</b>
<b>Id. Initial and 30-day pregnancy testing for female candidates for jobs with potential pesticide contact.</b>	All prospective female actors took two pregnancy tests, one prior to the start of IRS and one after 30 days. One female candidate tested positive during the 2 <sup>nd</sup> round	All districts provided the test kits.	As the spray campaign lasted more than 30 days, second round pregnancy tests were administered.
<b>Ie. Health fitness testing for all operators</b>	In 2017 AIRS Ethiopia conducted a health fitness test for all spray actors. The screening was done by clinicians that attended poison management training on IRS.	Based on the screening test results, 25 people were found to be unfit for the operation (8 due to chronic medical conditions and 17 due to physical fitness). The individuals found to be unfit did not participate in the operation.	TLs were conducting daily health check screening for members of their squad.
<b>If. Procurement of, distribution to, and training on the use of PPE for all workers with potential pesticide contact.</b>	Use of PPE was incorporated in to all trainings provided in 2017. SOPs were provided with PPE and a pair of neck protection. There were 43 out of 706 Homeowner Preparation supervisory reports indicating SOPs without full PPE.		PPE rehearsal and corrections were done on the spot; but appropriate boot and coverall size is still an issue to be addressed.
<b>Ig. Training on mixing pesticides and the proper use and maintenance of spray pumps.</b>	Training on mixing of insecticide (Actellic 300CS) was done at TOT and during cascade training and no mistake in mixing which could compromise the quality of spray. There were only 3 reports of errors out of 706 observations reported through the Homeowner Preparation form during the spray campaign.		In addition to practical training there were frequent and direct observation of SOPs performance.
<b>Ih. Provision of adequate facilities and supplies for end-of-day cleanup.</b>	In addition to the fixed soak pits in 82 district-based operational sites and 98 CB-based sites, 14 MSPs were used in the 2017 operation. During the IRS implementation 14 MSPs were deployed; 1 MSP was deployed in each of 8 sites that were hard to reach and 2 MSPs were deployed in each of another 3 sites to mitigate the challenge encountered because of the shallow water table.		
<b>Ii. Enforce spray and cleanup procedures.</b>	For the 2017 spray season, purging of the hose, lance, CFV, and nozzle with each rinse was incorporated in the progressive rinsing procedure This rinsing procedure was demonstrated at all levels of training and was practiced during the spray campaign.	The challenge after this change was compliance by the spray actors, since the new rinsing procedure is time-consuming and tiresome.	



Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
<b>2a. IEC campaigns to inform homeowners of responsibilities and precautions.</b>	Community mobilizers were deployed and oriented by the project one week before the operation to convey clear information to the households. Out of the 667 smartphone inspections, 39 households responded that they were not notified of the actual date of the spraying.		Engaging mobilizers and community leaders in the operation has contributed to better participation of the community.
<b>2b. Prohibition of spraying houses that are not properly prepared.</b>	SOPs and SLs were trained on how to prepare structures before spraying was done. Out of 706 inspections captured by the smart phone, 2 were non-compliant with the procedure. i.e. On the home owner preparation there were 2 attempts made to spray before the item removal for the house		In all non-compliant cases, actions were taken to address the situation including covering immovable materials with plastic sheets.
<b>2c. Two-hour exclusion from house after spraying</b>	Of the 706 homeowner inspections done on household preparation, no SOP forgot to remind the households to stay outside for two hours and allow circulation of air for at least 30 minutes before re-entering the house.		The key messages were adequately communicated.
<b>2d. Instruct homeowners to wash itchy skin and go to health clinic if symptoms do not subside.</b>	Most of homeowners were instructed to wash with plenty of water and soap if any household member experienced itching skin, and to visit the nearest clinic if itching persisted. Of 706 homeowners visited, only 22 were not informed on this key message		
<b>3a. Indoor spraying only.</b>	SOPs sprayed the indoor walls of living structures. This included inner walls, ceiling, and eaves of all sleeping rooms, kitchens, toilets and animal sheds. Of 706 SOPs observed by direct supervision, 11 were found spraying non-eligible structures.		Since spraying non eligible structures has significant EC impact, it was corrected on the spot.
<b>3b. Training on proper spray technique</b>	Training on proper spray techniques was more practical and every SOP was evaluated with a competency check and recruited. Out of 706 SOP performance observations, 45 SOPs sprayed without maintaining correct distance speed and rhythm.	Intensive training and every morning rehearsals should continue to keep the quality of spraying high.	Based on last years' experience, intensive training focused on practical sessions and supported by direct supervision led to improved quality of spraying.

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
<b>3c. Maintenance of pumps</b>	Besides the dedicated pump technicians, SOPs, Supervisors, and TLs were trained on pump maintenance. Pumps were checked daily before use. The parts of pumps that were found to be faulty were replaced. Of 706 total SOP performance inspections done using the smartphone, 61 inspections showed that there were pump leakages.		Immediate maintenance of the pumps was done.
<b>4a. Choose sites for disposal of liquid wastes, including mobile soak pit sites, according to PMI BMPs.</b>	Though the sites selected for soak pit construction met the BMP requirement, new constructions of housing/ offices are unacceptably approaching the soak pit sites after the installation.	Demarcation of buffer zone should be considered for the newly constructed soak pits.	All stakeholders are informed of the situation so as to seek corrective measures.
<b>4b. Construct fixed and mobile soak pits with charcoal to adsorb pesticide from rinse water.</b>	All soak pits were constructed with five layers including sawdust, charcoal, bigger stones, smaller stones, and gravel as the top layer. They were sloped towards the bio bed.	The use of MSPs in difficult conditions should continue to address compliance in these situations.	Fixed soak pits were lined with a plastic sheet on the sides to prevent effluent leakage through the sides before going through the filtration layers.  Due to some challenges in a few sites, MSPs were used as a mitigation method of the problem.
<b>4c. Maintain soak pits as necessary during season.</b>	Soak pit maintenance is done on an annual basis.	Durable fencing material, like wire mesh, would help to reduce frequent maintenance work on the soak pit and temporary showers.	
<b>4d. Inspection and certification of solid waste disposal sites before spray campaign.</b>	Solid contaminated wastes generated in the operation, including empty bottles, cartons and used masks are being collected from the district stores to the central warehouse. Recyclers of the bottles and the cartons are identified.	Although most of the comments raised on the incineration of the used masks were well addressed, establishing the conditions that keep the smoke emission within the recommended range is ongoing.	The task will be accomplished in collaboration with Addis Ababa university.
<b>4e. Monitoring waste storage and management during campaign.</b>	Close 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, hand gloves, and all other wastes.	No outstanding issue except the ongoing facilitation of the used mask incineration conditions	

<b>Mitigation Measure</b>	<b>Status of Mitigation Measures</b>	<b>Outstanding issues relating to required conditions</b>	<b>Remarks</b>
<b>4f. Monitoring disposal procedures post-campaign.</b>	The AIRS Ethiopia ECO is monitoring the post-spray campaign solid waste collection	As of now, the wastes are being collected from the districts	
<b>5a. Maintain records of all pesticide receipts, issuance, and return of empty sachets/bottles.</b>	Records of all pesticide receipts, issuance, and returned empties are being kept on stock cards with a backup in a ledger.		
<b>5b. Reconciliation of number of houses sprayed vs. number of sachets/bottles used.</b>	AIRS and temporary supervisors conducted regular insecticide reconciliation to avert misuse. Only one empty bottle is reported as missed from districts.		
<b>5c. Visual examination of houses sprayed to confirm pesticide application.</b>	Direct observation ensured that the spraying quality conducted this year is of good quality.	Unlike the previous years, refusal because of the strong smelling and the accumulated insecticide as a white scale was noted.	
<b>5d. Perform physical inventory counts during the spray season.</b>	206 store checks were conducted during the spray campaign. In addition to the MOH supervisors, AIRS supervisors and cluster coordinators conducted the inspection frequently to ensure proper recording/ tracking of material movement. Closeout inventory was conducted in July 2017 and comprehensive inventory is going to happen in the second week of Sep 2017.		

**TABLE B-2. MEDICAL SCREENING CHECKLIST AND REPORTING TEMPLATE**

Date \_\_\_\_\_

**I. Basic Information**

- Name of the client \_\_\_\_\_ - Age \_\_\_\_\_
- Sex/Gender \_\_\_\_\_
- Height (m) \_\_\_\_\_ Weight (kg) \_\_\_\_\_

Position	SOP	Porter	SL	TL	DHead	DMFP	ZMFP	EC	IEC	AIRS staff

<b>II. Vital signs</b>			
		Within the Acceptable Range	
	Yes	No	Remark
- Body temperature			
- Pulse rate			
- Respiratory rate			
- Blood Pressure			
		Capable to Carry on the Challenge of IRS Operation	
<b>III. Physical Examination</b>		Yes	No
- Musculo-skeletal system			
- Vision acuity			
- Auditory acuity			
- Speech acuity			
- General Physical Fitness			
<b>IV. Laboratory Investigation (for females )</b>		Pregnancy status	
	+ve	-ve	Remark
- Hcg test result			
<b>V. History of chronic or acute illness</b>		yes	No
- Asthma			
- Other Pulmonary (lung) disease			
- Recognized allergy for pesticides			

**VI. Conclusion**

- Can the individual work in condition where there is a potential exposure to insecticide?
  - o Yes \_\_\_\_\_  
Comment \_\_\_\_\_
  - o No \_\_\_\_\_  
Comment \_\_\_\_\_

**VII.** Name of the examiner \_\_\_\_\_ Signature \_\_\_\_\_  
date \_\_\_\_\_

Stamp of the health facility

# ANNEX C: REPORT ON 2017 POST-IRS EVALUATION MEETING

The project organized a post-spray meeting to evaluate the implementation of the 2017 IRS campaign and document lessons learned from the process. The meeting was held in Adama on August 8- 9, 2017 for 36 Oromia project districts and in Nekemte on August 12, 2017 for 8 districts in Benishangul-Gumuz region. The participants were MFPs and district health office vice heads from the 41 project districts, zonal MFPs; zonal health office heads or vice heads from the eight project zonal health offices, representatives from the ORHB and BGRHB, and AIRS Ethiopia office staff. However 3 project districts (Jardage Jarte, Yaso and Sedal and West Guji zonal health office) were not represented in this meeting due to competing activities. A total of 115 participants attended the evaluation meeting at both locations.

**TABLE C-1: 2017 POST-IRS EVALUATION MEETING PARTICIPANTS**

Areas	Professional category	Sex			Remarks
		M	F	Total	
Project districts	Malaria Focal Person	36	4	40	4 absent
	Health office head/deputy	38	2	40	4 absent
Project zones	Malaria Focal Person	8	0	8	2 absent
	Health office head/Deputy	4	1	5	5 absent
ORHB	Malaria expert	1	0	1	2 absent
BGRHB	Malaria experts	1	1	2	1 absent
AIRS staff	Technical staff	15	0	15	
	Support staff	4	0	4	
<b>Total</b>		<b>107</b>	<b>8</b>	<b>115</b>	

Main agenda items included:

- Opening Remarks by COP, ORHB and BGRHB representatives;
- Presentations on IRS implementation and current malaria situation by 8 zonal MFPs;
- Presentations on IRS implementation by 5 MFPs (New DB IRS) and 3 MFP (CB IRS) to share experiences and challenges;
- AIRS technical staff presentations on spray operations, EC, warehouses & Logistics, M&E, mHealth and supervision, Finance and Administration; and
- Discussion and recommendations.

The meeting noted that the 2017 IRS operation was a great success with regard to high coverage, great improvement in spray quality, and the complete and timely implementation of the operation in 44 districts.

The presentation and discussions noted the following gaps:

- Poor selection of actors due to non-adherence to selection criteria;
- Gaps in supervision of cascade training due absence of some TLs either due to commitment issues or competing MOH activities;
- Community mobilization gaps due to unavailability of some HEWs in some villages due to competing programs;
- Limited commitment, weak supportive supervision and coordination among TLs, and district supervisors;
- Limited involvement of district administrators;
- Gaps in planning data in new districts leading to excess insecticide balance and lack of achievement of planned targets;
- Data flow gaps, data recording inaccuracy in early part of the campaign and limited consistency in data entry leading to backlog especially in the new districts;
- House preparation gaps in some instances;
- Limited utilization of supervision checklists by IRS supervisors;
- Competing MOH programs affecting district and zonal IRS supervisors leading to limited availability for IRS supervision ;
- Internet connectivity interruptions and frequent electric power outages (especially in Agalo, Yaso, Melka Soda, Jardage Jarte , Abe Dongoro districts) affecting data entry; and
- Topographic challenges and heavy rains rendering roads impassable.

### **Recommendations and Way Forward:**

Stakeholders discussed the challenges and provided suggestions on ways of improving the next spray campaigns:

- Planning data shared by districts should be as accurate as possible and be validated by AIRS in future spray rounds.
- It is the responsibility of the districts to screen and recruit SOPs and SLs of good conduct to ensure that issues related to attempted theft on IRS commodities is minimized hence MFPs should not abdicate the role fully to administrators.
- To be able to improve SOP conduct it was recommended that feedback on actors' behavior/conduct be shared with the kebele leaders at end of IRS.
- Supervision is recognized pillar of IRS hence selection of TLs as IRS supervisors should focus on commitment and availability for supervision. Consideration for selection of staff at lower levels of the health structure such as health facilities was recommended.
- Use of HEWs for social mobilization has come with challenges due to competing tasks and non-availability hence recruiting community leaders or influential persons in the community to serve as mobilizers should be considered.
- Absence of some TOTs especially TLs during cascade training affected training on spray techniques. It was recommended that districts and zones should consider only staff that are available and are committed to take up the roles on IRS.
- Beneficiaries in CB districts should take up on the construction of soak pits as their responsibility hence MFPs to make needed follow up with local administration.
- Program ownership must be taken by all district administrators; robust advocacy/sensitization at all administrative levels in the district, and especially with focus on new districts, should be undertaken
- Daily SOP spray output should be set in view of variability in structure sizes, spatial distribution and topographical challenges between districts

- Poor road conditions and near-inaccessibility in some of the new districts was highlighted and the meeting called for an earlier start of IRS to avoid the peak rainy period.
- Selection of IRS target districts by the regional health bureaus should also consider population density and spatial distribution of structures so as to maximize available resources and logistics. It was observed that IRS may not be particularly useful among pastoral communities in target districts in West Guji.

The role played by AIRS technical team and Zonal IRS coordinators together with zonal MFPs was appreciated by the participants as this afforded close supervision and strengthened the capacity of district MFPs to deal with challenges encountered during the campaign. The participants equally lauded the practice to hold mid spray evaluation meetings as it provided an opportunity for exchange of experiences and solving of challenges. The ORHB and BGRHB, zonal, and district health offices greatly appreciated and acknowledged USAID/PMI support for the program and districts were reminded that they need to take full responsibility for the implementation of the activity with commitment and integrity.

# ANNEX D: DATA COLLECTION AND QUALITY ASSURANCE TOOLS

**TABLE D-1. ETHIOPIA IRS 2017 DATA COLLECTION TOOLS**

Data Collection Tool	Usage
Training Participants Registration Form	Used by lead trainer at training workshops to capture category and number of people trained, disaggregating by participants' sex.
Daily Spray Operator Form	Used by SLs during spray operations to capture structures found, structures sprayed and not sprayed, population protected and not protected, and mosquito net and insecticide information. This tool also captures geography, spray actors' names and codes, household names, IRS numbers, structures type, Gender of respondent and other primary data indicators.
Daily Squad Leader Summary Form	Used by SLs to summarize the daily data from each Daily Spray Operator Form for which they are responsible.
Daily Team Leader Summary Form	Used by TLs to summarize the daily data from each SL 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 whom they supervise. This tool is mainly used to manage team performance on a daily basis.

**TABLE D-2. DATA QUALITY ASSURANCE TOOLS**

Data Quality Assurance Tool	Purpose and Usage
Error Eliminator (EE) Form	<p>Purpose:</p> <ul style="list-style-type: none"> <li>To check the completeness and correctness of data collected in the field.</li> <li>To highlight common data collection errors so they can be quickly identified with corrections being made and retraining provided by the supervisor.</li> </ul> <p>Used in the field post-data collection by:</p> <ul style="list-style-type: none"> <li>TLs on daily basis to check 50% of the forms filled by the SOPs under their supervision.</li> <li>IEC supervisor each day to check 37.5% of the forms filled by SOPs under his/her supervision.</li> <li>District MFP each day checks 12.5% of the forms filled by SOPs under his/her supervision.</li> </ul>
Data Collection Verification (DCV) Form	<p>Purpose:</p> <ul style="list-style-type: none"> <li>To check the accuracy of data collected in the field, i.e., ensure that the data written on the Daily Spray Operator Forms match the information reported by households and/or the data recorded on the IRS Cards disseminated to households.</li> </ul> <p>Used during field audits by:</p> <ul style="list-style-type: none"> <li>AIRS M&amp;E and Database Managers</li> <li>AIRS Operations Manager</li> </ul>



<b>Data Quality Assurance Tool</b>	<b>Purpose and Usage</b>
	<ul style="list-style-type: none"> <li>• AIRS Spray Operations Coordinator</li> <li>• AIRS Zonal Supervisors</li> <li>• Zonal District MFPs</li> <li>• District Heads and Deputies</li> <li>• District Environmental Compliance Experts</li> </ul>
Data Entry Site Supervision Checklist	<p>Purpose:</p> <ul style="list-style-type: none"> <li>• To check the application of data entry and documentation protocols and provide on-the-spot support to data entry clerks (DECs)</li> </ul> <p>Used during visits to data entry centers by:</p> <ul style="list-style-type: none"> <li>• M&amp;E Manager</li> <li>• Database Manager</li> <li>• IT Specialist</li> </ul>

**TABLE D-3. DATA QUALITY ASSURANCE AND CONTROL**

<b>Quality Assurance/ Quality Control Issue</b>	<b>Method/Tools for Quality Assurance</b>
Spray data integrity	<ul style="list-style-type: none"> <li>• Used standardized data collection forms</li> <li>• Comprehensive training for spray data capture and protocols</li> <li>• Multiple levels of supervision</li> <li>• SOPs are supervised directly by their SL and TL <ul style="list-style-type: none"> <li>▪ Supervisors monitor TLs and verify Daily Spray Operator Forms.</li> <li>▪ TLs, and IEC and EC experts monitor and verify data capture by SLs.</li> <li>▪ District MFP verifies and run random spot checks on data collection.</li> </ul> </li> <li>• Use of EE and DCV forms to ensure complete and accurate data collection</li> </ul>
Spray data entry and management	<ul style="list-style-type: none"> <li>• Data entry training for all DECs and spray supervisors</li> <li>• Prompt field data entry and transfer; data collection forms arrive at data entry sites daily and data entry is done on a daily basis</li> <li>• Data verification via double-data entry system <ul style="list-style-type: none"> <li>▪ Initial data entry of totals per data collection form</li> <li>▪ Follow-up entry of detailed data, i.e., per individual household</li> </ul> </li> <li>• Use of Microsoft Access-based IRS Cleaning/Reporting tool to clean data on a daily basis</li> <li>• Database designed with locks and validation checks</li> </ul>
Data security	<ul style="list-style-type: none"> <li>• Paper data collection forms stored systematically in binders and filed at district level for permanent reference</li> <li>• Database designed with passwords to restrict unauthorized entry</li> <li>• Databases backed up daily on the data entry server laptop, on Sugar Sync, and on external pen drives every day</li> </ul>

**TABLE D-4. HUMAN RESOURCES HIRED BY DISTRICT AND TYPE FOR THE 2017 SPRAY ROUND**

District	Team leaders			Squad leaders			Spray operators			Porters			Washers			Security guards			Water fetchers			Store assistants			Store Supervisor			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
Abay Chomen	2	0	2	10	0	10	38	0	38	6	4	10		2	2	2	0	2	0	0	0	1	0	1	1		1	1	0	1	1	0	1
Abaya	1	1	2	6	4	10	41	0	41	10		10		2	2	3	0	3	2	0	2	1	0	1	1		1	1	0	1	3	0	3
Abedobgoro	3	0	3	12	0	12	49	2	51	0	13	13		3	3	3	0	3	2	0	2		1	1	1		1	1	0	1	5	0	5
Agelo Meti	1	0	1	5	0	5	21	0	21	5	0	5	0	1	1	1	0	1	1	0	1	0	0	0	1		1	1	0	1	3	0	3
Amuru	2	0	2	8	0	8	35	0	35	4	4	8		2	2	2	0	2	1	2	3	1	0	1	1		1	1	0	1	3	0	3
Babo Gambel	2	0	2	9	0	9	36	0	36	5	4	9	1	2	3	3	0	3	2	0	2	1	0	1	1		1	1	0	1	3	0	3
Bako	CB IRS			6	20	26	66	0	66	12	4	16			0	15	0	15		0	0	1	0	1	1		1	1	0	1	1	0	1
Bambasi	3	0	3	9	2	11	45	0	45	2	10	12		3	3	3	0	3	3	0	3	0	0	0	1		1	1	0	1	5	0	5
Begi	2	0	2	9	0	9	36	0	36	6	3	9	0	2	2	2	0	2	2	0	2	1	0	1	1		1	1	0	1	4	0	4
Boniya Boshe	2	0	2	6	0	6	25	0	25	3	3	6		2	2	2	0	2	2	0	2	1	0	1	1		1	1	0	1	3	0	3
Chewaka	CB IRS			15	38	53	125	0	125	16	14	30			0	29	0	29		0	0	1	0	1	1		1	2	0	2	1	0	1
Dale Sedi	2	0	2	0	8	8	32	0	32	9	0	9		2	2	2	0	2	2	0	2	1	0	1	1		1	1	0	1	3	0	3
Dale Wabera	3	0	3	6	5	11	42	0	42		11	11		3	3	3	0	3	3	0	3	1	0	1	1		1	1	0	1	4	0	4
Dano	3	0	3	10	1	11	46	0	46		11	11		3	3	3	0	3	3	0	3	0	1	1	1		1	1	0	1	4	0	4
Diga	2	0	2	7	1	8	34	0	34	5	3	8	0	2	2	2	0	2	1	0	1	1	0	1	1		1	0	1	1	3	0	3
Gelana	2	0	2	6	2	8	31	3	34		8	8		2	2	2	0	2	2	0	2	1	0	1	1		1	1		1	3	0	3
Gida Ayana	3	0	3	6	6	12	39	7	46		12	12		3	3	2	0	2	2	0	2	1	0	1	1		1	1		1	4	0	4
Gobu Sayo	1	1	2	7	0	7	30	0	30	1	6	7		2	2	2	0	2	2	0	2	1	0	1	1		1	1		1	3	0	3
Goro	2	0	2	9	0	9	35	0	35	9		9		2	2	2	0	2	2	0	2	1	0	1	1		1	0	1	1	3	0	3

District	Team leaders			Squad leaders			Spray operators			Porters			Washers			Security guards			Water fetchers			Store assistants			Store Supervisor			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			
Guliso	2	0	2	7	0	7	29	0	29	3	4	7		2	2	2	0	2	2	0	2	1	0	1	1		1	1	0	1	3	0	3
Guto Gida	2	0	2	7	0	7	28	0	28	3	4	7		2	2	2	0	2	2	0	2	1	0	1	0	1	1	0	1	3	0	3	
Hawa Gelan	CB IRS			13	29	42	120	0	120	25	3	28			0	23	0	23		0	0	1	0	1	1		1	2		2	1	0	1
Ilu	3	0	3	11	0	11	45	0	45	2	9	11		3	3	3	0	3	3	0	3	1	0	1	1		1	1		1	4	0	4
Ilu Gelan	2	1	3	11	0	11	42	0	42	2	9	11	1	2	3	3	0	3	3	0	3	1	0	1	1		1	1		1	4	0	4
Jardega Jarte	1	0	1	3	0	3	15	0	15	4		4		1	1	1	0	1	1	0	1	1	0	1	1		1	1		1	2	0	2
Kamash	1	0	1	3	0	3	15	0	15	2	1	3		1	1	1	0	1	1	0	1	0	0	0	1		1	1		1	2	0	2
Kiltu Kara	2	0	2	6	0	6	24	0	24	5	1	6	0	2	2	2	0	2	2	0	2	1	0	1	1		1	1		1	2	0	2
Kondala	2	0	2	7	4	11	42	1	43		11	11	0	3	3	3	0	3	3	0	3	1	0	1	1		1	1		1	4	0	4
Lalo Kile	2	0	2	7	0	7	27	0	27	1	6	7		2	2	2	0	2	2	0	2	1	0	1	1		1	1		1	3	0	3
Manasibu	CB IRS			12	37	49	131	0	131	22	9	31			0	26	0	26		0	0	1	0	1		1	1	2	0	2	1	0	1
Limu	2	0	2	5	1	6	23	1	24		7	7		2	2	2	0	2	2	0	2	1	0	1	1		1	1		1	3	0	3
Melka Soda	2	0	2	6	0	6	26	0	26	1	5	6		2	2	2	0	2	2	0	2	1	0	1	1		1	1		1	3	0	3
Menge	2	0	2	9	1	10	42	0	42	10		10		2	2	2	0	2	2	0	2	0	0	0	0	1	1	1	0	1	5	0	5
Nejo	2	0	2	9	1	10	38	0	38	0	10	10	0	2	2	2	0	2	0	2	2		1	1	1		1	1		1	3	0	3
Nonno	2	0	2	6	2	8	33	0	33		8	8		2	2	2	0	2	2	0	2	1	0	1		1	1	1	0	1	3	0	3
Oda	3	0	3	12	0	12	48	0	48	12	0	12	1	2	3	2	0	2	2	0	2	1	0	1	1		1	0	1	1	5	0	5
Sasiga	CB IRS			2	12	14	55	0	57	0	14	14			0	10	0	10		0	0	1	0	1	1		1	0	1	1	0	1	
Seyo	2	0	2	8	0	8	31	0	31	2	6	8	0	2	2	2	0	2	2	0	2	1	0	1	1		1	1		1	3	0	3
Sedal	1	0	1	3	1	4	16	0	16	4		4	0	1	1	1	0	1	1	0	1	0	0	0	1		1	1		1	2	0	2
Sherkole	2	0	2	6	0	6	26	0	26	6	0	6		2	2	2	0	2	2	0	2	0	0	0	1		1	1		1	2	0	2

District	Team leaders			Squad leaders			Spray operators			Porters			Washers			Security guards			Water fetchers			Store assistants			Store Supervisor			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				
Walliso	2	0	2	8	1	9	35	0	35	6	3	9		2	2	2	0	2	2	0	2	0	0	0	1		1	1		1	3	0	3	
Wama Hagalo	2	0	2	9	0	9	31	5	36		9	9		2	2	2	0	2	2	0	2	1	0	1		1	1	1	1	0	1	3	0	3
Wayu Tuka	1	1	2	5	4	9	31	4	35		9	9	0	2	2	2	0	2	2	0	2	1	0	1	1			0	1	1	3	0	3	
Yaso	1	0	1	5	0	5	21	0	21	5		5		1	1	1	0	1	1	0	1	0	0	0	1		1	1		1	2	0	2	
Total	77	4	81	326	180	506	1,780	23	1,805	208	238	446	3	80	83	185	-	185	73	4	77	33	3	36	39	5	43	42	5	47	129	-	129	

**TABLE D-5. IRS QUALITY ASSURANCE AND CONTROL**

IRS quality control Tool	Usage	Purpose
DOS, Direct Observed Spraying	Objective: Ensure spray quality, specifically insecticide mixing and spray technique, but also including personal, household and environmental safety	<p>Purpose:</p> <ul style="list-style-type: none"> <li>To make sure SOPs follow BMP and are immediately corrected if they are not</li> <li>Ensure any gaps identified during the previous day are corrected, and any consistent or ongoing issues are escalated</li> <li>Document gaps identified daily and bring it for the morning briefing session</li> <li>SLs (4 SOPs) and TLs (16 SOPs) are expected to directly observe Spray Operators daily and twice weekly respectively</li> </ul> <p>Used during IRS by:</p> <ul style="list-style-type: none"> <li>Squad Leaders,</li> <li>Team Leaders,</li> <li>Malaria Focal Person (uses the summary data for decision-making and rapid error correction)</li> </ul>

**TABLE D-6. IRS DAILY HEALTH CHECK REPORT FORM**

### DAILY HEALTH CHECK REPORT BY SQUAD LEADERS

Date: \_\_\_\_\_ District: \_\_\_\_\_  
 Operation Site: \_\_\_\_\_ Squad No: \_\_\_\_\_  
 Name Squad Leader: \_\_\_\_\_

Item	Response		If Yes/ No Why?—As applicable, Name of SOP/ Action Taken
	YES	NO	
1. Did all SOPs in your squad have breakfast in the morning before setting off to spray?			
2. Do any of the SOPs in your team complain of fatigue/ dizziness?			
3. Have any of the SOPs on your team complained of any medical problem before, during and after the			

spraying?			
4. Did any of the SOPs in your team spray fewer structures yesterday than expected? If yes, why?			
5. Do all SOPs in your team wear PPE at all times during spraying activity?			

**NOTE:**

1. If any spray operator appears to be sick or appears to be unable to perform spraying, you are required to report it to your Team Leader and ask the spray operator to stop spraying immediately until further notice.
2. This form must be filled daily and submitted to the Site Team Leader.

Squad Leader signature: \_\_\_\_\_

Name and Signature Team Leader: \_\_\_\_\_

Action taken by Team Leader: \_\_\_\_\_

# ANNEX E: MONITORING & EVALUATION PLAN

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
Component 1: Establish cost-effective supply chain mechanisms and execute logistical plans								
I.1 Procurement								
I.1.1 Number and percentage of insecticide procurements that had a pre-shipment QA/QC test at least 60 days prior to spray campaign	Data source: Project records – insecticide procurements  Reporting frequency: Each spray campaign	By Spray Campaign	I; 100%	I order <sup>4</sup> ; 100%	I; 100%	I <sup>5</sup> order; 100%	I; 100%	I <sup>6</sup> order; 100%
I.1.2 Number and percentage of international insecticide procurements delivered in country, at port of entry, at least 30 days prior to the start of spray operations	Data source: Project records – international procurements  Reporting frequency: Each spray campaign	By Spray Campaign	I; 100%	I order; 100%	I; 100%	I order; 100%	I; 100%	I order; 100%

<sup>4</sup> Actellic 300CS (87,372 bottles)

<sup>5</sup> Actellic 300CS(280,000 bottles)

<sup>6</sup> Actellic 300CS (305,916 bottles)

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
I.1.3 Number and percentage of international equipment procurements, including PPE, delivered in country, at port of entry, at least 30 days prior to start of spray operations	Data source: Project records  Reporting frequency: Each spray campaign	By Spray Campaign	I; 100%	I order <sup>7</sup> ; 100%	I; 100%	I <sup>8</sup> ; 100%	I; 100%	I <sup>9</sup> ; 100%
I.1.4 Number and percentage of local procurements for PPE delivered 14 days before the start of spray operations	Data source: Project records  Reporting frequency: Each spray campaign	By Spray Campaign	I; 100%	I order <sup>10</sup> ; 100%	I; 100%	I <sup>11</sup> ; 100%	I; 100%	I <sup>12</sup> ; 100%
I.1.5 Successfully completed spray operations without an insecticide stock-out	Data source: Project records  Reporting frequency: Each spray campaign	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	Completed

<sup>7</sup> Ceramic Nozzle Tip, Washer for CFV, Control Flow Valve (CFV), Gumboots, Rubber Gloves, Mouth/nose masks

<sup>8</sup> Gloves, Respirator (Dust Mask), Lightweight Helmet, Face shield / Visor, Hudson X-Pert Stainless Steel - 3 Gallon Sprayer, Seal ( CFV Gaskets), Constant Flow Valve (CFV) and Nozzle Tip (Ceramic C 8002E)

<sup>9</sup> Ceramic Nozzle Tip, Gaskets for CFV, Control Flow Valve (CFV), Rubber Gloves, Mouth/nose masks, Hudson X-Pert Stainless Steel - 3 Gallon Sprayer, Lightweight Helmet, Face shield / Visor

<sup>10</sup> Water tanker 2000 Lit capacity, Apron / waterproof, Overalls, Toolkit Bag, Padlock, Canvas Tent 8 Main Size, Warning Sign, Chalk, Female size boots, Soap toilet, Soap laundry, Drycell Battery, Flashlight / Torch, Candle, Washer for CFV, IRS cards

<sup>11</sup> Apron, Hand held Flash lights (Torches), Battery, Box file, Waterproof Duffel bag, Overalls, Warning sign, Tool kit, Funnel, Graduated Cylinder, Laundry Soap, Bathing soap/toilet soap, Water Tank 2000ltr, Washing basin 40ltr, Mattress, Chalk, Neck protection, Candle, Training wall made of canvas

<sup>12</sup> Coverall, Canvas tent-size 2.70x2.50x1.90x0.90m, Neck protection, Torch, SOP Bag, Duffle Bag, Toolkit, Generator set, Warning sign, Graduated Cylinder, Calculator, Reflective Jacket, Towel, Laptop Computer, UPS(5000VA), Mattress, Fire Extinguisher, Water Tanker, First Aid Kit



Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
I.2 In-Country Exemption and Custom Clearance Process								
I.2.1 Complete exemption and clearance process within the minimum 2 weeks	Data source: Project records  Reporting frequency: Each spray campaign	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	Completed
I.3 In-Country Logistics, Warehousing, and Training								
I.3.1 Number and percentage of logistics and warehouse managers trained in IRS supply chain management	Data source: Training records  Reporting frequency: Each spray campaign	By Spray Campaign  By Gender	36; 100%	35; 97.2%  Male=30, Female=5	36; 100%	36; 100%  Male=31 Female=5	81; 100% <sup>13</sup>	86 <sup>14</sup> ; 106% Store Keepers Male=37 Female=6 Store supervisors Male=38 Female=5
I.3.2 Number and percentage of base stores where physical inventories are verified by up-to-date stock records	Data source: Project records  Reporting frequency: Each spray campaign	By Spray Campaign	39 (36 district stores and 3 central warehouses); 100%	38 <sup>15</sup> ; 36 district stores, 2 central warehouses	38; 100%	38; 36 district stores, 2 central warehouses	45; 100%	46; 44 district stores, 2 central warehouses
I.3.3 Submit up-to-date inventory records 30 days after the end of each spray campaign	Data source: Project records  Reporting frequency: Each spray campaign	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	Completed

<sup>13</sup> 36 district store keepers and 31 additional store supervisors for DB districts

<sup>14</sup> 43 store keepers and 43 store supervisors received the training

<sup>15</sup> In 2015 AIRS used 2 central warehouses

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
Component 2: Implement safe and high-quality IRS programs and provide operational management support								
2.1 Planning and Design of IRS Programs								
2.1.1 Annual PMI AIRS Ethiopia work plan developed and submitted on time	Data source: Project records  Reporting frequency: Annually	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	Completed
2.1.2 Percentage reduction in project operational expenses per structure from the previous year, excluding insecticide costs	Data source: Project financial records  Reporting frequency: Annually	By Spray Campaign	5%	7.5% <sup>16</sup>	5%	5%	5%	6%
2.2 Support of Safety and Health Best Practices and Compliance with USAID and Host Country Environmental Regulations								
2.2.1 SEA/letter reports submitted on time based on schedule agreed upon with the-PMI COR team	Data source: Project records – submitted SEAs/ letter reports  Reporting frequency: Each spray campaign	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	Completed
2.2.2 Number of spray personnel	Data source: Project records – Training	By Spray Campaign	2,584	3,178 <sup>17</sup> ;	3,060 <sup>18</sup>	3,057 <sup>19</sup>	3,243 <sup>20</sup>	3,558 <sup>21</sup>

<sup>16</sup> Plan=\$4.94, Actual=\$4.57; save \$0.37

<sup>17</sup> ToT Participants 255, SL=484, SOP=1511, Porter=495, Washer=69, Driver=102, Guard=191, Store keeper=35 and Store keeper assistant=36

<sup>18</sup> ToT Participants 234, SL=498, SOP=1513, Porter=380, Washer=72, Driver=101, Guard=190, Store keeper=36 and Store keeper assistant=36

<sup>19</sup> ToT Participants 223, SL=494, SOP=1523, Porter=379, Washer=71, Driver=101, Guard=194, Store keeper=36 and Store keeper assistant=36

<sup>20</sup> ToT Participants 276, SL=526, SOP=1701, Porter=428, Washer=83, Driver=130, Guard=171, Store keeper=44, Store controller =44 and Store keeper assistant=44

<sup>21</sup> ToT Participants 281, SL=506, SOP=1805, Porter=446, Washer=83, Driver=129, Guard=185, Store keeper=43, Store supervisor =43 and Store keeper assistant=37

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
trained in EC and personal safety standards in IRS implementation	reports  Reporting frequency: Each spray season	By Gender		Male=2,588, Female=590		Male= 2,456 Female= 601		Male=2997 Female=561
2.2.3 Number of health workers receiving insecticide poisoning case management training	Data source: Project records – Training reports  Reporting frequency: Each spray season	By Spray Campaign  By Gender	108	100;  Male=77, Female=23	108	96  Male = 77 Female = 19	131	121  Male = 97 Female = 24
2.2.4 Number of adverse reactions to pesticide exposure documented	Data source: Incident report forms  Reporting frequency: Each spray campaign	By Spray Campaign  By Residential/occupational exposure	0	0	0	1 <sup>22</sup> (occupational exposure)	0	0
2.2.5 Number and percentage of soak pits and storehouses inspected and approved prior to spraying	Data source: Project records – Reports submitted by district environmental officers  Reporting frequency: Each spray season	By Spray Campaign  By Soak Pit  By Storehouse	DB IRS: 65 soak pits; 100% 2 central warehouses and 30 store rooms; 100%	DB IRS: 61 Soakpits; 93.8% 2 Central werhouses; and 30 Store rooms; 100%	DB IRS: 78 soak pits; 100% and 30 store rooms; 100%  CB IRS: 120 soak pits;	DB IRS: 78 <sup>23</sup> Soakpits; 100% 30 Store rooms; 100%  CB IRS: 120 Soakpits; 100% and 6 Store rooms; 100%	DB IRS fixed soak pits 82; 100% and 38 Store rooms; 100%  CB IRS fixed soak pits 98 ;100% and 5 store rooms, 100%	DB IRS: 82 Soakpits; 100 % 39 Store rooms; 103%  CB IRS: 98 Soakpits; 100% and 5 store rooms; 100%

<sup>22</sup> A Spray Operator was identified as being allergic to the insecticide and changed to porter

<sup>23</sup> 55 soak pits were lined with plastic sheet on the sides to prevent any potential side leakage of effluent into the environment [73 of the soak pits are seen by using a mobile phone checklist and the other 5 are seen by paper based checklist]

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
			CB IRS districts: 120 soak pits; 100%; 6 stores 100%	CB IRS: 120 Soakpits; 100% and 6 Store rooms; 100%	100%; 6 stores 100% 2 central warehouses	2 central warehouses	2; 100% central warehouse 10; 100% Mobile soak pits	2 central warehouses; 100% 14 Mobile soakpits; 140%
<b>2.3 Conduct Communications Activities and Community Mobilization</b>								
2.3.1 Number of radio spots and talk shows aired	Data source: Project records  Reporting frequency: Per spray campaign	By Spray Campaign	N/A <sup>24</sup>	N/A	N/A	N/A	N/A	N/A
2.3.2 Number of IRS print materials disseminated	Data source: Project records  Reporting frequency: Semi-annually	By Spray Campaign  By Type of printed material and messages	N/A	N/A <sup>25</sup>	N/A	N/A	6,410 <sup>26</sup>	7,881
2.3.3. Number of people reached with IRS messages via door-to-door mobilization	Data source: Mobilization Data Collection Forms  Reporting frequency: Daily per mobilization conducted	By Spray Campaign  By Gender	N/A	N/A	N/A	N/A	N/A	N/A
<b>2.4 Spray Targeted Structures According to Technical Specifications</b>								

<sup>24</sup> Radio spots are not used in Ethiopia.

<sup>25</sup> Ethiopia carries out mass mobilization and does not go house-to-house distributing printed materials. Mass mobilization is conducted by the government.

<sup>26</sup> Posters focusing on IRS will be prepared and distributed for the 17 new districts.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
2.4.1 Number of 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	670,303 <sup>27</sup>	708,258	708,258 <sup>28</sup>	717,396 <sup>29</sup>	787,658	748,917 <sup>30</sup>
2.4.2 Number of structures sprayed with IRS	Data source: Daily Spray Operator Forms  Reporting frequency: Daily per spray campaign	By Spray Campaign	569,758 <sup>31</sup>	704,945	602,019 <sup>32</sup>	715,541	669,509 <sup>33</sup>	738,810
2.4.3 Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	Data source: Daily Spray Operator Forms  Reporting frequency: Daily per spray campaign	By Spray Campaign	85%	99.5%	85%	99.7%	85%	98.7%

<sup>27</sup> Number of structures targeted based on the number of structures found in 2014.

<sup>28</sup> Number of structures targeted based on the number of structures found in 2015.

<sup>29</sup> Number of structures found in 2016 campaign

<sup>30</sup> Number of structures found in 2017 campaign

<sup>31</sup> 85% of target (85% \* 670,303).

<sup>32</sup> 85% of target (85% \* 708,258).

<sup>33</sup> 85% of target (85% \* 787,658).

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
2.4.4 Number of people residing in structures sprayed (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	1,647,099 <sup>34</sup>	1,655,997 <sup>35</sup> Pregnant women= 23,084 Children <5= 230,366 Male: 831,310 Female: 824,687	1,655,997	1,688,745 <sup>36</sup> Pregnant Women= 23,011 Children <5 = 230,690 Male: 847,750 Female: 840,995	1,889,941	1,877,154 <sup>37</sup> Pregnant Women= 29,271 Children <5 = 269,299 Male: 957,349 Female: 919,805
<b>Component 3: Ongoing Monitoring and Evaluation and Quality Control Measures</b>								
3.1 Submit AIRS Ethiopia M&E Plan to PMI for approval	Data source: Project records  Reporting frequency: Semi-annual	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	Completed
3.2 Conduct a post-spray data quality audit within 60 days of completion of spray operations	Data source: Spray operations reports  Reporting frequency: Per spray campaign	By Spray Campaign	N/A	N/A	Completed	Completed <sup>38</sup>	Completed	In Progress
<b>Component 4: Contribute to Global and Country-Level IRS Policy Setting and Develop and Disseminate Experiences and Best Practices</b>								

<sup>34</sup> Based on number of people protected in 2014.

<sup>35</sup> This value includes males and females; the gender segregation is done as per the National Mini DHS 2014 where males comprise 50.2% of the population and females, 49.8%.

<sup>36</sup> The value Male and Female segregation is done based on the document “Federal Democratic Republic of Ethiopia Central Statistical Agency Population Projection of Ethiopia for All Regions At Wereda Level from 2014 – 2017” where males comprise 50.2% of the population and females, 49.8%

<sup>37</sup> Sex segregation were done based on 2017 projection on the document “Federal Democratic Republic of Ethiopia Central Statistical Agency Population Projection of Ethiopia for All Regions At Wereda Level from 2014 – 2017” where males consists 50.1% of the population and females, 49.9%

<sup>38</sup> Completed in one district which we identified a serious data quality issue and the main PSDQA is postponed to FY 2017 because of security concerns.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
4.1 Number of guidelines/checklists/tools related to IRS operations developed or refined with project support	Data source: Project records – Activity reports  Reporting frequency: Semi-annually	By Spray Campaign  By Guideline/checklist/tool	TBD	6 <sup>39</sup>	7 <sup>40</sup>	10 <sup>41</sup>	11 <sup>42</sup>	11 <sup>43</sup>
4.2 Number of articles/best practices documents published	Data source: Project records – Activity reports  Reporting frequency: Semi-annually	By Spray Campaign  By IRS Technical Area	TBD	-	0	0	TBD	0
4.3 Number of best practice presentations given at national/regional/international workshops and conferences	Data source: Project records – Activity reports  Reporting frequency: Semi-annually	By Spray Campaign  By IRS Technical Area	TBD	-	0	0	TBD	0

<sup>39</sup> 1: mHealth system/ smart phone application for Environmental and operational activities with 7 supervisory checklists, 2: Error Eliminator, 3: Data Collection Verification Form, 4: Data Entry Center Supervision Checklist, 5: AIRS Access Database and Cleaning/Reporting Tool, and 6: Training attendance sheet.

<sup>40</sup> 1: mHealth system/ smart phone application for Environmental, M&E and operational activities with 8 supervisory checklists, 2: Error Eliminator, 3: IRS actors recruitment guideline, 4: Data Entry Center Supervision Checklist, 5: AIRS Access Database and Cleaning/Reporting Tool, 6: Insecticide tracking Sheet and 7: Training attendance sheet.

<sup>41</sup> 1: mHealth system/ smart phone application for Environmental, M&E and operational activities with 8 supervisory checklists, 2: Error Eliminator, 3: IRS actor's recruitment guideline, 4: Data Entry Center Supervision Checklist, 5: AIRS Access Database and Cleaning/Reporting Tool, 6: Insecticide tracking Sheet. 7: Training attendance sheet 8: Daily SOP health check report checklist. 9: IRS actors' medical screening and reporting checklist. And 10: Direct observed spraying checklist

<sup>42</sup> 1: mHealth system/ smart phone application for Environmental, M&E and operational activities with 8 supervisory checklists, 2: Error Eliminator, 3: IRS actor's recruitment guideline, 4: Data Entry Center Supervision Checklist, 5: AIRS Access Database and Cleaning/Reporting Tool, 6: Insecticide tracking Sheet. 7: Training attendance sheet 8: Daily SOP health check report checklist. 9: IRS actors' medical screening and reporting checklist. 10: Direct observed spraying checklist and 11: IEC/BCC poster

<sup>43</sup> 1: mHealth system/ smart phone application for Environmental, M&E and operational activities with 8 supervisory checklists, 2: Error Eliminator, 3: IRS actor's recruitment guideline, 4: Data Entry Center Supervision Checklist, 5: AIRS Access Database and Cleaning/Reporting Tool, 6: Insecticide tracking Sheet. 7: Training attendance sheet 8: Daily SOP health check report checklist. 9: IRS actors' medical screening and reporting checklist. 10: Direct observed spraying checklist 12: Spray performance tracking sheet and 11: IEC/BCC poster

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
4.4 Number of enterprises engaged through public-private partnerships	Data source: Project records – Activity reports  Reporting frequency: Semi-annually	By Spray Campaign	2 <sup>44</sup>	2	2	3 <sup>45</sup>	3	3 <sup>46</sup>
<b>Component 5: Contribute to the collection and analysis of Routine entomological and epidemiological data</b>								
<b>5.1 Support entomological monitoring activities and insecticide resistance strategies</b>								
5.1.1 Number of entomological sentinel sites supported by the PMI AIRS Project established to monitor vector bionomics and behavior (vector species, distribution, seasonality, feeding time, and location )	Data source: Entomological reports  Reporting frequency: Annually	By Spray Campaign	3 <sup>47</sup>	3	8	8 <sup>48</sup>	8	8 <sup>49</sup>
5.1.2 Number and percentage of entomological monitoring sentinel sites measuring all the five primary PMI entomological	Data source: Entomological reports  Reporting frequency: Annually	By Spray Campaign	3; 100%	3; 100%	8; 100%	8 Sites; 100%	8; 100%	8 Sites; 100%

<sup>44</sup> Two private companies will be targeted for recycling AIRS waste: one for plastic OP bottles and the other for cardboard boxes.

<sup>45</sup> A total of three private companies: two for empty plastic Actellic bottles and one for cardboard boxes recycling

<sup>46</sup> A total of three private companies: two for empty plastic Actellic bottles and one for cardboard boxes recycling

<sup>47</sup> Three selected kebeles from three different districts (Ilu Gelan, Gobu Sayo and Seka Chekorsa) will host entomological sentinel sites.

<sup>48</sup> The Sites are: Seka Chekorsa, Alamata, Shele, Metema, Goro, Haromaya, Gobu Sayo and Ilu Gelan

<sup>49</sup> The sites are: Nonno, Bambasi, Abaya, Babile, Arbaminch Zuria, Goro, Alamata, and Dangur



Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
monitoring indicators								
5.1.3 Number and percentage of entomological monitoring sites measuring at least one secondary PMI indicator	Data source: Entomological reports  Reporting frequency: Annually	By Spray Campaign	3;100%	3;100%	8; 100%	8 Sites; 100%	8	8
5.1.4 Number and percentage of insecticide resistance testing sites that tested at least one insecticide from each of the four classes of insecticides recommended for malaria vector control	Data source: Entomological reports  Reporting frequency: Annually	By Spray Campaign	8 <sup>50</sup> ;100%	8 <sup>51</sup> ; 100%	11 <sup>52</sup> ; 100%	9; 81.2%	17 <sup>53</sup>	15 <sup>54</sup>
5.1.5 Number of wall bioassays conducted within 2 weeks of spraying to evaluate	Data source: Entomological reports	By Spray Campaign	48 <sup>55</sup>	48	48 <sup>56</sup>	48	48 <sup>57</sup>	48

<sup>50</sup> The sites are Omo Nada, Chewaka, Zeway Dugda, Halaba, Bahirdar, Alamata, Amibara and Gambela.

<sup>51</sup> All sites stated on footnote 29 are covered

<sup>52</sup> The sites are 1:Omo-Nada, 2:Gambela, 3:Alamata, 4:Humera, 5:Arbaminch, 6:Metema, 7:Bahirdar, 8:Amibara, 9:Ziway Dugda, 10:Haromaya and 11:Kebre Dehar

<sup>53</sup> The sites are 1:Omo-Nada, 2:Abobo, 3:Seleklaka, 4:Humera, 5:Kuraz, 6:Metema, 7:Bahirdar, 8:Amibara, 9:Ziway Dugda, 10:Babile, 11:Kebre Dehar; 12: Chewaka,13:Abaya, 14: Alaba, 15: Dangur, 16:Bambasi and 17:Shile

<sup>54</sup> The sites are 1:Omo-Nada, 2:Abobo, 3:Seleklaka, 4:Humera, 5:Kuraz, 6:Metema, 7:Bahirdar, 8:Amibara, 9:Ziway Dugda, 10:Babile and 11:Kebre Dehar; 12: Chewaka,13: Abaya, 14: Alaba, and 15: Dangur

<sup>55</sup> 12 houses from 4 kelebes (2 DB kebeles and 2 CB kebeles) will be used for wall bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS.

<sup>56</sup> From 4 kelebes (2 DB Tiro Afeta and Shebe; 2 CB Bako and Chewaka); 12 houses each within 2 weeks of spraying.

<sup>57</sup> From 4 kelebes (2 DB Nonno and Goro; 2 CB Bako and Chewaka); 12 houses each within 2 weeks of spraying.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
the quality of IRS	Reporting frequency: Per spray campaign							
5.1.6 Number of wall bioassays conducted after the completion of spraying at monthly intervals to evaluate insecticide decay*	Data source: Entomological reports  Reporting frequency: Per spray campaign	By Spray Campaign	240 <sup>58</sup>	264 <sup>59</sup>	288	288 <sup>60</sup>	288	48 <sup>61</sup>  Ongoing
5.1.7 Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites*	Data source: Entomological reports  Reporting frequency: Per spray campaign	By Spray Campaign  By Type of Insecticide	88 <sup>62</sup>	49 <sup>63</sup>	77 <sup>64</sup>	63 <sup>65</sup>	90 <sup>66</sup>	12 <sup>67</sup>
<b>5.2 Support Epidemiological Malaria Data Collection and Analysis</b>								
5.2.1 Collect routine epidemiological data	Data source: Project Reports	By Spray Campaign	N/A <sup>68</sup>	N/A	N/A	N/A	N/A	N/A

<sup>58</sup> From 4 kelebes (2 DB Tiro Afeta and Shebe; 2 CB Bako and Chewaka). 48 bioassays per month for 5 months will be conducted

<sup>59</sup> 264 bioassays from 4 kelebes (2 OP Tiro Afeta and Chewaka [168 ]; 2 Bendiocarb Bako and Shebe[96]);

<sup>60</sup> It will completed

<sup>61</sup> It will continue up to December

<sup>62</sup> AIRS Ethiopia plans to test 11 insecticides in eight different sites (number of sites noted in indicator 5.1.4).

<sup>63</sup> 49 Tests: Permethrin=5, Propoxur=5, Malathion=4, Lambdacyhalothrin=4, Fenitrothion=5, Etofenprox=4, DDT=4, Bendiocarb=5, Deltamethrin=5, Alpha-cypermethrin=3, Pirimphos-methyl=5

<sup>64</sup> AIRS Ethiopia plans to test 7 insecticides in 11 different sites.

<sup>65</sup> 63 Tests: Permethrin=8, Propoxur=9, Malathion=9, DDT=9, Bendiocarb=9, Deltamethrin=9, Pirimphos-methyl=9; Fenitrothion= 1

<sup>66</sup> 6 insecticides in 15 sites Permethrin = 17; Propoxur=17, DDT=17, Bendiocarb=17, Deltamethrin=17, Pirimiphos-methyl=17

<sup>67</sup> 12 Tests(Omonada and Abaya Ditriacts for each of 6 insecticides): Permethrin=2, Propoxur=2, DDT=2, Bendiocarb=2, Deltamethrin=2, Pirimiphos-methyl=2; Fenitrothion= 2

<sup>68</sup> This activity is not being carried out in Ethiopia.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
	Reporting Frequency: Annually							
5.2.2 Number of targeted health facilities with routine epidemiological malaria data collection supported by the PMI AIRS Project	Data source: Epidemiological reports  Reporting frequency: Annually	By Spray Campaign	N/A	N/A	N/A	N/A	N/A	N/A
<b>Component 6 (Cross-cutting): Capacity Building, Knowledge Transfer, Gender Inclusion</b>								
<b>6.1 Increasing the Role of Women and Addressing Gender Barriers</b>								
6.1.1 Number of people trained to deliver IRS in target districts *	Data source: Project records – Training reports  Reporting frequency: Semi-annually	By Spray Campaign  By Gender  Percentage of Women Trained	2,885 <sup>69</sup>	2,845 Male=2,318  Female=527; 18.5%	2,733	2,749 Male= 2,236  Female= 513; 18.7%	3,146 <sup>70</sup>	3,199 Male= 2,709  Female= 490; 15.3%
6.1.2 Total number of people trained to support IRS in target districts <sup>71</sup>	Data source: Project records – Training reports	By Spray Campaign  By Gender	4,398	4,383 <sup>72</sup> Male=2,755	4,220	4,346 <sup>73</sup> Male= 2,746	4,874	4,929 <sup>74</sup> Male= 3,362

<sup>69</sup> This is the planned number of people to be trained as Spray Operators, Squad Leaders, Porters, supervisors (i.e. via TOT), and those trained in poison management.

<sup>70</sup> This is the planned number of people to be trained as Spray Operators, Squad Leaders, Porters, supervisors (i.e. via TOT), and those trained in poison management, store controller and Pump Technicians

<sup>71</sup> This indicator covers the entire cadre who support IRS operations.

<sup>72</sup> TOT=255; DEC=44; Pesticide poison management=100; HEW=1061; SL=484; SOP=1511; Porter=495; Washers=69; Drivers=102; Guards=191; Store keepers=35 and Store keeper Assistant=36. 69 additional participants were trained at national trainings that were not affiliated with direct IRS support in target districts. These individuals were not included in the above figure.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
	Reporting frequency: Semi-annually	Percentage of women trained		Female=1,628 ; 37.1%		Female=1,600; 36.8%		Female= 1,567; 31.8%
6.1.3 Number of women recruited (i.e. number of women on the selection list) for IRS employment	Data source: Project records – Recruitment reports reports  Reporting frequency: Semi-annually	By Country  By Percentage of women recruited	N/A	N/A	N/A	N/A	N/A	N/A
6.1.4 Number of people trained at IRS Training of Trainers	Data source: Project records – Training reports  Reporting frequency: Semi-annually	By Spray Campaign  By Gender  Percentage of women trained	267	255  Male=236  Female=19; 7.5%	234	223  Male=205  Female=18; 8.1%	276	281  Male=258  Female=23; 8.2%
6.1.5 Total number of people hired to support IRS in target	Data source: Project records – Contracts signed	By Spray Campaign	4,398;  1,759	4,379 <sup>75</sup>  Male=2,753	4,065  1,626 women;	4,342 <sup>76</sup>  Male=2,743	4,876  1,949 women; 40%	4,923 <sup>77</sup>  Male= 3,358

<sup>73</sup> TOT=223; DEC=44; Pesticide poison management=96; HEW=1,041; SL=494; SOP=1,523; Porter=379; Washers=71; Drivers=101; Guards=194; Storekeepers=36 and Storekeeper Assistant=36; Boot Camp Training=54, Training of Master Trainers=20; Pump Technicians=34.

<sup>74</sup> TOT=281; DEC=53; Pesticide poison management=121; HEW=1,142; SL=506; SOP=1,805; Porter=446; Washers=83; Drivers=129; Guards=185; Storekeepers=43 and Storekeeper Assistant=37; Store supervisor =43, Training of Master Trainers=15; Pump Technicians=40.

<sup>75</sup> TOT=255; DEC=40; Pesticide poison management=100; HEW=1061; SL=484; SOP=1511; Porter=495; Washers=69; Drivers=102; Guards=191; Store keepers=35 and Store keeper Assistant=36

<sup>76</sup> TOT=223; DEC=40; Pesticide poison management=96; HEW=1041; SL=494; SOP=1523; Porter=379; Washers=71; Drivers=101; Guards=194; Storekeepers=36 and Storekeeper Assistant=36, Boot Camp Training=54, Training of Master Trainers=20, Pump Technicians=34

<sup>77</sup> TOT=281; DEC=47; Pesticide poison management=121; HEW=1142; SL=506; SOP=1805; Porter=446; Washers=83; Drivers=129; Guards=185; Storekeepers=43 , Store supervisors=43 and Storekeeper Assistant=37, Training of Master Trainers=15, Pump Technicians=40

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
districts	Reporting frequency: Semi-annually	Gender Percentage of women hired	women; 40%	Female=1,626 ; 37.1%	40%	Female=1,599; 36.8%		Female= 1,565; 31.8%
6.1.6 Number and percentage of women hired in supervisory roles in target districts (this number includes site supervisors, SLs, TLs, M&E assistants and others who supervise seasonal staff)	Data source: Project records – Contracts signed  Reporting frequency: Semi-annually	By Spray Campaign  Percentage of women hired	279; 36%	262 <sup>78</sup> ; 33.9%	304; 40%	276 <sup>79</sup> ; 36.7%	290; 40%	211 <sup>80</sup> ; 32%
1.7 Number of staff (permanent and seasonal) who have completed gender awareness training	Data source: Project records – Training reports  Reporting frequency: Semi-annually	By Spray Campaign  Gender  Percentage of women hired	288	310 <sup>81</sup> ;  Male=282  Female=28; 9.0%	291	279  Male= 252  Female= 27; 9.7% <sup>82</sup>	345	399 <sup>83</sup>  Male=361  Female=38; 9.5%
6.2 Capacity Building								

<sup>78</sup> Supervisors(incl. TLs)=19, SLs=238 and Store keepers=5

<sup>79</sup> Supervisors(incl. TLs)=18, SLs=253 and Storekeepers=5

<sup>80</sup> Supervisors(incl. TLs)=20, SLs=180 and Storekeepers=6 and store supervisor=5

<sup>81</sup> 255 TOT attendees; 35 Store keepers and 20 AIRS permanent staffs.

<sup>82</sup> 20 AIRS (16 male and 4 female), 36 Store keepers (31 male 5 female) and 223 supervisors (205 males and 18 females)

<sup>83</sup> 32 AIRS (28 male and 4 female), 43 Store keepers (37 male 6 female) , 43 Store supervisors (38 male 5 female) and 281 supervisors (258 males and 23 females)

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
6.2.1 Number of government officials trained in IRS oversight	Data source: Project records – Training reports  Reporting frequency: Semi-annually	By Spray Campaign  By Gender  Percentage of Women Trained	302 <sup>84</sup>	290 <sup>85</sup> ;  Male=266  Female=24, 8.3%	234	259 <sup>86</sup>  Male= 236  Female= 23; 8.9%	309	324 <sup>87</sup>  Male= 295  Female= 29; 9.0%
6.2.2 Implement all activities outlined in their yearly Capacity Building Action Plan	Data source: Project records – Capacity assessment reports  Reporting frequency: Semi-annually	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	Completed
6.2.3 Ethiopia government implements at least one aspect of the IRS program independently.	Data source: Project records – MOUs  Reporting frequency: Semi-annually	By Spray Campaign	Completed	Completed <sup>88</sup>	Completed	Not Completed <sup>89</sup>	Completed	Not Completed <sup>90</sup>

<sup>84</sup> 267 from TOT; 35 from National training.

<sup>85</sup> 255 from TOT; 35 from store keepers training

<sup>86</sup> 223 from TOT; 36 from store keepers training

<sup>87</sup> 281 from FTOT; 43 from store keepers training

<sup>88</sup> In 2015, the government of Ethiopia was responsible for mass mobilization prior to the implementation of the IRS campaign.

<sup>89</sup> In 2016, the government of Ethiopia didn't take any independent responsibility in implementing the IRS program.

<sup>90</sup> In 2017, the government of Ethiopia didn't take any independent responsibility in implementing the IRS program.



# ANNEX F: ACTIONS TAKEN TO IMPROVE SPRAY QUALITY IN 2017

	Action Accomplished	Output/ Remark
<b>Proposed Action 1: Improve the Quality of TOT and SOP Training</b>		
Train all AIRS Ethiopia technical staff and cadre of master trainers on spray techniques to facilitate high quality supervision and IRS	15 master trainers trained to conduct TOT with focus spray techniques	Skills of trainers and supervisors enhanced
Conduct TOT in small and manageable groups of three venues	TOT conducted in classes of 30 trainees with 4-5 trained facilitators per class	Training improved due to personalized learning and practical supervision
Conduct training of SOPs in CB based IRS districts centrally	SOPS trained at health centers in clusters of 4-5 kebeles with supervision oversight	Quality of training and training supervision improved
Select training sites with adequate wall surfaces for practical training	Training site assessment conducted by AIRS staff and training surfaces procured as needed	Quality of practical training improved
Recruit of SOPs with previous IRS experience	Recruitment guidelines for all IRS actors developed jointly with ORHB and BRHB, AIRS, zonal and district MFPs and shared with districts	SOPs with previous experience were recruited. 45% of total 993 were new
Recruit one pump technician per district	40 pump technicians trained and engaged on IRS operations	Pump maintenance and weekly calibration adequately done
Cluster based supervision scheme, AIRS Coordinators to support training and supervision	One supervisor assigned to 3-5 districts	Improved IRS implementation supervision and coordination of cascade training supervision
<b>Proposed Action 2: Improve IRS Supervision and Spray Quality</b>		
Train MOH staff with emphasis on supervision roles and spray techniques	Training conducted (TOT) and supervisors engaged in direct observation of spraying by SOPs	Spraying techniques improved through continuous guidance



	Action Accomplished	Output/ Remark
<b>Proposed Action 1: Improve the Quality of TOT and SOP Training</b>		
Hold weekly meetings between AIRS staff and district MFP with the Zonal Heads	Regular meetings actively conducted with active role of zonal MFPs	Commitment and engagement of district staff improved
Recruitment of MOH staff to serve on IRS as per recruitment guidelines	Districts did not adhere to recruitment guidelines for MOH staff and some staff changes post training realized	
AIRS develop and share supervision plan with district and zonal MFPs (smart phone and paper based)	Supervision based on agreed supervision plan and supervised by AIRS supervisors	Improved supervision of IRS observed
End-of-day meeting of supervisors	Regular meetings conducted to address any deficiencies	Coordination of IRS improved
Supply functional flashlights to SOPs and supervisors and SOPs to spray with partially open windows and doors	Flashlights procured and supplied to districts; supervisors ensure availability to SOPs at morning mobilization	House preparation and spraying adequately conducted
	Doors and windows partially open to allow light	Improved performance of spray quality
<b>Proposed Action 3: Improve Community Mobilization and House Preparation</b>		
Train and engage mobilizers (HEWs) on IRS	Some 1,142 HEWs trained and engaged on IRS	Spray dates and IRS messages effectively communicated in most districts
Importance of house preparation addressed at TOT and cascade trainings	Checklists filled by supervisors and reviewed daily	Household readiness improved